

EXECUTIVE SUMMARY

INTRODUCTION

Parsoda Manganese Ore Mine of Manganese Ore (India) Ltd. is situated in Parsoda Village, Ramtek Tehsil of Nagpur District in Maharashtra State, over an area of 53.75 ha. Parsoda Manganese Ore Mine of Manganese Ore (India) Ltd intends to produce Manganese ore up to 40,000 TPA.

SALIENT FEATURES OF PROJECT

District & State	Nagpur & Maharashtra
Tehsil	Ramtek
Village	Parsoda
Mine Lease Area	53.75 ha
Category	A
Production	40,000 TPA of Manganese ore
Anticipated Life of Mine	10 years
Method of Mining	Other than fully Mechanized method
Geographical Co-ordinates	1. 21°23'24.7" N, 79°17'42.6" E 2. 21°23'12.5" N, 79°17'39.9" E 3. 21°23'16.1" N, 79°18'03.0" E 4. 21°22'58.0" N, 79°18'00.2" E
Toposheet No	55 O/10, 11, 14 & 15
Road Connectivity	The lease area is 45 Km from Nagpur via Munsar on NH-7 (it is 4 km from Munsar village on Munsar-Tumsar State Highway)
Rail Connectivity	Ramtek (500m)
Wind Pattern during study period (Summer 2009)	Predominant wind direction during study period is from Northwest
Annual Average Rainfall	1110 to 1265 mm
Elevation	318 m – 324 m AMSL
Total Mineable Reserves(UNFC-111 + 122)	0.327 million tonnes
Names and distance of the national park, sanctuary Biosphere reserve, Tiger Reserve, Elephant reserve, Forest (RF/PF/Unclassified)	Ghukshi Reserve Forest (2.7 Km)

PROJECT DETAILS

TOPOGRAPHY

The topography of the applied area is almost flat with gentle slope towards South. The highest elevation is about 324 m AMSL towards North East and the lowest elevation is 318 m AMSL towards south.

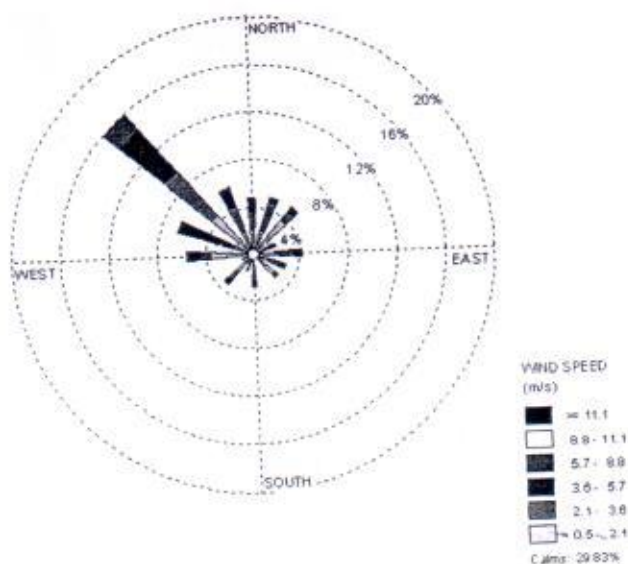
DESCRIPTION OF THE ENVIRONMENT

Baseline Environmental Study was carried out in an area of 10 km radius from the mine lease boundary.

Study period: Pre-monsoon 2009 (March – May 2009)

Predominant wind direction during study period is from Northwest

Wind Rose Diagram



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AIR ENVIRONMENT

Baseline Ambient Air Quality was monitored at 7 locations, 1 in core zone and 6 in buffer zone. The summary of air quality is as follows:

SUMMARY OF AMBIENT AIR QUALITY (MAXIMUM VALUES) UNITS: $\mu\text{g}/\text{m}^3$

Name of sampling location	SPM	PM ₁₀	SO ₂	NO _x
Mine Lease Area	130.5	40.37	8.3	14.6
Ramtek	131.5	39.76	7.9	16.6
Khariri Bihewada	132.0	42.42	6.8	7.1
Manapur	132.1	42.42	6.4	8.9
Kawadak	130.5	41.82	8.6	12.2
Mansar Mine	136.1	44.00	9.1	12.9
Chargaon	135.6	44.27	9.4	13.4

ANTICIPATED IMPACTS

OVERALL SCENARIO (UNITS: $\mu\text{g}/\text{m}^3$)

LOCATION OF MONITORING STATIONS	BACK GROUND LEVEL	PREDICTED CONCENTRATION	RESULTANT CONCENTRATION
Mine Lease Area	40.37	9.23	49.6
Ramtek	39.76	<0.15	<39.91
Khariri Bihewada	42.42	0.15	42.57
Manapur	42.42	<0.15	<42.57
Kawadak	41.82	<0.15	<41.97
Mansar Mine	44.00	<0.15	<44.15
Chargaon	44.27	<0.15	<44.42

PROPOSED MITIGATION MEASURES

- Regular sprinkling of water at the mine pits and also on the haulage roads
- Regular maintenance of the transport vehicles
- Controlled blasting techniques

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- ☛ Not more than 10 holes will be blasted at a time and no hole will be charged with more than 350 gm of explosives at a time
- ☛ Practicing Wet drilling
- ☛ Provision of dust masks to the workers
- ☛ Maintenance of the external OB dump with leguminous plantation and water sprinkling.
- ☛ Avoiding overloading of tippers and covering of loaded tippers with tarpaulins during ore transportation
- ☛ Limiting the speed of transport vehicle
- ☛ Maintenance of wide green belt all along the mine lease boundary, OB yard and along the main transport roads
- ☛ Periodical monitoring of air quality to take steps to control the pollutants

NOISE ENVIRONMENT

The ambient noise levels were measured at 7 locations (same as AAQ stations). The results obtained are as follows.

NOISE LEVELS DURING STUDY PERIOD [UNITS: dB (A)]

S. No	Location	Direction w.r.t Mines	Distance w.r.t Mines (km)
N-1	Mine Lease Area	--	3.3
N-2	Ramtek	ENE	1.1
N-3	Khariri Bihewada	SW	2.7
N-4	Manapur	ESE	2.8
N-5	Kawadak	NE	1.8
N-6	Mansar Mine	NW	2.3
N-7	Chargaon	N	

	N1	N2	N3	N4	N5	N6	N7
Min	40.9	45.4	48.7	48.9	48.4	49.6	47.9
Max	55.5	55.0	53.8	54.3	54.0	54.3	53.5
Ld	52.6	52.9	50.7	51.4	51.0	50.8	50.8
Ln	42.0	42.2	40.8	42.0	42.2	42.2	42.5

It is observed that the noise values recorded were within the prescribed Ambient Noise Level Standards with respect to Noise.

PROPOSED MITIGATION MEASURES

- ☛ Controlled blasting techniques with sequential blasting to reduce noise level and blast induced ground vibrations.
- ☛ Use of low density explosives to have a heaving effect than an explosion
- ☛ Restricting the blasting operations to noon times to avoid the periods of temperature inversions.
- ☛ Use of sharp drilling bits and delivery of compressed air at optimal pressure during drilling.
- ☛ Provision of earmuffs/ear plugs to workers in noise prone zones in the mine.
- ☛ Timely maintenance of drilling machines and transporting vehicles as per manufacturers recommendations
- ☛ Limiting of speed of haulage vehicles/tippers.

WATER ENVIRONMENT

Six ground water samples and two surface water sample were collected and tested to know the water quality of study area. Physico-chemical analysis of water shows that the concentration of dissolved solids & hardness in ground water are more than the permissible limits as per IS 10500 standards.

IMPACT ON GROUND WATER TABLE

The ore body is in the fine grained schistose formation, it is not a potential aquifer for economic yield, if a bore well is constructed tapping this zone. Although permeability is very poor and rate of recovery is very slow, large open area of wetted surface in the quarry is likely to result in the accumulation of significant quantities of suspended water from the transition zone and inflow from the zone of saturation. This seepage water collected during mining is required to be pumped out to continue mining operations. In this process of mine water pumping, dewatering of adjoining area and consequent decline of ground water levels takes place. The pumped out water if discharged directly into any water body or agricultural fields, it is likely to cause turbidity or siltation issues to the environment. Visit to the similar working mines in the same ground water has shown that the MOIL authorities are encountering ground water seepage problems. At the 135 level quarry situated at Wahitola MOIL Colony, much beyond the proposed mine area seepage water is to be pumped out for 5 to 6 hours using 50 HP pump, whose pit surface and bottom

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reduced levels are 336 and 307 m AMSL having dimensions 60 x 10 m. Satak Mine situated at a distance of nearly 4 Km down stream top the proposed mine has encountered seepage at a depth of about 25 m onwards. Mining was under progress with intermittent pumping of collected water.

The proposed mine ultimate depth is 50 m from the surface. As the mine width increases and mine face advances with depth, more and more water accumulates with lapse of time, although the formation specific yield is low. The quantity of water collected in the quarry will vary depending on the dry and wet conditions in the area. Collected water has to be pumped out as per the approved mining plan by utilizing Electric Pump and Diesel driven pumps of capacity ranging from 15 to 50 HP.

IMPACT ON SURFACE WATER BODIES

There are no surface water storage bodies, nallahs and canals within the mine lease area. Kindsi reservoir is outside the zone of influence at higher elevation, the irrigation canal network is much below the lease area. There is no impact on the quality and quantity of water bodies in the Buffer zone. The two abandoned quarries of 30 x 12 m and 16 x 22 m dimensions of Parsoda Mine beyond the lease area are in upper reaches. Both the pits are having nearly 16 m water column collected from rain water inflow and seepage from the wetted perimeter of mine face. In addition, there is another large quarry pit known as Kamthi Lady Pit (KL Pit) further upstream to Parsoda I quarries, of dimensions 150 x 40 m having 20 m water column. Water stored in these three quarries instantaneously release to contribute into the proposed Parsoda quarry in the form of seepage.

PROPOSED MITIGATION MEASURES

In order to prevent, control and minimize the silt load in the rainfall storm water generated from the mine area the following suggested plans are required to be implemented.

- a. During quarrying the ore body the permitted height of 7.5 m and width of 15 m are to be followed for the Over Burden and Ore Bench, respectively to prevent collapse, slippage and debris wash off. Similarly the haul road gradient has to be maintained at 1 in 16 and ramp slope to be kept at 1 in 10 to avoid loose material mixing with storm water.

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- b. Waste dump side slope is required to be kept 28° , surface is to be stabilized with fast growing grasses. Retaining wall of 6 to 9" stone masonry is to be built around the toe of dump.
- c. Individual terraces should not exceed 30° slope and are to be connected to garland drain. The terraces are to have inward slope with catch drains directing to the garland drain. Retention wall of rubble check is to be constructed around Over Burden dump, across the gradient.
- d. Garland drain of 1 m width and 0.5 m depth has to be provided to the southern boundary of lease area. The drain has to have silt traps on its way
- e. A check dam is to be provided to the end of the lease area with a bund height of 1 m and width of 10 m to store water drained from the lease area and also pumped out water
- f. 7.5 m width barrier zone all around the periphery of the lease area with growth of 50 trees in 500 Sq.m shall reduce the migration of silt from the mine area.
- g. Clean water released from the mine area may be supplied to the down stream users for irrigation of the adjacent agricultural fields.
- h. In order to prevent dust from water sprinklers may be used periodically during operation periods.

