

EXECUTIVE SUMMARY

FOR

GUGULDOH MANGANESE ORE BLOCK

Village – Guguldoh - Manegaon, Tehsil - Ramtek,

District – Nagpur, State - Maharashtra

Mining Lease Area: 105 Ha (Forest Land & Govt. Land),

Peak Production Capacity: 0.306 MTPA ROM (Manganese Ore)

Project Category: 'B', Sector 1(a)(i)

PROJECT PROPONENT

M/S. Shanti G.D. Ispat & Power Pvt. Ltd.

504, Rajiv Gandhi Complex, Bal Ashram Compound,

Kutchery Chowk, Raipur, Chhattisgarh - 492001

PREPARED BY

POLLUTION & ECOLOGY CONTROL SERVICES,

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NABET Accredited EIA Consulting Organization

Certificate No. NABET/EIA/2023/SA 0165 Valid till 09.06.2023

EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Directorate of Geology and Mining (DGM), Government of Maharashtra, pursuant to the Mines and Minerals (Development and Regulation) Act, 1957 and the Mineral (Auction) Rules, 2015 had issued the notice dated January 19, 2018 inviting tender to commence the auction process for grant of mining lease for Guguldoh Block located in Village Guguldoh- Manegaon, Tehsil Ramtek, District Nagpur, State Maharashtra. The e-auction process was conducted in accordance with the tender document for the said mineral block and M/s Shanti G.D. Ispat and Power Pvt. Limited was declared as the 'Preferred Bidder' under Rule 9(9)(iii) of the Auction Rules. Accordingly, Government of Maharashtra issued the Letter of Intent (LOI) vide Letter No. MMN - 0518 / C.R.30 / Industry - 9 dated 5-6-2018 for grant of Mining Lease for Guguldoh Manganese Ore Block of 105 Ha to M/s Shanti G.D. Ispat & Power Pvt. Ltd. for a period of 50 Years.

Subsequent to issuance of the LOI, M/s Shanti G.D. Ispat & Power Pvt. Ltd obtained approval of the Mining Plan from the Indian Bureau of Mines (IBM) vide Letter No. NGP/MN/MPLN-1177/NGP-2019 dated 18-09-2019.

As per EIA Notification 2006 and amendments thereof, the project falls in Sr. No. 1 (a)(i) 'Mining of minerals' of the schedule and is required to obtain prior Environmental Clearance. Based on the mining lease area, the project falls in Category 'A' and is required to obtain Environmental Clearance from Expert Appraisal Committee (Non – coal Mining), MoEF&CC, New Delhi.

The proposal was submitted online vide Proposal No. IA/MH/MIN/222185/2021 dated 30.07.2021 for grant of Terms of Reference. The project was considered in the 35th EAC meeting held on 17th August 2021 and 41st EAC meeting held during 15th - 18th November 2021. The EAC, MoEF&CC has recommended Specific ToR as well as Standard ToR for conducting EIA/EMP studies for the project vide File No. IA-J-11015/58/2021-IA-II(NCM) dated 16th December 2021.

However subsequently, MoEF&CC vide its Notification No. S.O. 1886(E) dated 20th April 2022 amended the categorization. As per the recent amendment, now the Non Coal Mining Project with lease area of more than 250 Ha has been classified as Category "A" Projects.

Considering all the above, Guguldoh Manganese Mining Project of M/s Shanti G D Ispat and Power Private Limited with Lease Area of 105 Ha shall be now considered as Category “B” Project from Environment Angle. Accordingly, the Project shall be appraised by State Environment Impact Assessment Authority (SEIAA) at state level for grant of Environment Clearance.

Pollution and Ecology Control Services, Nagpur, who is environmental consultant for this project, has conducted the baseline environmental monitoring studies during post monsoon season 2021 (Oct - Dec 2021) and prepared this draft EIA/EMP report in line with the Standard & additional TOR issued by EAC, MoEF&CC for conducting public hearing for the project as a part of Environmental Clearance process.

1.1.1 Project Name & Location

The applied Mine lease area having applied lease area of 105.0 Ha is located in Survey No. 107, 144,145,148,149, 150 & 151 in Guguldoh- Manegaon village, Tehsil Ramtek, District – Nagpur, Maharashtra. The applied Mine lease area falls under Survey of India Toposheet no. 55 O/7 on R.F. 1:50,000 and lies between Latitudes 21°25′53.06" to 21°26′19.36"N & Longitudes 79°24′04.29" to 79°25′31.55" E.

1.1.2 Products & Capacity

It is proposed to produce a maximum of 3,06,065 TPA Manganese Ore ROM from this mine by mechanized opencast method of mining. Total applied mining lease area of the project is 105 Ha. Cost of the project is estimated as approx. **Rs. 18.34 Crore.**

1.2 REQUIREMENT OF RESOURCES

1.2.1 Land Requirement & Ownership

The proposed Manganese ore mine is having a Mine lease area of 105.0 Ha, which comprise of 99.95 Ha Protected Forest land and 5.05 Ha Govt. Revenue land. Existing & Proposed Land use pattern of the mine lease area is given in Table below:

Existing & Proposed Land Use

Sr. No.	Head	Area (Ha)		
		Present	At the end of mining plan period	At the end of mine life
1	Area under Pit	3.5570	8.9552	8.9552
2	Waste Dump	6.4394	21.3479	21.3479
3	Soil dump	0.0024	2.3733	2.3733