LAND ENVIRONMENT

LAND UTILIZATION PATTERN

Area in ha

S. No	Particulars	Present	End of 5th year of mining	End of Mine Life
1.	Area excavated	1.75	5.25	12.0
2.	Overburden dump/Mineral stack	0.25	7.25	7.70
3.	Roads	0.10	0.50	0.50
4.	Green belt	3.0	5.0	12.35
5.	Others (Site services)	1.0	2.0	0.20
6.	Undisturbed area	47.65	33.75	21.00
	Total	53.75	53.75	53.75

LAND USE OF STUDY AREA AS PER SATELLITE IMAGERY

S No	Land Use Land Cover Class	Area in Ha	% of Usage
1	Agriculture- Single Crop	11812.90	22.65
2	Agriculture-Double Crop	987.66	1.89
3	Plantations	787.66	1.51
4	Agricultural fallow	8163.96	15.66
5	Degraded Scrub	455.02	0.87
6	Land with/ without scrub	26765.99	51.33
7	Mining Areas	239.45	0.46
8	Water Body	535.00	1.03
9	Built up	2395.35	4.59
	Total	52143.00	100.00

SOIL QUALITY

Soil samples were collected from 5 locations from the core and buffer zone to evaluate the soil quality in the study area. Soil samples in the study area are having moderate to fertile soil quality.

BIOLOGICAL ENVIRONMENT

There are no National Parks, Wild Life Sanctuaries or Biosphere Reserves within the study area. A consolidated list of plant species of the study area based on primary random data collection and from Nagpur Forest division is prepared and given below.

FLORA

S. No.	Name of the species	Common Name
Trees		
	Babul/Babhool	Acacia arabica
	Bad/wad	Ficus bengalensis
	Behada	Terminalia belerica
	Biba/Bhilawa	Semecarpus anacardium
	Bija	Pterocarpus marsupium

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	Chinch/imli	Tamarindus indica
	Chichwa	Albizzia odoratissima
	Dhoban	Dalbergia paniculata
	Garari (poisonous)	Cleistanthus collinus
	Gular	Ficus glomerata
	Hiwar	Acacia sp.
	Hirda/Harra	Terminalia chebula
	Jambhul/Jamun	Eugenia jambolana
	Kalakarai	Casearia elliptica
	Kakai	Flacourtia indica
	Karanj	Pongamia pinnata
	Khair	Acacia catechu
	Kusum	Schleichera oleosa
	Neem	Azadirachta indica
	Palas	Butea frondosa
	Pangara	Erythrina variegata
	Rohan	Soymida febrifuga
	Sag/sagwan/teak	Tectona grandis
	Saja/Ain	Terminalia tomentosa
	Salai	Boswellia serrata
	Shisham	Dalbergia sissoo
	Sitaphal	Annona squamosa
	Subabul	Leucaena leucocephala
	Tendu	Diospyros melanoxylon
Shrubs		
	Aal (Indian mulberry)	Morinda citrifolia
	Bhawarmal	Hamiltonia suaveolens
	Dikamali	Gardenia resinifera
	Gautri	Grewia hirsuta
	Jilbili	Woodfordia fruticosa
	Kaladhotra	Datura metel
	Katumber	Ficus hispida
	Khatara	Dodonea viscosa
	Muradheng/marophal	Helicteres isora

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	Neel	Indigofera tinctoria
	*Rui *	Calotropis procera
	Sindhi/Chhindi	Phoenix sylvestris
	Waghnakhi	Martynia annua
Source: DFO, Nagpur		

FAUNA

Fauna	Scientific name	Schedule
Mammals		
Stripped hyaena	Hyaena hyaena	II
Jackal	Canis aureus	II
Fox	Vulpes vulpes	IV
Jungle cat	Felis chaus	II
Palm squirrel	Funambulus palmarum	IV
Dog	Canis familiaris	IV
Cat	Felis domesticus	IV
Indian Hare	Lepus nigricollis	IV
Fruit Bat	Rousettus leschenaulti	IV
Mouse	Mus musculus	V
Reptiles		
Lizard	Hemidactylus sp	V
Viper	Viper russeli	III
Chameleon	Chameleon zeylanicus	IV
Green tree snake	Dendrophis sp	IV
Avifauna		
Pond Heron	Ardeola grayii	IV
Indian cuckoo	Megaloima merulinus	IV
Rock Pigeon	Columbus livibus	IV
Red jungle crow	Gallus gallus	IV
Sparrow	Passer domesticus	IV
Common Kite	Milvus migrans	IV
Myna	Acridotheres tristis	IV
Source: DFO, Nagpur		

SOCIO-ECONOMIC ENVIRONMENT

The socio-economic condition of the people living in 45 villages falling in 10 Km radius is summarized below

(As Per Census 2001)

S.NO	DESCRIPTION	NUMBERS
DEMOGRAPHIC DETAILS		
1	Total Villages	45
2	Total no. of House Hold	10270
3	Total Population	48222
4	Total SC Population	6157
5	Total ST Population	9303
6	Total Literate Population	28421

SOCIO-ECONOMIC DEVELOPMENT ACTIVITIES

Manganese Ore (India) Ltd is committed to take the following social responsibility for development of income generating sources in the surrounding village area of mine

- ☛ Plantation of fodder species will be carried out in and around the Mine Lease area
- ☛ Sapling of fruit bearing species will be distributed and planted in the surrounding villages to encourage alternate source of income
- ☛ Temple and school of local villages will be maintained by the company

OCCUPATIONAL HEALTH AND SAFETY MEASURES

- ☛ Providing a working environment that is conducive to safety & health
- ☛ The management of occupational safety & health is the prime responsibility of mine management from the executive level to the first line supervisory level
- ☛ Employee involvement and commitment in the implementation of health and safety guidelines
- ☛ Implementing safety and health management system and assessing the effectiveness through periodic audits
- ☛ Setting of safety and health objectives based on comprehensive strategic plans and measure the performance against these plans

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- ☛ Monitoring the effects of mining activities on safety and health and conducting regular performance reviews
- ☛ Provision of necessary personal protective equipments
- ☛ Establishing and maintaining a system of medical surveillance for employees
- ☛ Ensuring employees at all levels receive appropriate training and are made competent to carry out their duties and responsibilities

SUMMARY - MONITORING SCHEDULE

S.No	Parameters	Schedule / Frequency of Monitoring	Locations
1	Ambient air quality monitoring in and around the mine of for SPM, SO ₂ , NO _x & CO. Mn & Si in PM10 will also be tested as workplace exposure. Air born dust will be monitored at (1). Haulage road (2). Dump area (3). Excavated pit (4) Mining gate.	Twice in a week for 4 weeks for entire 3 months in a season except monsoon as per MoEF & CPCB guidelines	4 in core zone 4 in buffer zone
2	Ambient noise levels	Once in a season except monsoon	4 in Core zone 4 in Buffer zone
3	Water quality monitoring	Once in every season	Pit water and wells around the mine lease
4	Inventory of flora	Once a year on all the planted sites and once in five years in study area.	Core & Buffer Zone.
5	Plantation 1. Year wise plantation. 2. Survival rate	Annually	Within ML area
6	Inspection to check any signs of slope failure and	Regularly	Within ML area

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S.No	Parameters	Schedule / Frequency of Monitoring	Locations
	excess erosions along the pit and the waste dumps.		
7	Efficacy of bunds, garland drains and de-silting pits	Regularly	Within ML area
8	Gully plugs, Parapet walls and Check dams;	Prior to onset of monsoon and after monsoon	Within ML area
9	Socio-economic condition	Once in five years of local population, physical survey.	With in Buffer zone
10	Occupation Health & Safety for workers Health check-up for villagers	Annually	Within the ML area.
		Twice in an year	Near by villages

BUDGET FOR ENVIRONMENTAL MANAGEMENT

(Rs. Lakhs)

PARTICULARS	CAPITAL COST	RECURRING COST
Pollution Control		
Dust suppression	2.00	0.50
Gully plugs 2 Nos, 1 Check Dam, 2 Retaining Walls etc	1.00	0.50
Pollution Monitoring	2.50	1.00
Occupational Health		
For routine check up	2.50	1.00
Medical aid as per ESI Scheme	1.50	1.50
Reclamation & Rehabilitation		
Green belt & afforestation	2.00	1.50
Others (Social Development Plan, etc.)	3.00	1.50
Miscellaneous	5.00	2.50
Total	19.50	10.00

**MOIL लिमिटेड च्या Parsoda मँगनीज Ore खाणचा
कार्यकारी सारांश**

परिचय :

MOIL लिमिटेड च्या Parsoda मँगनीज खाण, 53.75 हेक्टर, मँगनीज टीपीए 40,000 पर्यंत मँगनीज उत्पादन करण्यात येणार आहेत. Parsoda हे गाव महाराष्ट्रातील नागपूर जिल्ह्यात तहसील रामटेक येथे वसलेले आहे.

प्रकल्पाचे ठळक वैशिष्ट्ये:

जिल्हा व राज्य	नागपूर व महाराष्ट्र
तहसील	रामटेक
गाव	Parsoda
खाण लिज क्षेत्र	53.75 हेक्टर
श्रेणी	A
उत्पादन	मँगनीज 40,000 टीपीए
खाण अपेक्षित जीवन	10 वर्षे
खाण पद्धत	पूर्णपणे यांत्रिक पद्धत पेक्षा इतर
भौगोलिक गुणक	1. 21°23'24.7"N, 79°17'42.6"E 2. 21°23'12.7"N, 79°17'39.6"E 3. 21°23'16.1"N, 79°18'3.0"E 4. 21°22'58.0"N, 79°18'00.2"E
topo पत्रक क्रमांक	55 0/10, 11, 14 आणि 15
रस्ते संपर्क	लीज क्षेत्र 7, नागपूर via munsar पासून 45 कि.मी. अंतरावर आहे (4 कि.मी. munsar-तुमसर राज्य महामार्गावर Munsar गाव आहे)
रेल्वे कनेक्टिव्हिटी	रामटेक (500m)
अभ्यास काळात वारा नमुना (उन्हाळा 2009)	अभ्यास काळात प्रबळ वाऱ्याची दिशा वायव्य आहे
वार्षिक सरासरी पाऊस	1110 ते 1265 मि.मी.
उंची	318 मीटर - 324 मीटर AMSL
एकूण खाण सक्षम साठा (UNFC- 111, + 122)	0.327 दशलक्ष टन
नाव आणि राष्ट्रीय उद्यान पवित्र जैव गोल राखीव, वाघ राखीव, हत्ती राखीव, वन अंतर (आरएफ / प्रॉव्हिडंट फंड / अवर्गीकृत)	ghukshi राखीव जंगल (2.7 किमी)

प्रकल्प तपशील:

भौगोलिक परिस्थिती :

लागू क्षेत्र भौगोलिक परिस्थिती, दक्षिण दिशेने जवळजवळ सपाट आहे. सर्वाधिक उंची ईशान्य दिशेने 324 मीटर AMSL आहे आणि सर्वात कमी उंची दक्षिण दिशेने 318 मीटर AMSL आहे.

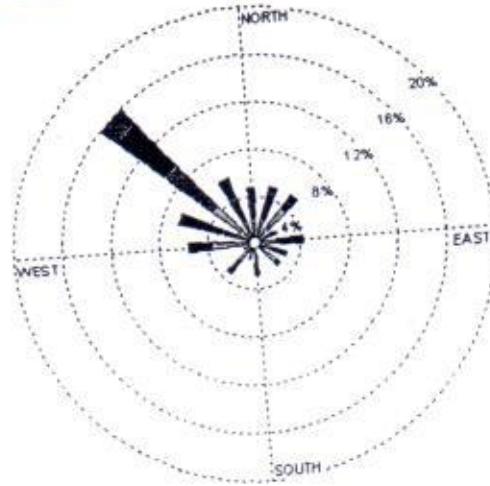
पर्यावरण वर्णन :

बेसलाइन पर्यावरण अभ्यास खाण लीज धावा पासून 10 किमी त्रिज्या क्षेत्रात चालते.

अभ्यास कालावधी: पावसाळा पूर्व 2009 (मार्च - मे 2009).

अभ्यास काळात प्रबळ वाऱ्याची दिशा वायव्य आहे.

वारा आकृती



हवाई वातावरण :

बेसलाइन सभोवतालची हवा गुणवत्ता बफर झोन मध्ये 7 ठिकाणी, कोर झोन मध्ये 1 आणि 6 परीक्षण करण्यात आले. खालील प्रमाणे हवा गुणवत्ता सारांश आहे: अभ्यास काळात प्रबळ वाऱ्याची दिशा वायव्य आहे

सभोवतालची हवा गुणवत्ता (जास्तीत जास्त मूल्ये) युनिट सारांश: आणि / m³

नमूना स्थान नाव	एसपीएम	PM ₁₀	SO ₂	NO _x
खाण लिज क्षेत्र	130.5	40.37	8.3	14.6
रामटेक	131.5	39.76	7.9	16.6
खैरी bejewada	132.0	42.42	6.8	7.1
manapur	132.1	42.42	6.4	8.9
Kawadak	130.5	41.82	8.6	12.2
munsar	136.1	44.00	9.1	12.9
chargaon	135.6	44.27	9.4	13.4

अपेक्षित परिणाम :

एकूणच परिस्थिती युनिट: आणि / m³)

देखरेख केंद्रांची स्थान	पार्श्वभूमी पातळी	अंदाज एकाग्रता	परिणाम एकाग्रता
खाण लिज क्षेत्र	40.37	9.23	49.6
रामटेक	39.76	< 0.15	< 39.91
खैरी bejewada	42.42	0.15	42.57
manapur	42.42	< 0.15	< 42.57
Kawadak	41.82	< 0.15	< 41.97
munsar	44.00	< 0.15	< 44.15
chargaon	44.27	< 0.15	< 44.42

प्रस्तावित ते सौम्य करणारी उपाययोजना:

- . खाण खड्डे आणि मालाची वाहतूक रस्त्यावर पाणी नियमित ठेवणे.
- . वाहतुकीचे वाहन नियमित देखभाल.
- . तंत्र वा-याचा झपाटा नियंत्रित.
- . 10 पेक्षा जास्त राहील एका वेळी तिरस्करणीय जाणार नाही, भोक एका वेळी स्फोटके जास्त 350 ग्रॅम शुल्क आकारले जाईल नाही.
- . ओले ड्रिलिंग सराव.
- . धूळ मुखवटे तरतूद
- .. शेंगांचा वृक्षारोपण आणि पाणी शिंपडून सह बाह्य OB डंप देखभाल.
- .. माती वाहतुकीच्या दरम्यान tippers च्या overloading आणि tarpaulins लोड tippers आच्छादन टाळणे.
- .. वाहतुकीचे वाहन गती मर्यादा घालून.
- .. माझे सर्व लीज सीमा, OB आवारातील बाजूने आणि मुख्य वाहतूक रस्त्याच्या कडेने रुंद हरितपट्टा देखभाल.
- .. हवा गुणवत्ता वेळोवेळी निरीक्षण प्रदूषण नियंत्रण ठेवण्यासाठी पावले उचलणे.

ध्वनी वातावरण:

वातावरणीय आवाज पातळी 7 ठिकाणी (AAQ स्टेशन समान) येथे मोजली होते. खालील प्रमाणे प्राप्त परिणाम आहेत.

अभ्यास काळात ध्वनी पातळी [युनिट: डीबी (अ)]:

क्रमांक	स्थान	खाणी w.r.t दिशा	अंतर w.r.t खाणी (कि.मी.)
N-1	खाण लिज क्षेत्र	-	-
N-2	रामटेक	ENE	3.3
N-3	खैरी bejewada	SW	1.1
N-4	manapur	ESE	2.7
N-5	Kawadak	NE	2.8
N-6	munsar	NW	1.8
N-6	chargaon	N	2.3

	N1	N2	N3	N4	N5	N6	N7
Min	40.9	45.4	48.7	48.9	48.4	49.6	47.9
Max	55.5	55.0	53.8	54.3	54.0	54.3	53.5
Ld	52.6	52.9	50.7	51.4	51.0	50.8	50.8
Ln	42.0	42.2	40.8	42.0	42.2	42.2	42.5

हे रेकॉर्ड आवाज मूल्ये आवाज संबंधित विहित वातावरणीय आवाज पातळी मानके आत होते साजरा केला जातो.

प्रस्तावित ते सौम्य करणारी उपाययोजना:

...घडणारा वा-याचा झपाटा नियंत्रीत वा-याचा झपाटा तंत्र आवाज पातळी आणि स्फोट प्रेरित जमिनीवर स्पंदने कमी.

... कमी घनता स्फोटके वापर स्फोट पेक्षा एक heaving परिणाम.

... दुपारी वेळा वा-याचा झपाटा ऑपरेशन मर्यादा तापमान inversions अधूनमधून टाळण्यासाठी.

... ड्रिलिंग दरम्यान चांगल्या दबाव ठीक ड्रिलिंग बिट वापर आणि संकुचित हवा नाही.

... Earmuffs तरतूद / कान माझे आवाज पोटावार चेहरा खाली करून झोपणे झोन मध्ये कामगारांना बोळे.

... मशीन ड्रिलिंग आणि उत्पादक शिफारसी नुसार वाहने वाहतूक वेळेवर देखभाल.

... मालाची वाहतूक वाहने / tippers च्या speed मर्यादित.

पाणी वातावरण:

सहा जमिनीवर पाणी नमुने आणि दोन पृष्ठभाग पाणी नमुना गोळा आणि अभ्यास क्षेत्र पाणी गुणवत्ता जाणून चाचणी होते. पाणी भौतिकी-रासायनिक विश्लेषण विसर्जित पदार्थांना आणि जमिनीवर पाणी कडकपणा प्रमाण नुसार परवानगी मर्यादा 10500 आहेत.

राउंड वॉटर टेबलवर परिणाम:

माती शरीर एक कूपनलिकेच्या हे क्षेत्र टॅप रचना करण्यात आली आहे, तर तो, आर्थिक उत्पन्न एक संभाव्य सच्छिद्र जमीन नाही, दंड करिता schistose निर्मिती आहे. प्रवेशा अतिशय गरीब आहे आणि पुनर्प्राप्ती दर मंद आहे, तरी सावज मध्ये wetted पृष्ठभाग मोठ्या खुल्या क्षेत्रात संपृक्तता झोन पासून संक्रमण झोन आणि अंतः प्रवाह निलंबित पाणी लक्षणीय प्रमाणात जमा होतो परिणाम होण्याची शक्यता आहे. खाण दरम्यान गोळा हा झिरपणारा द्रव पाणी खाण सुरू करण्यासाठी बाहेर पंपाने वाहून नेणे आवश्यक आहे. माझे पाणी उपसण्याच्या या प्रक्रियेत, शेजारच्या क्षेत्र आणि जमिनीवर पाणी पातळी परीणाम घट झाली dewatering स्थान घेते. पाणी शरीर किंवा शेती मध्ये थेट सोडण्यात तर बाहेर ओतला पाणी, ते वातावरण turbidity किंवा siltation अडचणी निर्माण होऊ होण्याची शक्यता आहे. खूप परिश्रम करणे अधिकारी जमिनीवर पाणी झिरपणारा द्रव समस्या येत आलं आहे त्याच जमिनीवर पाणी समान काम खाणी करण्यासाठी भेट द्या. Wahitola खूप परिश्रम करणे कॉलनी येथे वसलेले 135 पातळी सावज वेळी, प्रस्तावित माझ्या क्षेत्र झिरपणारा द्रव पाणी पलीकडे जास्त ज्या खड्डा पृष्ठभाग आणि तळाशी कमी पातळी 50 एचपी पंप वापरून 5 ते 6 तास बाहेर पंपाने वाहून नेणे आहे 336 आणि 307 मीटर AMSL येत

परिमाणे 60 आहेत, 10 मीटर. Satak खाण आली आहे प्रस्तावित सुमारे 4 कि.मी. खाली प्रवाह वरच्या अंतरावर पुढे सुमारे 25 मीटर एक खोली येथे झिरपणारा द्रव खनन गोळा पाणी अधूनमधून पंपिंग सह सुरु होते.

प्रस्ताव खाण अंतिम खोली पृष्ठभाग पासून 50 मीटर आहे. माझे रुंदी वाढते आणि खाण खोली प्रगती म्हणून निर्मिती विशिष्ट उत्पन्न कमी आहे, तरी अधिक आणि अधिक पाणी, वेळ जुने सह गोळा. सावज गोळा पाण्याचे प्रमाण क्षेत्र मध्ये कोरडी आणि ओले अटी अवलंबून बदलत असतात. गोळा पाणी विद्युत पंप आणि डिझेल 15 50 एचपी ह्या क्षमता चेंडू पंप वापर करून मंजूर खाण प्लॅन प्रमाणे बाहेर पंपाने वाहून नेणे आहे.

पृष्ठभाग पाणी संस्था परिणाम:

खाण लीज परिसरात नाही पृष्ठभाग पाणी साठवण संस्था, nallahs आणि कालवे आहेत. Kindsi जलाशय उच्च उंची येथे प्रभाव झोन बाहेर आहे, सिंचन कालवा नेटवर्क लीज क्षेत्र खूपच कमी आहे. बफर झोन मधील मोठ्या दर्जाच्या आणि पाणी संस्था प्रमाण नाही प्रभाव आहे. 30 X 12 मीटर आणि लिज क्षेत्र पलीकडे parsoda माझ्या 16 X 22 मीटर परिमाणे दोन बेबंद खाण वरच्या पोहोचते आहेत. दोन्ही खड्डे माझे चेहरा perimeter wetted पाऊस पाणी ओघ आणि झिरपणारा द्रव गोळा सुमारे 16 मीटर पाणी स्तंभ येत आहेत. याव्यतिरिक्त, 150 नाम 40 मीटर 20 मीटर पाणी स्तंभ येत परिमाणे मी खाण parsoda आणखी अपस्ट्रीम कामठी लेडी खड्डा (AF खड्डा) म्हणून ओळखले दुसऱ्या मोठ्या सावज खड्डा आहे. या तीन खाण पाणी साठवून तत्क्षणी झिरपणारा द्रव स्वरूपात प्रस्तावित parsoda quarry मध्ये योगदान सोडावे.