Sr. No.	Head	Area (Ha)		
		Present	At the end of mining plan period	At the end of mine life
4	Roads	0.0000	0.4500	0.4500
5	Mineral storage	0.0000	0.1775	0.1775
6	Reject stack	0.0000	0.0895	0.0895
7.	Structures	0.0000	0.4924	0.4924
8	Plantation	0.0000	2.0000	2.0000
9	Undisturbed area	95.0012	69.1142	69.1142
	Total	105.0000	105.0000	105.0000

1.2.2 Water Requirement & Source

The daily water requirement for the project has been divided in two parts i.e. for initial four years of mining and for fifth year of mining. This is because there is a great difference in production program in these years. Mining will be carried out at maximum production rate of 0.043 MTPA during the initial four years and the peak rated production of 0.3 MTPA will be achieved only in the fifth year of mining. Thus, the water requirement in the initial four years will be very less as compared to that of the fifth year. The water requirement will be initially met from ground water drawn from borewell drilled in the mine lease area. In the later stage, the mine workings will intersect ground water table in the area. Thus, the additional water required will be supplied from ground water seepage accumulated in the mine pit. Rainwater harvesting will also be carried out in the mine lease area and the harvested rainwater will be used in mine to the extent possible. Necessary permission for drawl of ground water has been obtained from CGWB for drawal of 9.5 KLD ground water.

1.2.3 Manpower Requirement

The Guguldoh Manganese Ore Mine has been planned as Opencast mechanized mine. The Project shall require services of Highly Skilled (Managerial), Skilled, Semi-Skilled and Un-Skilled personnel for undertaking various activities related to mining. Total manpower requirement for the mining project is estimated as 42 persons.

1.2.4 Fuel Requirement

The main fuel required for the Project shall be High Speed Diesel (HSD) for the HEMM as well as other allied equipment. The envisaged diesel requirement for the Project is estimated at about 1645 liter per Hr. Diesel will be purchased from nearby authorized dealers.

1.3 PROJECT DESCRIPTION

1.3.1 Geology & Reserve Estimation

The Guguldoh manganese lease area forms the eastern continuity of the manganiferous sediment forming the entire Manegaon-Guguldoh belt of Mn ore. The rock type found in this area are muscovite schist with sillimanite, garnet magnetite, quartzite, manganiferous quartzite, auto-clastic conglomerate, quartz muscovite schist, gondite, pegmatite, Mn ore, deformed granite, and impure dolomitic marble.

Abandoned Mines Pit

There are number of rectangular deep pits in ENE -WSW direction for over a length of 2.5 km. These are mostly the ancient abandoned mines and trial pits and trenches. Low-grade ore is exposed in these pits. Numerous ore dumps are also found in and around the abandoned pits. The Central block has the largest abandoned quarry for over 700 m in length. The western block has 3-abandoned quarries indicating lateral extension of the ore for 200m, and in the eastern block, there are numerous small quarries arranged in a linear fashion indicating lateral extent of the ore for more than a km in length.

Manganese Ore Horizons

Manganese ore horizons are represented by manganiferous quartzite, gondite and low grade Mn ore. Mn ore horizon is 4 to 6 m thick and is traceable for a strike length of 900 m in Central block. Four conformable Mn bands were identified, during detailed mapping and drilling. From south to north the bands have a strike length of 250m, 720m, 640m, and 50m respectively. They define an arcuate pattern with strike ranging from NW-SE to E-W to ENE-WSW with steep to sub vertical dip to south. The abandoned quarries discontinuously extend both to east and west for over a strike length of 1.9 km. Lithologically, Mn ore occurs at the interface of garnetiferous mica schist and quartz mica schist as well as within the quartzite. The Mn ore band has a southern convexity due to N-S trending F4 fold.

In eastern block, Mn ore occur discontinuously over 900 m strike length in ENE direction. Two conformable stratified Mn ore band have been mapped. In western block two bands have been identified based on the presence of two abandoned Mn quarry. The strike length is about 100 m with widths varying from 1 to 3 m. Detailed mapping of the area has revealed that the different Mn ore bands in the block belong to the same stratigraphic horizon and repeated due to folding.

The total resources estimated in the mine lease area are given below.

	UNFC Code	Quantity in tonnes	Grade
A. Total Mineral Resource	122	4,40,185.0	
Proved Mineral: Mineable Mn ore Reserve.	122	4,40,185.0	Mn : 1.22 to 40.72 % SIO ₂ : 9.0 to 59.0% Fe : 1.50 to 17.0 % P : 0.05 to 1.70 % Avg. grade : Mn 22.70%
Probable mineral Reserves, blocked ore	121 and 122	0.0	
B. Total Remaining Resources	-	0.0	
Feasibility mineral Resources	211	-	
Prefeasibility mineral resources	221 and 222	-	
Measured mineral resources, Blocked	331	-	
Indicated mineral resource	332	-	
Inferred mineral resource	333	-	
Reconnaissance mineral resources	334		
Total Reserves + Resources		4,40,185.0	

Proposed Production & Life of Mine

There is a mineable reserve of 4,40,185 tonnes as per DGM's re-estimation. The preferred bidder now intends to mine 4,38,678.0 tonnes during the ensuing mining plan period, leaving balance 1507 tonnes for conceptual period. Thus, due to meager reserve left out for conceptual period, there will be no conceptual mining. However, due to proposed exploration, if proved additional reserve, it will be modified accordingly.

1.3.2 Method of Mining

The sequence of mining operations will be as under:

- The method of mining will be opencast mechanised method under category 'A'.

- Drilling & blasting in OB will be carried out by Wagon drill 100mm dia with bench height 6m and width not less than the height of bench. The OB benches will be blasted six meter high in one go.
- Drilling and blasting in ore will be done by small dia. Jack hammer drill.
- Ore and OB will be loaded by deploying loader into 16 tonnes tippers.
- There is no top soil that supports crop where the excavation of Mn ore is proposed during the ensuing mining plan period. Hence, top soil will not generate during the plan period, therefore, its careful removal and separate stacking is not needed. Ramps at a gradient varying from 1:10 to 1:16 having width more than three times the width of dumpers will be provided for connecting different benches at locations favorable for optimizing haul length and maximizing mineral extraction.
- In lease, infertile soil not suitable for crops is available for a two meter thickness from surface. This soil will be scrapped meticulously and stacked to its designated place for which an area of 23733.35m² has been earmarked.
- There will be generation of 103613m³ of soil during the plan period.
- Blasted muck will be loaded by the loader in to 16 tonnes tippers to be transported at stacking site for making saleable size.
- The recovery of Mn ore will be 100% by volume from pit and reject will be 10% while sorting. This reject will be stacked to its designated place.
- The ore will be brought to sorting yard and waste to its waste dumping yard.
- OB/Waste generation excluding soil will be in the form of quartzite, mica schist amounting to 3958174m³ during five year period. For stacking, a separate dump will be created for which 149084m² of area has been earmarked.
- The waste will be dumped from foot hill in steps along hill slope 10m high 20m wide. As per the exploration done by GSI and state DGM, the land chosen is non-mineralised. Further, to avoid wash off from dump, it will be provided gabion wall at toe of the dump.
- There will be generation of reject due to winning of Mn Ore which will be 14150.9m³ during five year period. Reject will constitute less than 10mm in size and also which contain +10 to -20% Mn. This will be stacked separately.
- The bulk density of Manganese ore is considered as 3.1T/cu.m. as per GSI Report and for OB/reject is 1.75 T/cu.m.

Proposed production during the 5 year mining plan period is given in Table below:

Development & Production program during mining plan period

Year	Total tentative Excavation (Cum)	Soil (Cu m)	OB/SB/IB (Cum)	ROM (Cum)	ROM Tonnes	Mineral reject (Cum)	Mineral Reject (tonnes) 10%	Ore /Waste Ratio t/m ³
1	3	4	5	6		8	9	10
I Year	91822.13	5917.0	77533.0	8376.13	25966.0	837.61	2596.6	1:3.213
II Year	39230.47	1401.0	28454.0	9325.47	28909.0	932.54	2890.9	1:1.032
III Year	82643.44	8142.0	63454.0	11046.44	34244.0	1104.64	3424.4	1:2.090
IV Year	101205.32	2942.0	84233.0	14030.33	43494.0	1403.03	4349.4	1:2.004
V Year	3888170.64	85211.0	3704500.0	98730.66	306065.0	9873.06	30606.5	1:12.382
Total	4203072.00	103613.0	3958174.0	141509.03	4,38,678	14150.9	43867.8	1:9.259

1.3.3 Conceptual Plan

The mining activity for exploitation of Manganese ore has not yet commenced. However, due to old workings, there are 14 pits and 11 dumps of waste material. During the first five years of the mining plan period, 8.955 Ha area will be required for working upto bottom RL of 271m.

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1.3.4 Use of Mineral

The consuming industry in general demands the chemical composition of more than 25% Mn content. As per the GSI's chemical analysis, the ore has about 30% Mn content; therefore, the ore mined will be in demand fetching good price for at least the 50% of the saleable ore. The balance 50% saleable ore may be in the range of 22 to 25% Mn content as per DGM's analysis. This grade too may fetch good price on account of depleting manganese ore resources. It will be sold to such traders who offers highest price to a particular grade.

1.3.5 Material Handling & Transport

No processing / beneficiation of the ROM or Mineral Reject are planned. The ROM will be manually sized and sorted at site and will be sold as per the different grades.

Sized/ graded manganese ore will be transported to the mineral stack yard and from there to buyer's location by covered trucks.

1.3.6 Site Infrastructure

Temporary office, maintenance room, chemical laboratory and other temporary infrastructure facilities will be provided within the mine. Urinals, toilets, drinking water facilities, rest shelters, canteen, parking area, first aid centre, etc. will be provided within the mine lease area as per statutory requirement.

1.4 EIA/EMP REPORT

Guguldoh Manganese Ore Mine of M/s Shanti G.D. Ispat & Power Pvt. Ltd. is classified as "Category B" as per the EIA notification dated on 14th September, 2006 and amendments thereof. The baseline environmental monitoring was carried out in line with ToR issued by EAC, MoEF&CC by NABL accredited laboratory during Post monsoon Season 2021 (Oct - Dec 2021). for determining the status of ambient air quality, ambient noise levels, surface and groundwater quality, soil quality, status of flora, fauna and eco-sensitive areas and socio-economic status of the villages within 10 km radius study area. The observations of the studies are incorporated in the draft EIA/EMP report. Impacts of the proposed project activities during construction and operation stages were identified and duly addressed in the EIA/EMP report along with the proposed management plan to control / mitigate the impacts. Environmental Management Plan is suggested to implement the pollution control measures in the project.