प्रस्तावित ते सौम्य करणारी उपाययोजना:

नियंत्रण प्रतिबंध आणि सूचित खालील योजना लागू करणे आवश्यक आहे खाण क्षेत्र व्युत्पन्न पाऊस वादळ पाण्यात गाळ लोड कमी करण्यासाठी.

अ) माती शरीर 15 मीटर परवानगी 7.5 मीटर उंची आणि रुंदी सर्वाधिक पतपुरवठा दरम्यान अनुक्रमे बंद धुवा संकुचित, slippage आणि मोडतोड टाळण्यासाठी, चेंडू ओझे आणि माती खंडपीठाने अनुसरण करणे आहेत. तसेच कामगिरी रस्ता जोरात 1 in 16 ठेवली असेल आणि वादळ पाणी मिसळून सैल साहित्याचा टाळण्यासाठी 1 in 10 ठेवल्या सामान्य उतरंड केले आहे.

ब) कचरा बाजूला उतार पृष्ठभाग जलद वाढत गवत असलेल्या stabilized केले आहे, 28° ठेवले करणे आवश्यक आहे. 9" दगड दगडी बांधकाम 6 भिंत Tetaining डंप च्या पायाचे बोट बांधली जाणार आहे.

क) वैयक्तिक पायऱ्यांवर 30° उतार जास्त असु नये आणि निचरा हार अर्पण कनेक्ट झाले आहेत. पायऱ्यांवर हार घालणे काढून टाकावे निर्देश झेल वाहू सह आवक उतार आहेत आहेत. संरक्षण मंत्रालयाने धनादेश धारणा भिंत ओलांडून जोरात, ओझे डंप प्रती सुमारे बांधण्यात यावे. 1 मीटर रुंदी आणि 0.5 मीटर खोली.

ड) हार अर्पण निचरा लीज क्षेत्र दक्षिण भागाला देण्यात येणार आहे. पाऊस त्याच्या मार्गावर गाळ सापळे आहेत आहे.

ई) एक चेक धरण एक बंधारा. 1 मीटर उंचीवर आणि लिज क्षेत्र निचरा पाणी साठवून 10 मीटर रुंदी आणि बाहेर ओतला पाणी लिज क्षेत्र शेवटी देण्यात येणार आहे.

फ) सर्व 500 चौरस मीटर 50 झाडे वाढ लिज क्षेत्र परिघ सुमारे 7.5 मीटर रुंदी अडथळा झोन माझे क्षेत्र पासून गाळ स्थलांतर कमी होईल. खाण क्षेत्र सुटका (ग्रॅम) स्वच्छ पाणी समीप शेती सिंचनासाठी खाली प्रवाह वापरकर्त्यांना पुरवले जाऊ शकते.

पाणी शिंपडण धूळ टाळण्यासाठी

ह) ऑपरेशन काळात नियमितपणे वापरले जाऊ शकते.

जमीन वातावरण

जमीन वापर नमुना

हेक्टर क्षेत्र.

अनुक्रमांक	तपशील	उपस्थित	खाण 5 वर्षांच्या शेवटी	खाण आयुष्याच्या शेवटी
1	क्षेत्र उत्खनन	1.75	5.25	12.0
2	वाजवीपेक्षा जास्त काम डंप / खनिज स्टॅक	0.25	7.25	7.70
3	रस्ते	0.10	0.50	0.50
4	हरितपट्टा	3.0	5.0	12.35
5	इतर (स्थळ सेवा)	1.0	2.0	0.20
6	नाही दंगल क्षेत्र	47.65	33.75	21.00
	Total	53.75	53.75	53.75

उपग्रह प्रतिमा नुसार अभ्यास क्षेत्र जमीन वापर

अनुक्रमांक	जमीन वापरासाठी जमीन कव्हर वर्ग	हेक्टर क्षेत्र	वापराचे %
1	शेती - एकल पीक	11812.90	22.65
2	शेती - दुहेरी पीक	987.66	1.89
3	वृक्षारोपण	787.66	1.51
4	शेती - लागवडीसाठी पडीक दुहेरी	8163.96	15.66
5	हास झालेल्या खरबरीत	455.02	0.87
6	खरबरीत न करता / जमीन	26765.99	51.33
7	खाण क्षेत्र	239.45	0.46
8	पाणी शरीरातील	535.00	1.03
9	उभारलेले	2395.35	4.59
	Total	52143.00	100.00

माती गुणवत्ता:

माती नमुने अभ्यास क्षेत्रात माती गुणवत्ता मूल्यमापन करण्यासाठी कोर आणि बफर झोन 5 ठिकाणी एकत्रित करण्यात आले. अभ्यास क्षेत्रात माती नमुने सुपीक माती गुणवत्ता मध्यम येत आहेत.

जैविक वातावरण:

अभ्यास परिसरात नाही राष्ट्रीय उद्याने, वन्यजीव अभयारण्ये किंवा Biosphere राखीव आहेत. प्राथमिक यादृच्छिक डेटा एकत्रीकरण आणि नागपूर वन विभागातील आधारित अभ्यास क्षेत्र वनस्पती प्रजाती एकत्रित यादी तयार आणि खाली दिली आहे:

फलोरा

क्रमांक	प्रजाती (झाड) नाव	सामान्य नाव
1	बाबुल	बाभूळ arabica
2	बड / बध	ग्लूमेराटा bengalensis
3	behada	terminalia belerica
4	biba / bhilawa	semecarpus anacardium
5	bija	pterocarpus marsupium
6	Chinch / imli	Tamarindus वैशिष्ट्ये
7	Chichwa	Albizzia odoratissima
8	Dhoban	Dalbergia pandiculta
9	Garari (विषारी)	Cleistanthus collinus
10	Gular	ग्लूमेराटा glomerata
11	Hiwar	बाभूळ एसपी.
12	Hirda / Harra	Terminalia chebula
13	Jambhul / जांभूळ इ	युजेनिया jambolana
14	Kalakarai	Casearia elliptica
15	Kaka	Flacourtia वैशिष्ट्ये
16	Karanj	करंजाच्या पिन्नाटा
17	खैरे	बाभूळ कात
18	कुसुम	Schleichera oleosa
19	कडुनिंब	Azadirachta वैशिष्ट्ये
20	पळस	Butea Frondosa
21	Pangara	Erythrina वेगळा नमुना
22	रोहन	Soymida febrifuga
23	साग / sagwan / सागवृक्ष	Tectona grandis
24	Saja / अईन	Terminalia tomentosa
25	Salai	Boswellia Serrata
26	Shisham	Dalbergia sisso
27	Sitapha	Annona squamosa
28	सबाबुल	Leucaena leucocephala
29	तैदू	Diospyros melanoxylon

shrubs

1	AAL (भारतीय तुतीची)	Morinda citrifolia
2	Bhawarmal	Hamlitonia suaveolens
3	Dikamali	पांढऱ्या किंवा पिवळ्या सुवासिक फुलांचे फुलझाड resinifera
4	Gautri	grewia hirsuta
5	Jilbili	Woodfordia fruticosa
6	Kaladhotra	Datura metel
7	Katumber	ग्लूमेराटा hispida
8	Khatarra	Dodonea viscosa
9	Muradheng / maropha	Helicteres isora
10	नील	Indigofera tinctoria
11	Rui	धोतरा Proceras
12	सिंधी / chhindi	फिनिक्स sylvestris
13	Waghnakhi	Martynia वार्षिक
		स्त्रोत: DFO, नागपूर

विशिष्ट प्रदेशातील किंवा कालखंडातील प्राणिजात :

विशिष्ट प्रदेशातील किंवा कालखंडातील प्राणिजात	सायंटिफिक नाव	वेळापत्रक
<u>सस्तन प्राणी :</u>		
stripped तरस	तरस तरस	II
लांडगा	Canis aureus	II
कोल्हा	Vulpes	IV
जंगली मांजर	Felis chaus	II
खजुरीची खार	Funambulus palmarum	IV
कुत्रा	Canis familiaris	IV
मांजर	Felis domesticu	IV
भारतातील हरे	Lepus nigricollis	IV
फळ फलंदाजी	Rousettus leschenaulti	IV
उंदीर	Mus musculus	V
<u>सरपटणारे प्राणी :</u>		
पाल	Hermidactylus एसपी	V
घातकी	घातकी russeli	III
सरडा	सरडा zeylanicus	IV

ग्रीन झाड साप	Dendrophis एसपी	IV
Avifauna :		
तलाव नेशनल	Ardeola grayii	IV
भारतीय कोकिळा	Megaloima merulinus	IV
रॉक कबूतर	कोलंबस livibus	IV
लाल जंगली कावळा	Gallus gallus	IV
चिमणी	passer domesticus	IV
सर्वसाधारण पतंग	Milvus migrans	IV
Myna	Acridotheres tristis	IV
		स्त्रोत: DFO, नागपूर

सामाजिक-आर्थिक वातावरण :

10 किमी ही त्रिज्या मध्ये घसरण 45 खेड्यांमध्ये राहणाऱ्या लोकांना सामाजिक-आर्थिक स्थिती आहे.

(2001 च्या जनगणनेनुसार)

क्रमांक	वर्णन	नंबर
1	एकूण गावे	45
2	एकूण कुटूंब	10270
3	एकूण लोकसंख्या	48222
4	एकूण अनुसूचित जातीची लोकसंख्या	6157
5	एकूण अनुसूचित जमातीची लोकसंख्या	9303
6	एकूण लोकसंख्या साक्षर	28421

सामाजिक-आर्थिकविकासकामे:

MOIL लिमिटेड खाण परिसर गावात क्षेत्रात उत्पन्न स्रोत विकास खालील सामाजिक जबाबदारी घेणे वचनबद्ध आहे.

... चारा प्रजाती वृक्षारोपण आणि खाण लीज क्षेत्र सुमारे करण्यात येणार आहे.

... फळ प्रजाती रोपटे उत्पन्न पर्यायी स्रोत प्रोत्साहित करण्यासाठी आसपासची गावे वितरित आणि लागवड जाईल.

... स्थानिक गावे मंदिर आणि शाळा कंपनीने ठेवली जाईल.

व्यावसायिक आरोग्य व सुरक्षा उपाय:

... सुरक्षा आणि आरोग्य हितावह आहे की एक कार्यरत वातावरण देणे.
... व्यावसायिक सुरक्षा व आरोग्य व्यवस्थापन पहिली ओळ पर्यवेक्षकीय पातळीवर कार्यकारी पातळी माझे व्यवस्थापन मुख्य जबाबदारी आहे.

... आरोग्य व सुरक्षा मार्गदर्शक तत्त्वे अंमलबजावणी कर्मचारी सहभाग आणि बांधिलकी.
... सुरक्षा आणि आरोग्य व्यवस्थापन प्रणाली अंमलबजावणी आणि नियमित ऑडिट माध्यमातून प्रभावी मूल्यांकन.

... सुरक्षा आणि आरोग्य उद्दिष्टे सेटिंग व्यापक धोरणात्मक योजना आधारित आणि या योजना विरोधात कामगिरी मोजण्यासाठी.