Table: Salient Features of The Project Site

Sr. No.	Particular	Details
1.	Site Elevation & Topography	335m to 438 m MSL, Hilly topography
2.	Nearest Town & District Headquarter	Nearest village: Guguldoh village : 1.5 km SE District HQ: Nagpur (45 km SW)
3.	Nearest Highway	Ramtek – Tumsar (SH-249) State Highway – 4.3 Km SE, Nagpur Jabalpur (NH44) National Highway – 9.3 km W
4.	Nearest Railway Station	Ramtek (Narrow guage) Railway Station: 12 Km SW, Nagpur R.S. – 45 km SW

Sr. No.	Particular	Details
5.	Archaeologically listed Important Place	ASI protected sites at Ramtek (8 km SW)
6.	National Parks, Wild Life Sanctuaries, Elephant Corridor, Biosphere Reserves etc. (Existing as well as proposed)	Mansingdeo Wildlife Sanctuary: 9.1 km NW
7.	Reserved / Protected Forests within 10 Kms Radius	Chorbahuli R F : 2.0 Km (NW) Tangla R F : 2.5 Km (NE) South Bawanthari R F : 2.5 Km (E) Shahpura R F : 7.0 Km (SSE) Reserved Forest : 6.0 Km (S)
8.	Nearest Water Body	Seasonal Nala : 1.3 Km (W), Water Reservoir: 0.9 km E, Sur Nadi: 5.5 km (SW), Khindsi Lake : 4.5 Km (SW), Mogarkasa Pond : 8.0 Km (NE), Ajana Nadi : 8.0 Km (W), Tangla Nala : 8.5 Km (NE)
9.	Seismic Zone	Seismic Zone II (Low Damage Risk Zone)
10.	Mineral User (End Use Plant) Locations	Sale in open market
11.	Other Industries / Mines	Other small Manganese Ore mines (mostly non-operative) at 1.5 to 3 km S – SE

1.5 EXISTING ENVIRONMENTAL SCENARIO

1.5.1 Baseline Environmental Studies

The EIA report for the project has to describe the existing environmental conditions surrounding the proposed Mining area. The baseline environmental monitoring was carried out by NABL accredited laboratory during Post monsoon Season 2021 (Oct - Dec 2021) as

recommended by the Ministry of Environment and Forest in the Standard TOR issued for the project.

1.5.2 Meteorology & Ambient Air Quality

Summary of Site Specific Meteorological data

Temperature (°C)	5.7°C to 36.3°C
Relative Humidity (%)	34% to 96%
Predominant Wind Direction	SE (11.2%)
Average wind speed	2.20 m/s
Calm wind %	15.53%

Ambient Air Quality Status

The status of ambient air quality within the study area was monitored for winter season during Oct - Dec 2021 at 9 locations including the Mine lease area and in nearby villages.

The minimum and maximum values of monitoring results are summarized below:

Summary of Ambient Air Quality Monitoring Results

Station code	Location	Parti- culars	PM10, (µg/m ³)	PM2.5, (µg/m ³)	SO2 (µg/m ³)	NOx (µg/m ³)	CO mg/m ³
A1	Project Site	Min	34.1	16.3	6.7	9.6	0.29
		Max	44.9	20.7	9.5	13.6	0.59
A2	500 m Downwind	Min	34.1	15.6	6.6	9.5	0.24
		Max	48.4	22.5	10.1	14.6	0.58
A 3	Manegaon village	Min	34.6	15.6	7.0	9.8	0.30
		Max	51.4	24.0	11.0	15.6	0.59
A 4	Mandri village	Min	35.4	16.4	7.3	10.4	0.32
		Max	51.7	24.0	11.3	15.7	0.53
A5	Guguldoh village	Min	41.8	18.9	8.5	12.4	0.35
		Max	58.4	27.0	12.4	18.1	0.61
A6	Musewadi village	Min	40.1	16.2	8.4	11.8	0.30
		Max	54.1	22.0	11.5	16.1	0.54
A7	Umari village	Min	40.8	17.1	8.6	12.1	0.35
		Max	55.0	22.8	11.7	16.8	0.56
A8	Murda	Min	35.6	14.8	7.7	10.5	0.25

Station code	Location	Particulars	PM10, ($\mu\text{g}/\text{m}^3$)	PM2.5, ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	CO mg/m ³
	village	Max	45.6	18.6	9.8	13.8	0.49
A9	Mahadula village	Min	41.1	19.4	9.4	13.0	0.35
		Max	53.1	24.9	12.2	17.5	0.58
NAAQ Standard			100 (24 hrs)	60 (24 hrs)	80 (24 hrs)	80 (24 hrs)	2.0 (8 Hr)

1.5.3 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 given below:

Summary of Ambient Noise Level Monitoring Results

Station Code	Location	Range [LEQ IN dB(A)]		Ld, dB(A)	Ln, dB(A)
		Minimum	Maximum		
N1	Project Site	36.0	50.3	46.5	36.5
N 2	Forest Area	32.7	47.7	43.5	33.6
N 3	Manegaon village	36.6	51.2	47.3	38.2
N 4	Mandri Village	36.8	50.1	46.6	37.7
N 5	Guguldoh Village	36.6	51	47.1	38.5
N 6	Musewadi Village	35.4	49.9	46.1	37.3
N 7	Murda Village	33.7	48.1	44.5	34.3
N 8	Mahadula Village	37.5	51.3	47.6	38.6

1.5.4 Surface and Ground Water Resources & Quality

Water Resources

There is no perennial surface water body in the applied mine lease area. Storm water run-off from the hillocks flows along the slopes and joins nearby seasonal streams through water cut channels. Drainage of the study area is mostly carried by Sur nadi and other numerous first and second order streams originating through the hills in the area.

Sur nadi flows at 5.5 km SW of the mine lease area. A Dam is constructed on Sur Nadi forming Khindsi Lake (Reservoir), which is located at 4.5 km SE of the lease area. A seasonal nalla flows at 1.3 km W of the lease area and joins Khindsi Lake at 4.5 km SW of the lease area. Ajana nadi flows 8.0 km W of the lease area and further joins Sur Nadi. Tangla Nala flows at 8.5 km NE of the lease area. A small water reservoir is located at 0.9

km E of the lease area and Mogarkasa pond is located at 8.0 km NE of the lease. Apart from these, there are number of small village ponds in the 10 km radius study area.

Guguldoh mine lease area is located on hilly undulating area. The surface elevation of the mine lease area varies from 335 m aMSL to 438 m aMSL. Ground water conditions in the plain area outside the mine lease area appears to be quite good as seen in nearby existing wells. The water table in dug wells varies from 10 to 20 m from winter to summer season from general ground level of 329 mRL.

The mine workings will be on hill slope from 385 mRL to 271 mRL for a depth of 114 m and it may go below 58 m from surface level. The working will intercept the water table because excavation will be below the ground water table. The water will be pumped out by deploying 10 HP water pumps.

Water Quality

The existing status of groundwater and surface water quality was assessed by identifying 7 ground water locations in different villages and 6 surface water locations.

Surface Water Quality

The results of the surface water samples analysed and are compared with the IS-10500 standards. The pH of the surface water samples collected was 7.1 to 7.5 and within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in the range of 188 - 488 mg/l and are within the acceptable limit at all locations. The total hardness varied between 146 - 309 mg/l and is observed to be within permissible limit at all locations. In all samples, iron content is not detected except in Ajna nadi, where it is observed to be 0.09 mg/l, Nitrate are not observed in any surface water sample, fluoride varied between 0.3 - 0.5 mg/l, chloride 11.2 – 29.0 mg/l, Sulphate 3.1 – 12.9 mg/l, alkalinity 156– 370 mg/l, calcium 34.9 – 51.2 mg/l and magnesium in between 16.7 – 23.8 mg/l in all samples. Total Coliform organisms are observed to be in the range of 224 to 424 MPN/100 ml. It was observed from the analysis that, the physico-chemical characteristics of the surface water samples are within permissible limits for all the parameters except for coliform organisms. Coliform organisms are observed in all the samples. Thus, the water from all these can be used for drinking & domestic use after proper primary treatment and disinfection.

Groundwater Quality

The physico-chemical characteristics of groundwater are analysed and are compared with the IS-10500 standards. The pH of the water samples collected ranged from 7.0 to 7.4 and

within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in the range of 342 - 836 mg/l and is within the acceptable limit at two locations and within permissible limit at all locations. The total hardness varied between 363 - 580 mg/l and is observed to exceed acceptable limit but are within permissible limits at all locations.

In all samples, iron content varied in between 0.05 - 0.09 mg/l, Nitrate not detected in any sample, fluoride varied between 0.3 - 0.5 mg/l, chloride 31.8 – 50.1 mg/l, Sulphate 14.4 – 40.2 mg/l, alkalinity 302 – 412 mg/l, calcium 115.4 – 217.7 mg/l and magnesium in between 24.1 – 40.8 mg/l. The overall ground water quality was found to be good with slightly higher hardness. The levels of heavy metals content were found to be within permissible limits. Thus, the ground water is required can be used for drinking and domestic use after necessary primary treatment, softening and disinfection.

1.5.5 Land use Land Cover classification

Satellite imagery for the 10 km radius study area of the project was obtained and studied for identifying the different land use land cover patterns. Survey of India toposheets were also used to correlate with the satellite imagery. The Land Cover classes and their coverage are summarized below:

LU/LC classes and their coverage within 10 km radius

LULC Class	Area (Ha)	%
Crop land	173.37	55%
Deciduous forest	86.03	27%
Fallow	2.54	1%
Forest Plantation	20.04	6%
River / Stream / Canals	4.93	2%
Rural	2.76	1%
Scrub Forest	14.08	4%
Scrub land	0.13	0%
Urban	1.78	1%
Waterbodies	10.217	3%

1.5.6 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. Total 5 samples within the study area were collected and analyzed. From the analysis results of the soil samples, it was observed that the soil is low to medium and having low productivity.

1.5.7 Biological Environment

Forests

Out of 105 Hectare Mining lease area, 99.95 Hectares area falls under Forest and rest of 5.05 Hectares area is Government Land. The project site is partly located in Protected Forest Compartment No. 293 PF in Manegaon Beat. Tehsil Ramtek & District – Nagpur, Maharashtra. Most of the northern half of study area is covered under Forest area. Chorbahuli R F : 2.0 Km (NW), Tangla R F : 2.5 Km (NE), South Bawanthari R F : 2.5 Km (E), Shahpura R F : 7.0 Km (SSE) and Reserved Forest : 6.0 Km (S) are the forest areas located in the 10 km radius study area. Mansingdeo Wildlife Sanctuary is located at 9.1 km NW of the lease area. There is no other forest area, National Park, Wildlife sanctuary or Biosphere reserve within the 10 km radius study area of the project.

Flora

The Guguldoh Manganese Ore Mine lease is partly located in Protected Forest area. The tree enumeration of the mine lease area was carried out under the guidance & supervision of Range Forest Officer, Ramtek Range. There are total 36964 trees in the Guguldoh Manganese Ore Block.

Flora (Plant Species): in Lease area: Teak, Saja, Bija, Kadam/Haldu, Garadih, Bhera, Dhaura, Palash, Movai, Dikamali, Khair, Rohan, Tendu, Char, etc.

In Study area: Babool, Khair, Bel, Dhaura, Sitaphal, Neem, Palas, Amaltas, Shisam, Jamun, Kaith, Bargad, Peepal, Mahua, Aam, Aanjan, Tad, karanji, Amrud, Imli, Sagwan, Arjun, Harara, Sahaja, Ber, etc.

Fauna

Wild fauna observed in the study area comprise of Asian House Shrew, Fruit bat, Short nose Fruit- Bat, Hanuman Langoor, Indian Common Mongoose, Jungle Cat, Indian squirrel, House rat, Bandicoot rat, Indian Hare, Gaur, Chausinga etc.