सारांश - वेळापत्रक देखरेख

क्रमांक	घटके	देखरेख वेळापत्रक / वारंवारता	ठिकाण
1	एसपीएम, SO ₂ , Nox आणि PM ₁₀ सहकारी., Mn आणि सी साठी मी माझ्या भोवती एक सभोवतालची हवा गुणवत्ता संनियंत्रण देखील कामाच्या ठिकाणी प्रदर्शनासह म्हणून चाचणी घेतली जाईल. हवाई जन्म धूळ (1) परीक्षण केले जाईल. मालाची वाहतूक रस्ता (2). डंप क्षेत्र (3). उत्खनन खड्डा (4) खनन गेट.	दोनदा वन आणि केंद्रीय प्रदूषण नियंत्रण मार्गदर्शक सूचनांनुसार पावसाळा वगळता एका हंगामात संपूर्ण 3 महिने 4 आठवडे आठवड्यातून.	कोर झोन मध्ये 4 बफर झोन मध्ये 4
2	वातावरणीय आवाज पातळी	एकदा पावसाळा वगळता एक हंगामात	कोर झोन मध्ये 4 बफर झोन मध्ये 4
3	पाणी गुणवत्ता संनियंत्रण	प्रत्येक हंगामात एकदा	खड्डा पाणी आणि खाण लीज भोवती विहिरी
4	वनस्पती यादी	सर्व लागवड वर्षातून एकदा आणि अभ्यास क्षेत्रात पाच वर्षात एकदा	कोर आणि बफर झोन
5	वृक्षारोपण 1. वर्ष निहाय वृक्षारोपण 2. जगण्याची दर	दरवर्षी दोनदा एक वर्ष मध्ये	एमएल परिसरात गांव जवळ

6	तपासणी उतार अपयश आणि खड्डा बाजूने जादा erosions आणि कचरा डंप कोणत्याही चिन्हे तपासा.	नियमितपणे	एमएल परिसरात
7	बांध, हार घालणे गटारे आणि डी-silting खड्डे प्रभावीपणा.	नियमितपणे	एमएल परिसरात
8	चेंडू plugs, कडेची लहान भिंत भिंती आणि तपासा धरणे.	पाऊस आणि पावसाळा नंतर दिसायला लागायच्या अगोदर	एमएल परिसरात
9	सामाजिक-आर्थिक स्थिती	स्थानिक लोकसंख्या पाच वर्षांत, भौतिक सर्वेक्षण एकदा	बफर झोन अंतर्गत
10	कामगार उद्योग आरोग्य आणि सुरक्षितता. ग्रामीण आरोग्य तपासणी.	दरवर्षी दोनदा एक वर्ष मध्ये	एमएल परिसरात गांव जवळ

पर्यावरण व्यवस्थापनासाठी बजेट (रु. लाख) :

तपशील	भांडवली खर्च	आवर्ती खर्च
प्रदूषण नियंत्रण		
धूळ दडपशाही	2.00	0.50
चेंडू 2 नग, 1 चेक धरण, 2 अस्तराच्या भिंती बोळे	1.00	0.50
प्रदूषण	2.50	1.00
व्यावसायिक आरोग्य		
नियमानुसार तपासणी	2.50	1.00
ESI योजनेनुसार वैद्यकीय मदत	1.50	1.50
सुधारणा आणि पुनर्वसन		
हरितपट्टा आणि वनीकरण	2.00	1.50
इतर (सामाजिक विकास योजना इ)	3.00	1.50
किरकोळ	5.00	2.50
एकूण	19.50	10.00

EIA & EMP Report

CHAPTER 1: INTRODUCTION

1.1 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

M/s. Manganese Ore (India) Limited (MOIL), Nagpur is a Government of India undertaking. The State Govt. of Maharashtra, Industries, Energy and Labour Department, Mumbai, vide their letter No. MMN-2299/C.R.7743/IND-9, dated 09.10.2007 and MMN-2299/7743/UDYOG-9, dated 20.08.2008 has consented for grant of mining lease under Rule 22 of MCR 1960 and for extraction of Manganese Ore at Village Parsoda, Tehsil Ramtek, District Nagpur in Maharashtra. Since the mineral Manganese Ore is specified in first schedule of MMRD Act 1957, prior approval under Section 5 (1) of MMRD Act 1957 has been granted by the Central Govt. vide letter No.- 5/24/2007-M.IV dated 05.09.2007. The lease area covers 53.75 hectares area. The Lessee proposes to produce Manganese Ore to a tune of 40,000 TPA.

1.2 ADDRESS OF THE APPLICANT

M/s Manganese Ore (India) Ltd
Moil Bhawan, 1A Katol Road
Nagpur (M.H)

Pin code: 440013

Phone No. :

0712-2590050,280600

Fax :

0712-2592350

E mail ID :

moilind_ngp@sancharnet.in

1.3 GENESIS & OBJECTIVE OF THE PROJECT

Manganese Ore (India) Ltd intends to produce 40,000 TPA of Manganese Ore by other than fully mechanized method (OTFM).

The Honourable Committee of Ministry of Environment and Forests, Government of India after going through the project details and presentation made thereof on the environmental issues and salient features of the project has issued Terms of

EIA/EMP Report of Parsoda Manganese Ore Mine of M/s Manganese Ore (India) Ltd.

Reference vide letter no J-11015/42/2009-IA.II (M) dated 30 April 2009 for preparation of EIA/EMP report.

Based on the 14th September 2006 EIA Notification and TORs issued by MoEF after scoping and appraisal of the project the study has been conducted to establish the baseline scenario of the area and evaluate the environmental impacts that would arise due to the proposed project by M/s Bhagavathi Ana Labs Ltd., Hyderabad so that an appropriate Management Plan can be put in place in order to minimize the environmental impacts at the source.

1.4 SCOPE OF THE STUDY

The scope of the study includes detailed characterization of various environmental components like air, noise, water, land and socio-economics in an area of 10 Km radius around the proposed Mine Lease area. The baseline data is collected during summer season (March 2009 - May 2009)

The various steps involved in the study are divided into three phases.

- ☛ Identification of significant environmental parameters and assessing their present status within the impact zone
- ☛ Prediction of Impacts envisaged due to proposed project
- ☛ Preparation of Management Plan to curtail the possible impacts that would arise due to the project.

1.5 LOCATION OF THE PROJECT

Parsoda Manganese Ore Mine of Manganese Ore (India) Ltd. is situated in Parsoda Village, Ramtek Tehsil of Nagpur District in Maharashtra State, over an area of 53.75 ha.

A location map of mining lease area is shown in Figure 1.1

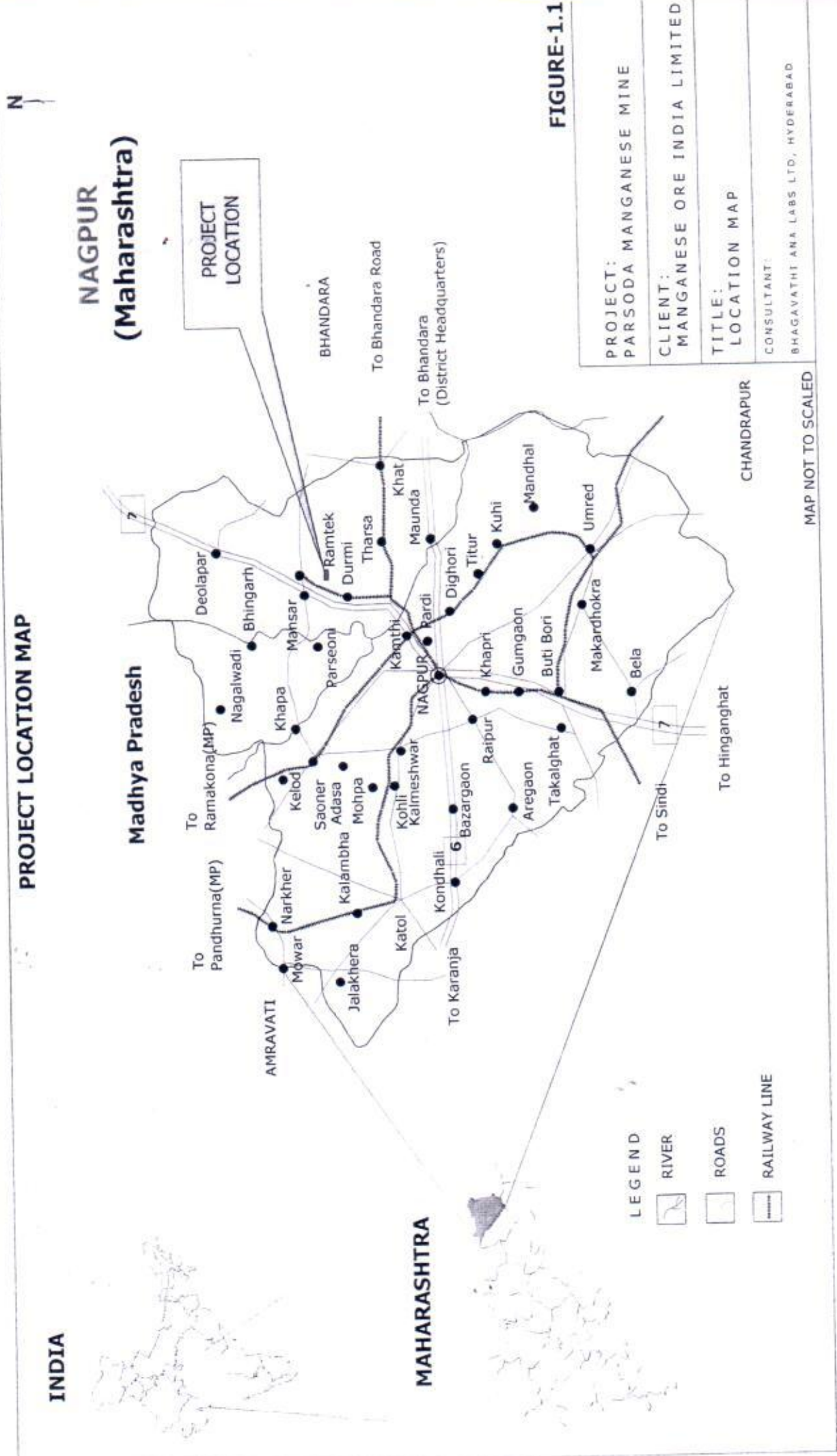


TABLE 1.1: SALIENT FEATURES OF THE PROJECT

District & State	Nagpur & Maharashtra
Tehsil	Ramtek
Village	Parsoda
Mine Lease Area	53.75 ha
Ownership	Private Land
Category	'A'
Production	40,000 TPA of Manganese ore
Anticipated Life of Mine	10 years based on present level of exploration
Geographical Co-ordinates	1. 21°23'24.7" N, 79°17'42.6" E 2. 21°23'12.5" N, 79°17'39.9" E 3. 21°23'16.1" N, 79°18'03.0" E 4. 21°22'58.0" N, 79°18'00.2" E
Toposheet No	55 O/10, 11, 14 & 15
Road Connectivity	The lease area is 45 Km from Nagpur via Munsar on NH-7 (it is 4 km from Munsar village on Munsar-Tumsar State Highway)
Rail Connectivity	Ramtek (500m)
Wind Pattern during study period (Summer 2009)	Predominant wind direction during study period is from North west.
Annual Average Rainfall	1110 to 1265 mm
Elevation	318 m - 324 m AMSL
Total Mineable Reserves (UNFC-111 + 122)	0.327 million tonnes
Archaeological/Historical/Ancient Monuments within 10 km area	None within 10 Km radius
Names and distance of the national park, sanctuary Biosphere reserve, Tiger Reserve, Elephant reserve, Forest (RF/PF/Unclassified)	Ghukshi Reserve Forest (2.7 Km)
Water Bodies	Kindsi Reservoir 6.0 km