Schedule-I fauna was observed reported within the study area of the project and necessary Wildlife Conservation Plan prepared and submitted for approval of competent authority.

1.5.8 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. Summary of the socio-economic status of the study area is given below:

Summary of Socio-economic Environment of villages within 10 km radius area

Particulars	Numbers	%
No. of villages	38	
No. of Household	11460	
Total Population	50353	
Total Male	25529	50.7
Total Female	24824	49.3
Population SC	6292	12.5
Population ST	9928	19.7
Total Literate	36857	73.2
Male Literate	19942	39.6
Female Literate	16915	33.6
Total workers	24317	48.3
Total main workers	19372	38.5
Cultivators	3729	7.4
Agriculture Labors	6832	13.6
Household Industries	485	1.0
Other workers	8326	16.5
Total Marginal Workers	4945	9.8
Total Non workers	26036	51.7

1.6 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

1.6.1 Ambient Air Quality

Impacts on Air Quality

The proposed mine with its capacity of 0.3 million TPA of ROM, is likely to generate dust, NO_x and SO₂. The sources of gaseous pollutants from the proposed mining include:

- Drilling & blasting operations;

- Operation of heavy earth moving equipment which mostly run on diesel;
- Loading operations;
- Transportation of Manganese Ore/overburden in dumpers;
- Exposed pit area and dumps;

Prediction of impacts on air environment has been carried out by a mathematical model, AEROMOD dispersion model which is a computerized air quality model specifically designed for computing concentration and analysis of the dispersion of fugitive dust.

The predicted maximum- incremental GLC (24-hour average) of PM10 due to operations at Guguldoh Manganese ore mine, as predicted by air modelling was **1.11 µg/m³**.

From the observations of modeling results, it is observed that the predicted concentrations of PM10 in the study area will remain within the permissible limits after commencement of the mining operations.

Air Pollution Control Measures

- Provision of regular water sprinkling at excavation & leveling sites.
- Gap filling plantation within the safety barrier zone and along approach road before start of mining operations.
- Water sprinkling on haul roads within ML area;
- Water sprinkling on transport road by truck mounted mist spray;
- Controlled blasting;
- Afforestation of completely mined out area, with minimum gap between excavation and afforestation;
- Regular maintenance of vehicles and machinery;
- Cabins for shovel and dumpers and dust masks to workmen;
- Prohibition on overloading and over-speeding.
- Thick plantation along both the sides of transport road connecting village road.
- Periodic maintenance of village road used for mineral transport
- Transportation of crushed ore through trucks covered with tarpaulin.

1.6.2 Ambient Noise Levels & Ground vibrations

For predicting the impacts on ambient noise levels, mathematical Noise modeling was carried out. From the modeling results, it is observed that the maximum resultant noise levels near the mine lease boundary will be about 60dB(A). The noise levels will be further

reduced and the predicted resultant noise levels at the nearest village habitation i.e. Guguldoh village will be below 55 dB(A).

Nearest habitation from the mine lease area is located in Guguldoh village located at 1.5 km SE of the mine lease area. The ground vibrations at Guguldoh village due to the blasting in Guguldoh Manganese Ore Mine are calculated using the empirical equation. It is observed that the proposed maximum charge per blast of 275 kg will result in ground vibrations well below the minimum Peak Particle Velocity limit of 5 mm/s for domestic houses located in Guguldoh village. There is no building or structure within 500 m from the proposed mining pit area. Based on the empirical equation results, there is no impact envisaged on any building/structure located outside the mine lease area due to blasting.

Proposed Noise Control Measures

- Mining will be conducted during day time only;
- Secondary blasting will be minimized to the extent possible;
- Blasting will be carried out during favorable atmospheric conditions;
- Prime movers/diesel engines will be properly maintained;
- A buffer barrier of tree belt will be provided in phased manner along the periphery of the mine to attenuate noise;
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM producing high levels of noise will be made; and
- Exposure time of workers to the higher noise levels would be minimized.
- Isolation/enclosure of noisy machines/equipment, wherever possible.
- Provision of enclosures, silencers, etc to the possible extent to control noise propagation.
- Use of adequate silencers and practicing speed limit for material transport vehicles

Proposed Ground vibration control measures

- Blasting will be performed strictly as per the guidelines specified under blasting technology;
- Overcharging will be avoided;
- Charge per delay will be minimized and preferably more number of delays will be used per blast;

- Blasting operations will be carried out only during day time;
- A safe distance of about 100 m will be maintained from blasting site.
- During blasting, other activities in the immediate vicinity will be temporarily stopped;
- Drilling parameters like overburden, depth, diameter and spacing will be properly designed to give proper blast.
- Regular monitoring of vibration shall be done

1.6.3 Topography & Drainage

The Guguldoh Manganese Ore block lies in hilly region north east of Ramtek town. Highest elevation of the lease area is at 438 m aMSL in the north central part and the lowest elevation of 335 m aMSL is at south western part. General ground level is at about 325 m aMSL at 100 m S of the lease area. At present, there are 14 number of rectangular deep pits in ENE -WSW direction for over a length of 2.5 km.

Mining operations will alter the topography of the mine lease area by formation of mine pits and waste dumps. Mining will be commenced from the RL of 385 mAMS L and mine pits will be developed. The ultimate depth of mine pits at conceptual stage is proposed at 271 aMSL. Thus, the mine workings will be carried upto a depth of 114 m from surface. The mine pits will cover about 8.9552 Ha area at the conceptual stage. At conceptual stage, lower part of the mine pit will be developed as water reservoir by harvesting rainwater and the remaining top benches of the mined out pit will be rehabilitated by carrying out grass plantation as per the directives of Hon'ble Supreme Court.