TABLE 1.2: DETAILS OF THE AREA – KHASARA NUMBERS

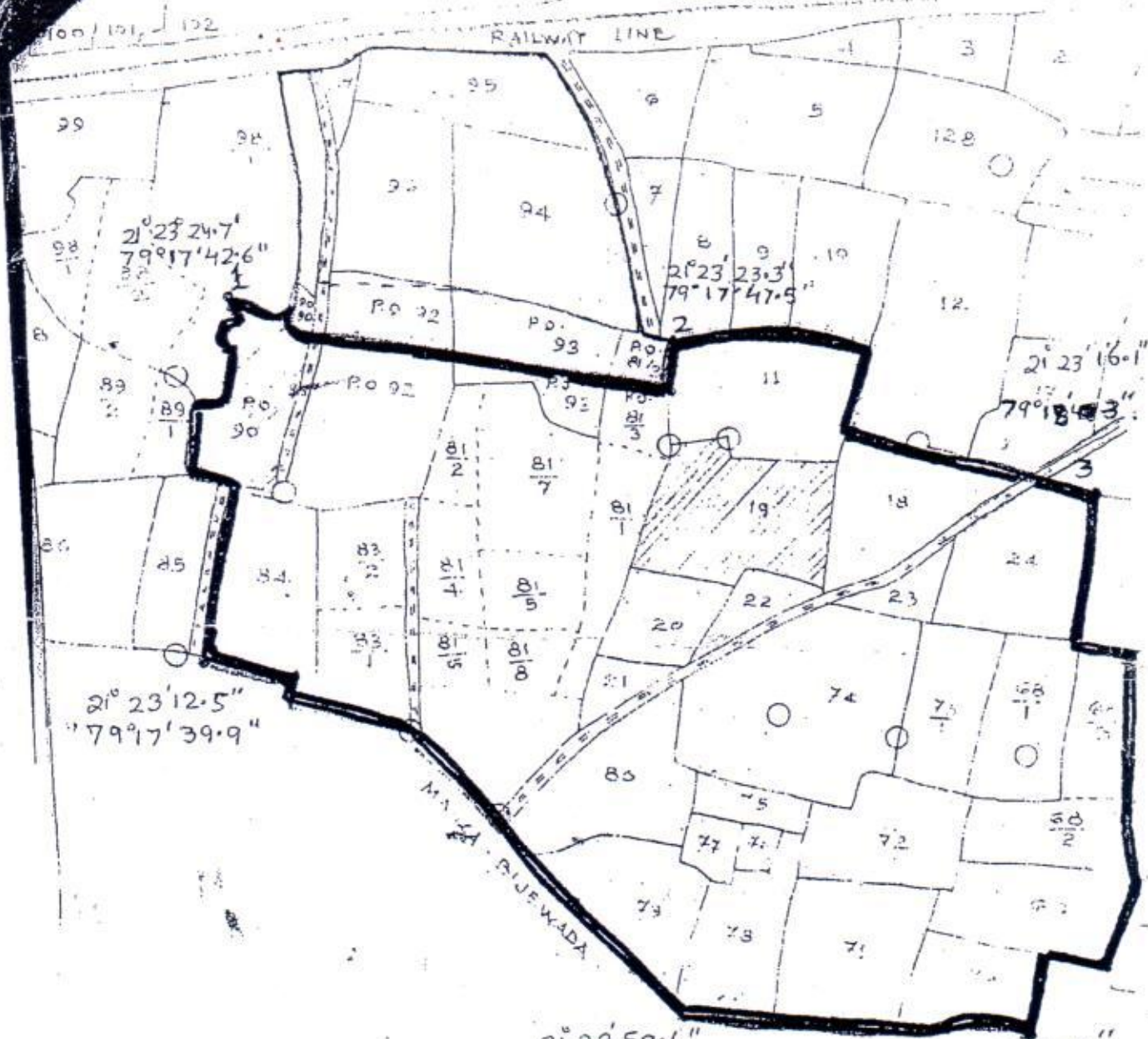
Dist & State	Taluka	Village	Khasara No	Area in Ha.
Nagpur, Maharashtra	Ramtek	Parsoda	11	2.5
			18	2.67
			20	1.17
			21	0.49
			22	0.64
			23	0.56
			24	2.5
			68/1	1.43
			68/2	1.42
			68/3	0.4
			68/3	1.6
			69	2.17
			70	1.42
			71	2.64
			72	1.84
			73/1	0.4
			74	5.04
			75	0.56
			76	0.32
			77	0.25
			78	1.92
			79	1.83
			80	2.48
			81/1	1.95
			81/2	0.63
			81/3	0.1
			81/4	0.97
			81/5	1.62
			81/6	1.25
			81/7	2.02
			81/8	0.81
			83/1	1.32
			83/2	1.32
			84	2.51
			92	2.3
			93	0.7
Total				53.75
Source: Approved Mining Plan				

Lease Area map showing geological coordinates is shown in Figure 1.2

TABLE 1.3: STATUS & STAGE OF REGULATORY CLEARANCES

REGULATORY CLEARANCE	STATUS		
	Approved	vide	No
Mining Plan	NAG/Mn/MPLN-1035/NGP dated 06.07.2009		
Terms of Reference	J-11015/42/2009-IA.II (M) dated 30 April 2009		
Public Consultation	Completed on 06-02-2010		
Environmental Clearance	Applied		
Forest Clearance	Not Applicable		

FIGURE: 1.2



21° 22' 59.6"
79° 17' 45"

45
P. 7750 d

Page 4014

1944

ref - 1:50000

21° 22' 58"
79° 18' 0.2"

 $1 \text{ km} = 62 \text{ m}$

girl
chief (Aed)

CHAPTER 2: PROJECT DETAILS

2.1 TOPOGRAPHY

The project area is a plain land with high relief. Highest surface elevation is 324 m above mean sea level (AMSL) in the North-Eastern part and the Southern and South Western part has surface elevation of 318 m AMSL.

The Buffer Zone has prominent hill range of trend W-NW – ESW, extending from Ghuksi Reserve Forest in the West to Ramtek Hills in the East. The maximum elevation of these hills is 403 m AMSL and 469 m AMSL. The land slope is from North to South-East in the larger part of the Buffer zone area, whereas, it is from North to South West in the Western part comprising Ghuksi Reserve Forest. There is a conspicuous break in the topography along the Munsar Hill range to divide the entire area in to two separate physiographic units.

Surface Plan of the lease area is shown as **Figure 2.1**.

2.2 GEOLOGY

2.2.1 REGIONAL GEOLOGY

The Manganese ore horizon occurs in the lower part of the sequence of meta-sedimentary rocks of Sausar Group of Pre-Cambrian age.

The Sausar group extends broadly in ENE-WSW direction from Balaghat district, M.P. in the east through Bhandara district to Nagpur district both in Maharashtra, in the west, comprising within the famous Manganese belt of central India. This belt stretches over a length of 200 km and is about 25 km wide in the central part. Rocks representing the lower part of the Sausar group sequence Viz. Tirodi gneisses, Sitsaongi and Munsar formation occur in and around Munsar Mine. The regional strike of formation is E-W varying to ENE-WSW locally with moderate to steep southerly dip (45° to 70°). Bedding and foliation are parallel as observed in the well-bedded quartzite and manganese ore horizon and the enclosing schist. Structurally the formations are isoclinally folded, with axial plane tilting towards South at 45° to

70°. Dongri Buzurg ridge represents an inverted northern limb of a regional anticline pitching towards east and closing about 8 km east of the area near Chikla Mines of MOIL (Manganese Ore India Ltd). As a consequence of this inversion, the older formations like Tirodi gneisses and Sitasaongi formations constitute the hanging wall of the manganese ore horizon and younger Munsar schist from the footwall.

2.2.2 LOCAL GEOLOGY

The mine lease area comprises of intensely deformed metamorphosed suite of rock of Precambrian Sausar group containing manganese deposits. Manganese ore horizon is confined to the metapelitic rocks of the Munsar formation. The ore is stratiform and strata bound type and are found frequently interbedded with gonditic layer rich in manganese oxide mineral and often occur alternating with arenaceous gonditic layer. Braunite is the dominant mineral in the ore with subordinate amounts of pyrolusite and psilomelane.

Ore zone: The manganese ore horizons occur as a bed at the stratigraphic contact of quartz-mica-schist and pink gneiss and underlying mica-sillimanite-schist all along its strike length. The ore bed is typically lenticular in nature. The general strike of the ore bed is SSE-NNW with moderate to steep dip. The thickness of horizon varies from 2 m to 35 m. the manganese ore horizon dip towards ENE with an angle varying between 50°-68°. A geological map and cross sections are shown herewith.

Geological Plan & sections are shown as Figure 2.2 and Figure 2.3

2.3 EXPLORATION DETAILS

2.3.1 EXPLORATION ALREADY CARRIED OUT

There is an old quarry towards north of the applied area. The size of the quarry is 220 m x 90 m while the depth is upto 6 m. A well from the bottom of the quarry extends upto 9 m depth from the quarry floor. The GSI has done exploration in the area. 2060.95 m drilling has been done in form of 17 bore holes.

N

SURFACE PLAN

- LEGEND
- MLBOUNDARY
 - QUARRY
 - CONTOUR
 - ROAD
 - UPL

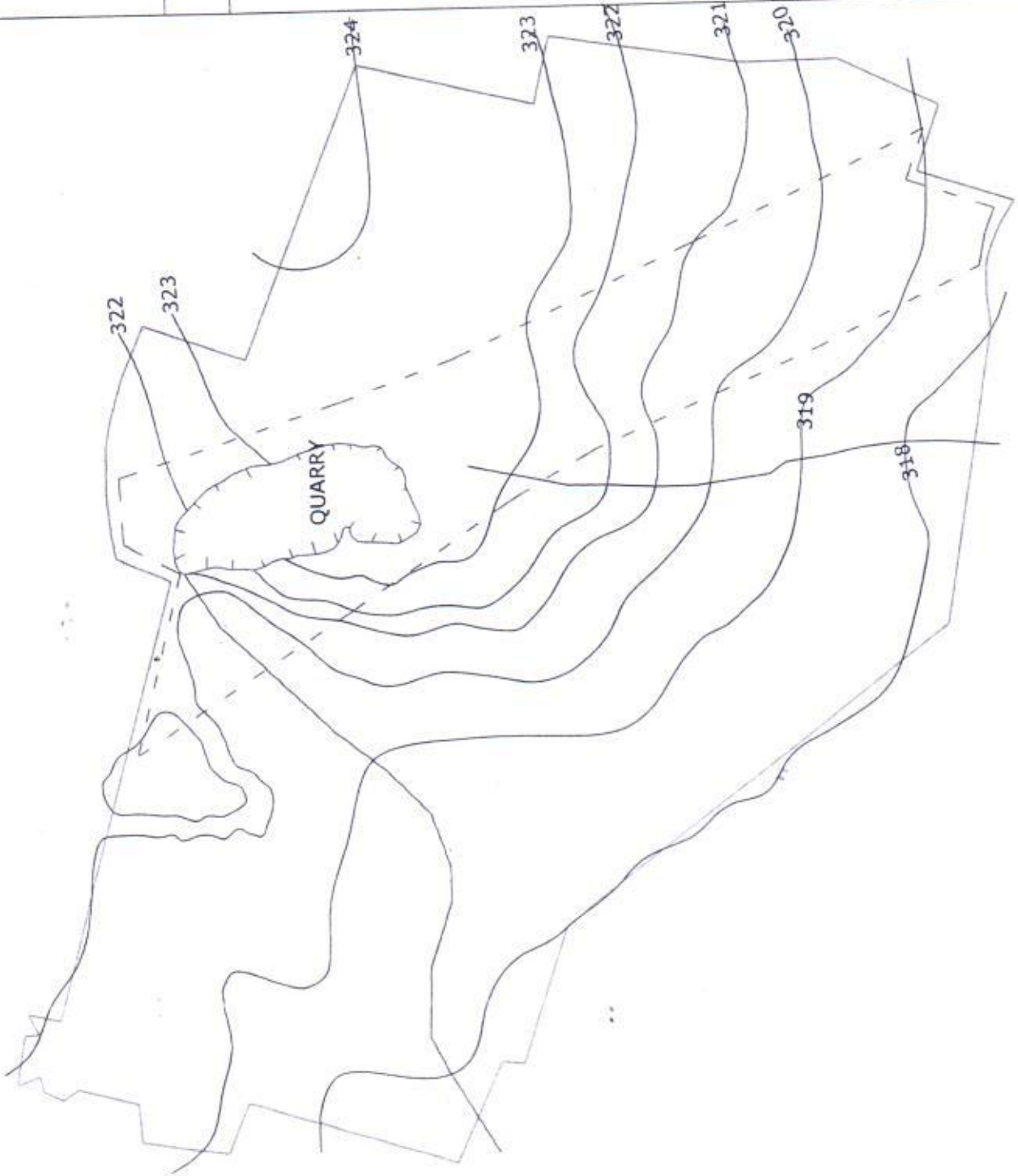
FIGURE-2.1

PROJECT:
PARSODA MANGANESE MINE

CLIENT:
MANGANESE ORE INDIA LIMITED

TITLE:
SURFACE PLAN

CONSULTANT:
BHAGAVATHI ANA LABS LTD, HYDERABAD





GEOLOGICAL PLAN

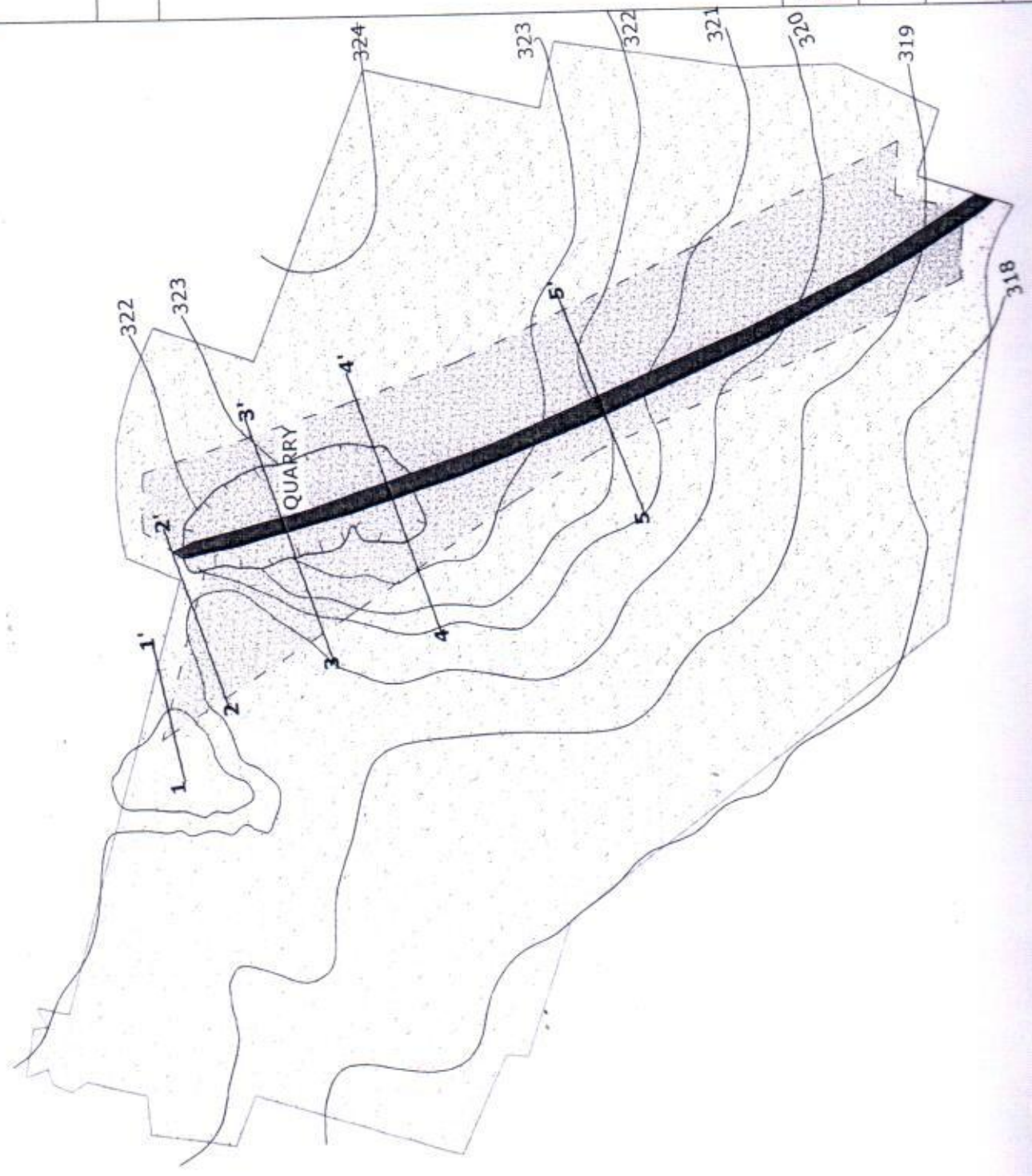
- LEGEND
- MLBOUNDARY
 - QUARRY
 - CONTOUR
 - ROAD
 - UPL
 - MICA SCHIST
 - MN ORE
 - SOIL

FIGURE-2.2

PROJECT:
PARSODA MANGANESE MINE

CLIENT:
MANGANESE ORE INDIA LIMITED

TITLE:
GEOLOGICAL PLAN



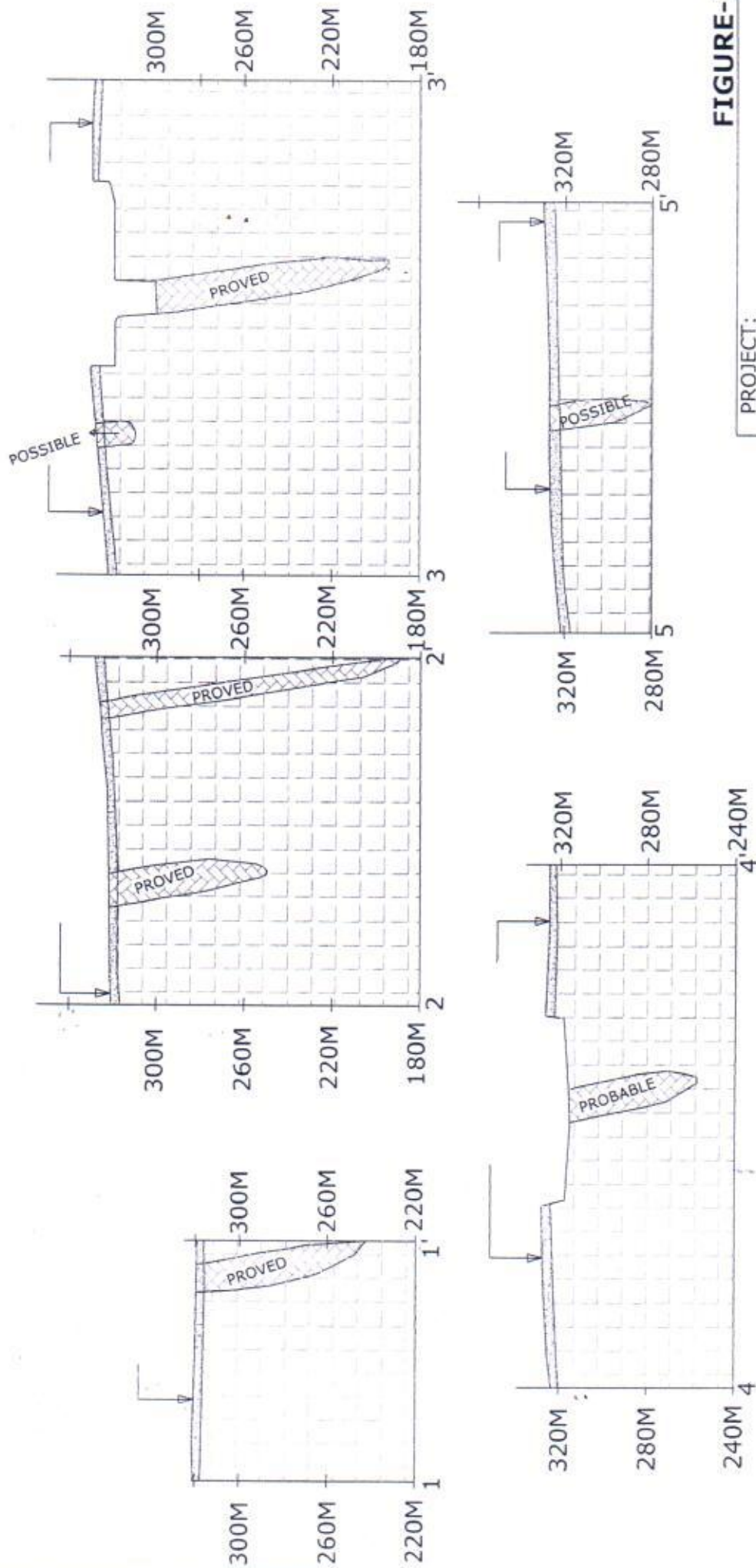


FIGURE-2.3

PROJECT:

PARSODA MANGANESE DEPOSIT

CLIENT:

MANGANESE ORE (INDIA) LTD, NAGPUR

TITLE: GEOLOGICAL SECTION

CONSULTANT:

BHAGAVATHI ANA LABS LTD., HYDERABAD

2.3.2 EXPLORATION PROPOSED TO BE CARRIED OUT

TABLE 2.1: PROPOSED EXPLORATION

YEAR	NO.OF BORE HOLES	TOTAL METERAGE	INCLINATION	LOCATION
1 st	3	225 m	70 ⁰	SSE of quarry
2 nd	4	300 m	70 ⁰	West of applied area
3 rd	3	225 m	70 ⁰	West of applied area
4 th	2	150 m	70 ⁰	West of applied area

Source: Approved Mining Plan

2.4 RESERVES & ANTICIPATED LIFE OF MINE

Estimated proved mineral reserves of Manganese (111)	: 1, 85, 882 t
Estimated probable mineral reserves of Manganese (122)	: 1, 40, 569 t
Estimated possible mineral reserves of Manganese (333)	: 2, 01, 262 t
Expected rate of production/year	: 40,000 TPA
Anticipated Life of Mine	: 10 years

(However the life of mine will increase after exploration during the ensuing Mining Plan period.