1.6.4 Impact on Landuse & its management

The proposed Manganese ore mine is having a Mine lease area of 105.0 Ha, which comprise of 99.95 Ha Protected Forest land and 5.05 Ha Govt. Revenue land. The mining operations will alter land use of most of the mine lease area into mine pits, surface dumps and other infrastructure facilities. However, the site infrastructure will be dismantled and removed after completion of mining, as such, there will not be any built-up land in the mine lease area at conceptual stage. At conceptual stage, the mine pits will cover 8.9552 Ha of the lease area and waste dumps will be spread over 21.3479 Ha. Roads will cover 0.45 Ha of the lease area.

Reclamation & Rehabilitation of Mined Out Area

At conceptual stage, lower part of the mine pit will be developed as water reservoir by harvesting rainwater and the remaining top benches of the mined out pit will be

rehabilitated by carrying out grass plantation as per the directives of Hon'ble Supreme Court. Surface dumps will also be rehabilitated by development of grass & tree plantation. Thus, the mining area will be developed as a water body and plantation area at the conceptual stage.

The mined out area can't be reclaimed through backfilling and major pit will be reclaimed by plantation. At the end of conceptual period, entire mined out area and waste dumps will be rehabilitated by plantation. The land will be handed over to forest department after ensuring proper reclamation.

Proposed Plantation Program

Out of the 105.00 Ha Mine lease area, 69.1142 Ha area will remain undisturbed. Out of the remaining 35.8858 Ha area under mining and associated activities, 26.4806 Ha area will be rehabilitated by plantation including 0.4924 Ha area under Site infrastructure. Apart from the above, top benches of the mined out pit will be rehabilitated by grass plantation. Balance 0.45 Ha area under roads will be left for future use. A total of 52961 trees will be planted during life of the mine.

1.6.5 Solid waste Management

There is no top soil in the area which supports crops; however it has a layer of infertile soil. Hence, no top soil will be generated. The soil intermixed with waste amounting to 103613m³ will be stacked separately in southern side of the lease and mineral reject. The reject generated will be stacked separately. During the ensuing plan period, waste/OB removal would be 3958174.0m³ during First to fifth year and would be dumped NE corner of the lease area in a single dump. The area earmarked for this purpose is 149084m². The waste dumping will be in a retreating manner.

At conceptual stage, all the dumps will be stabilized by plantation. Geotex lining will be used for development of plantation on the dump slopes. Native plant species will be used for development of plantation on the dumps.

For controlling silt wash off from dumps during rains, provision of retention walls and garland drains will be made along the toe of external waste dump. The garland drains will be connected to settling tanks for ensuring proper settling of storm water run-off. The water collected in settling tanks will be used for dust suppression and plantation in the mine.

1.6.6 Water Resources & Quality

Impact on Water Resources & Quality

There is no perennial surface water body in the applied mine lease area. Storm water run-off from the hillocks flows along the slopes and joins nearby seasonal streams through water cut channels. Mining activity increases sediment load and total dissolved solids in streams due to erosional activity of overburden dump and loosened soil by movement of vehicles.

During operation phase, storm water run-off from the mine lease area will be collected in a series of settling tanks through a network of garland drains. The properly settled water will be used for dust suppression and plantation in mines and excess water, if any, will be nearby farmers after ensuring proper settling. Thus, it will be ensured that there is no silt wash off and no impact on the seasonal streams and agriculture lands outside the lease area.

Impact on ground water resources

Guguldoh mine lease area is located on hilly undulating area. The surface elevation of the mine lease area varies from 335 m aMSL to 438 m aMSL. Ground water conditions in the plain area outside the mine lease area appears to be quite good as seen in nearby existing wells. The water table in dug wells varies from 10 to 20 m from winter to summer season from general ground level of 329 mRL.

The mine workings will be on hill slope from 385 mRL to 271 mRL for a depth of 114 m and it may go below 58 m from surface level. The working will intercept the water table because excavation will be below the ground water table. The water will be pumped out by deploying 10 HP water pumps. The drawal of ground water from mine pit may deplete the ground water resources and thereby reduce the availability of ground water to the nearby villagers.

The ground water seepage in the mine pit will be collected in mine sump and will be used for dust suppression and plantation in the mine. Necessary permission from CGWA will be obtained before dewatering of the mine pit. The excess water in mine sump, if any, will be supplied to nearby farmers for agriculture use.

For minimising the impact on ground water resources, due to drawal of water from the mine pit, rainwater harvesting measures will be adopted in the mine lease area and in nearby villages.

Wastewater generation & discharge

The wastewater generation will be due to following operation:

- Mine discharge during monsoon from mine
- Domestic effluent

Average rainwater harvesting potential from the mine lease area is estimated as 325731m³. Part of this rainwater will be accumulated in mine pit & settling tanks for use in mine for dust suppression and plantation and the excess water will be supplied to nearby farmers or will be recharged to ground after ensuring proper settling. Domestic effluent from the urinals and toilets will be discharged in septic tank followed by soak pit constructed within the lease area. There will not be any open discharge of domestic effluent.

1.6.7 Biological Environment

Guguldoh Manganese ore Mine lease area is located in Forest area. Development and working of the mine in the forest area will result in loss of the natural ecosystem in the mine lease area and in the surrounding area. Removal of all vegetation from the area required for mining and waste dump, approach road, etc. alters the availability of food and shelter for faunal population. Increase in turbidity due to runoff from overburden dumps and addition of suspended solids from the other activities will deteriorate the water quality if discharge is allowed without any treatment.

Mansingdeo Wildlife sanctuary is located at 9.1 km NW of the mine lease area. There is no other Wildlife Sanctuary or National Park in 15 Km radius of the mining project.

Proposed plantation program:

Out of the 105.00 Ha Mine lease area, 69.1142 Ha area will remain undisturbed. Out of the remaining 35.8858 Ha area under mining and associated activities, 26.4806 Ha area will be rehabilitated by plantation including 0.4924 Ha area under Site infrastructure. Apart from the above, top benches of the mined out pit will be rehabilitated by grass plantation. Balance 0.45 Ha area under roads will be left for future use. A total of 52961 trees will be planted during life of the mine.

Measures for Minimizing Impact on wildlife

- Adoption of controlled blasting technique to control noise and ground vibrations
- Development of plantation in the safety barrier zone during construction stage itself.
- Plantation of fruit bearing trees in the forest land outside the mine lease area through State Forest Department.

- Construction of water holes in the forest land outside the mine lease area through State Forest Department.
- Monetary Contribution in the Wildlife Conservation Plan of the State Forest Department.
- Mining will be carried out during day time only.
- Strict prohibition to workers for entering into forest land outside the mine lease area.
- Conducting awareness camps in nearby villages for ban on hunting wild animals.

1.6.8 Socio-economic Environment

The Guguldoh Manganese Ore Block consists of 99.95 Ha Forest land and 5.05 Ha Govt. Revenue land. There is no private land involved in the mine lease area. Also, there is no habitation in the proposed mine lease area. The project proponent has already applied for forest clearance of the 99.95 Ha forest area in the mine lease area. No rights under the Forest Right Act, 2006 (The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006) has been given in the applied area. Hence no Rehabilitation & Resettlement is envisaged in the proposed mining project.

The local population is mostly engaged in agriculture and related works & in other household industries. Some of the workers are employed in industries in nearby towns. The proposed Manganese ore mining project will require about 42 workers as direct employees during operation phase. This will provide employment opportunities to the local people as most of the workers will be recruited from nearby villages.

1.6.9 Occupational Health & Safety

All the employees in the mine will be subjected to pre-employment & periodic medical examination to assess the occupational health impacts. All workers will be subjected with pre-employment & periodic awareness & training program on health and safety issues of mining and related activities. Under the provisions of the Medical Regulation, the examining doctor will maintain health records for each worker examined and records will be updated with findings.

1.7 PUBLIC CONSULTATION

The Draft EIA/EMP report for proposed Guguldoh Manganese Ore Mine (Lease Area: 105 Ha) near Village – Guguldoh – Manegaon, Tehsil – Ramtek, District Nagpur, Maharashtra of M/s Shanti G.D. Ispat & Power Pvt. Ltd. is prepared as per the TOR issued by EAC,

MoEF&CC and the report is submitted for public consultation process as per the provisions of EIA Notification 2006 and amendments thereof. After completing the public consultation process, the issues raised during the public hearing and commitment made by the Project Proponent will be incorporated in the final EIA/EMP report.

1.8 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

The assessment of risk in the proposed Guguldoh Manganese Ore Mining project has been estimated for fire, explosion and toxicity 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 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 are considered in detail in the Disaster Management Plan.

1.9 OCCUPATIONAL HEALTH MEASURES

M/S Shanti G.D. Ispat & Power Pvt. Ltd. considers protection of Worker's Health and well-being as its prime concern and responsibility. The Company accordingly proposes to adopt certain measures for providing proper occupational health services which will ensure optimal physical and mental health of employees & workers. These measures include:

- Identification and assessment of the risks from health hazards in the workplace;
- Surveillance of the factors in the work environment and work practices which may affect workers' health
- Proper planning and organization of work, including the design of workplaces, maintenance of machinery and other equipment.

M/S Shanti G.D. Ispat & Power Pvt. Ltd. has proposed a budget of Rs. 13.07 Lakh as capital cost and Rs. 5.13 Lakh/annum as recurring expenses for implementation & maintaining occupational health and safety measures in the Guguldoh Manganese Ore Mine. The funds provided are based on standard estimates and will be increased as per the actual requirement at site.

1.10 PROJECT BENEFITS

The proposed Guguldoh Manganese ore mining Project is partly located in Forest. The proposed Guguldoh Manganese Ore mining Project will provide direct employment to 42 persons and indirect employment opportunities to more than 100 persons from the nearby villages, which would finally result in improvement in the quality of life of people in the nearby villages around the mining area. The people in nearby villages will be benefited through following:

- Improvement in physical infrastructure
- Improvement in social infrastructure
- Improvement in employment

1.11 ENVIRONMENTAL MONITORING PROGRAM

With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions, if any, due to operation of the proposed Guguldoh Manganese Ore Mine and so that suitable control measures can be adopted in time to safeguard the environment. The environmental monitoring for the Guguldoh Manganese Ore Mine will be conducted for following aspects:

- Ambient Air quality
- Ambient Noise Levels
- Ground water depth
- Surface and ground water quality
- Soil Quality
- Survival rate of Plantation
- CSR Activities

A budget provision of Rs. 5.65 lakh per annum has been made for implementation of the environmental monitoring program.

1.12 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. An Environmental Management Cell (EMC) will be established for the mining project under the control of Vice President. (Mines & Geology). The EMC will look after the environmental management of the proposed project.

- 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.

The capital cost of the proposed Guguldoh Manganese Ore Mining project is approx. **Rs 18.34 Crores**. It is proposed to invest an amount of **Rs. 179.74 Lakh** as capital cost and **Rs. 18.5 Lakh/annum** as recurring expenses towards implementation of Environmental Management Plan.