2.4.1 GRADE

Two Grades of the ore will be recovered from the mine i.e. 45% Mn and 0.26% P from western band and 38.39% Mn and 0.29% P from eastern band.

2.5 MINING

Opencast other than fully mechanized method of mining will be adopted. All operations of mining will be done by deployment of heavy earth moving machineries for excavation, loading and transport except deep-hole drilling. Sorting and sizing be carried out by manual means. Loading of ore will be done manually.

Removal of over burden will be done by loader cum excavator. Drilling in OB & ore will be done by jack hammer or drills of hole dia upto 75 mm. Blasting will be carried out for heaving effect and fragmentation to the deposit. Blasted material will be

EIA/EMP Report of Parsoda Manganese Ore Mine of M/s Manganese Ore (India) Ltd.

loaded into the dumpers by loaders and will be transported to the destination dump yard. Secondary blasting, if needed, will be carried out. Handling of waste rock will be done by excavators of 0.9 to 3.2 cum & dumpers of 10 t to 35 t capacity.

The height and width of the benches will be 7.5m & >15m. The bench slope will be maintained at 60° and over all pit slope will be 45°. Working has been proposed towards north eastern side of the applied area around the existing quarry. Working will be carried out along the strike and in depth. The hang wall side and foot wall side will also be stripped to go in depth. The faces will be laid along the NNW-SSE direction and will advance towards south and in depth. The 1st bench will be in soil while the rest of the benches will be in OB mica schist or ore body.

The year wise production and development program is given in **Table 2.2**.

TABLE 2.2: PROPOSED YEAR-WISE PRODUCTION/DEVELOPMENT

Year	Overburden			Total production (t)
	Soil (m ³)	OB Waste(m ³)	Bed Rejects (m ³)	
1	9,750	37,267	5,333	28,000
2	7,500	39,615	6,095	32,000
3	10,500	47,047	7,238	38,000
4	10,500	49,881	7,619	40,000
5	11,250	50,381	7,619	40,000

Source: Approved Mining Plan

Conceptual Plan and sections are enclosed as Figure 2.4 and Figure 2.5

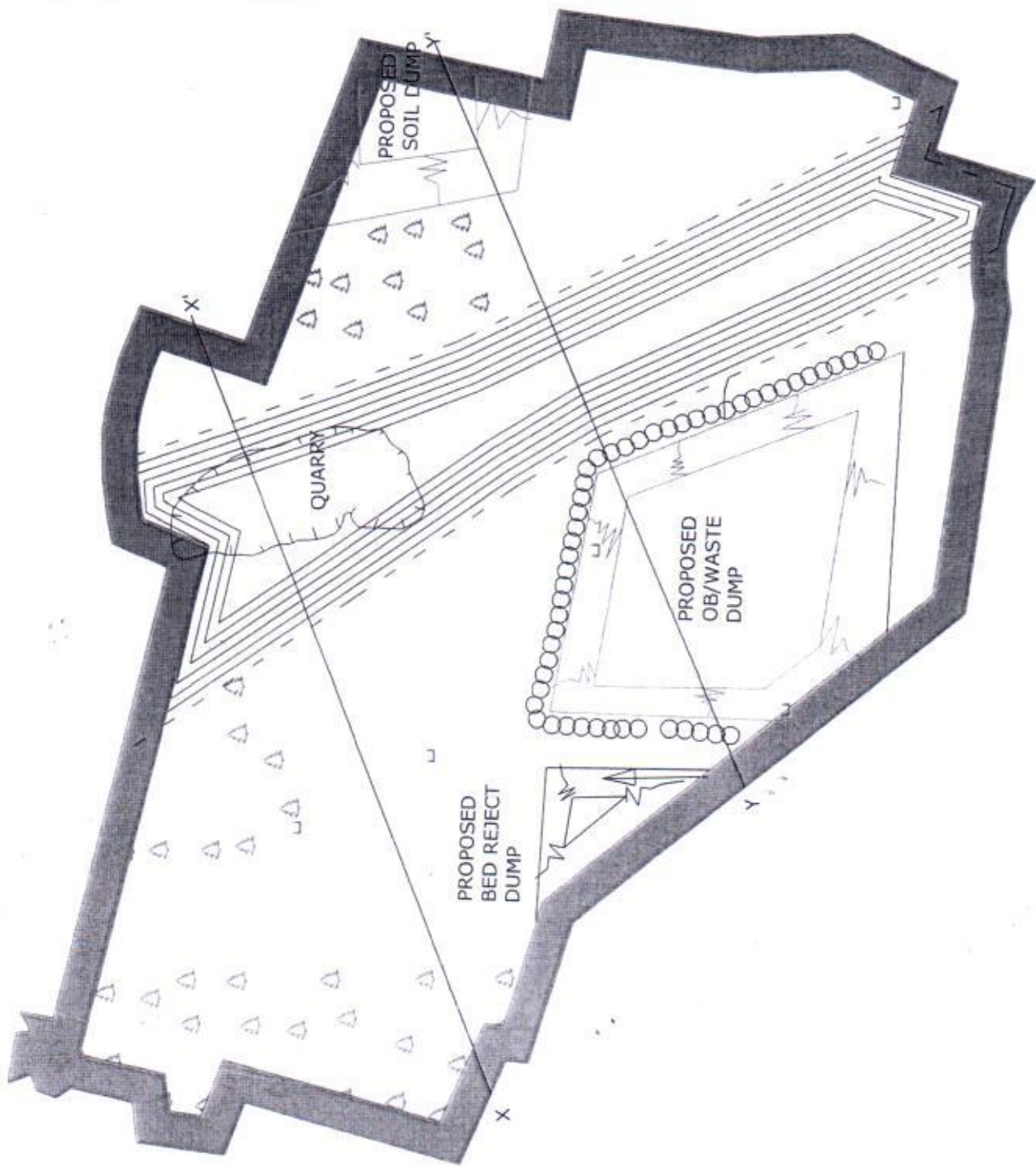
2.6 BLASTING

Blasting will be done as per details here under:

Spacing	= 1.0m.
Burden	= 0.8m.
Depth of hole	= 1.5m.
Charge per hole	= 350 gms.
Powder factor	= 8.57t./kg
Diameter of hole	= 32mm

Type of explosive to be used

1. Permitted Explosive viz Indomides
2. Nonel and ED



CONCEPTUAL PLAN

LEGEND



ML BOUNDARY



QUARRY



ROAD



UPL



30M WIDTH GREEN BELT



PLANTATION



RAIN WATER HARVESTING PIT



GARLAND DRAIN

FIGURE-2.4

PROJECT:
PARSODA MANGANESE MINE

CLIENT:
MANGANESE ORE INDIA LIMITED

TITLE: CONCEPTUAL PLAN

CONSULTANT:
BHAGAVATHI ANA LABS LTD, HYDERABAD

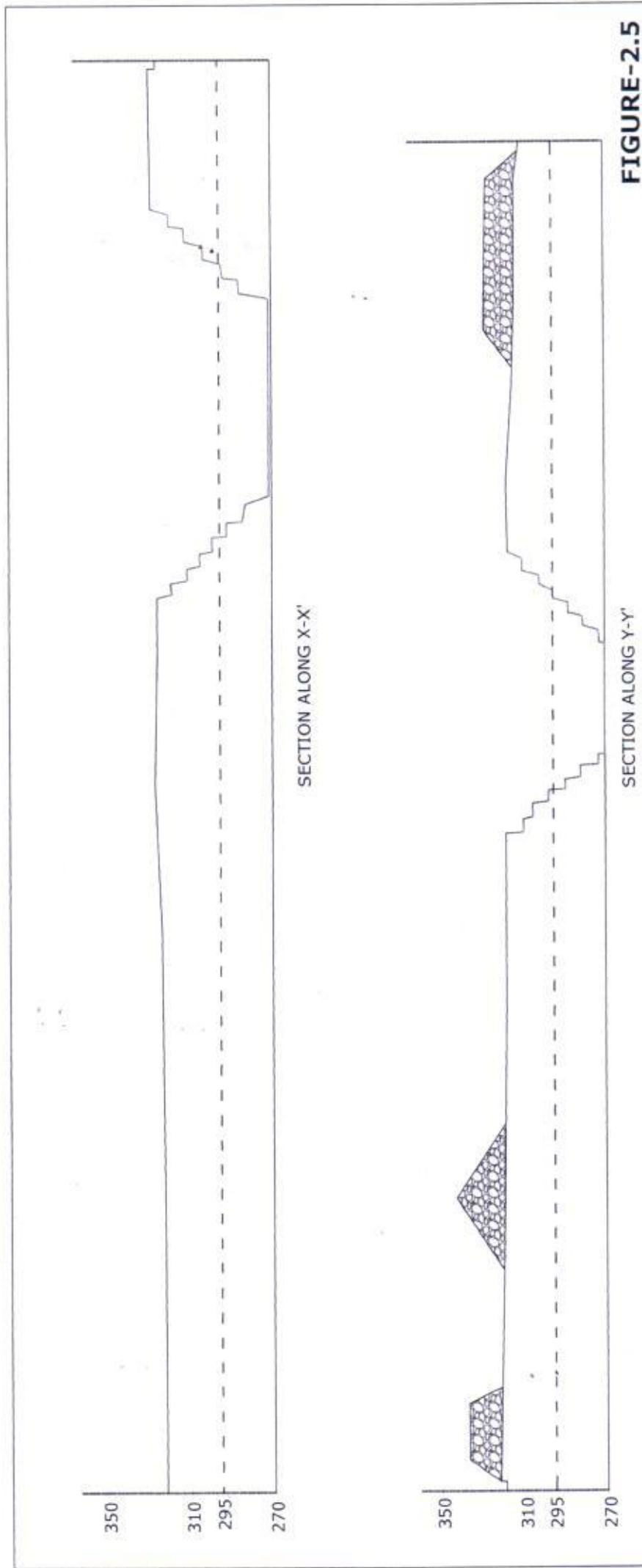


FIGURE-2.5

PROJECT:
PARSODA MANGANESE MINE

CLIENT:
MANGANESE ORE INDIA LIMITED

TITLE:
CONCEPTUAL SECTIONS

CONSULTANT:

BHAGAVATHI ANA LABS LTD, HYDERABAD

LEGEND

MLBOUNDARY

PLANTATION

GROUND WATER TABLE

PIT/QUARRY

DUMP

Powder Factor

Powder factor will be 8.57 t per Kg of explosive

Secondary Blasting

Secondary blasting will be needed to the extent of 3%

Storage of Explosives

The applicant has a valid licence from Controller of Explosive to store explosive in magazine. The magazine has been installed at Munsar Mine site.

2.7 MINE DRAINAGE

The water table in the area is about 20 – 25m below general ground level (315m MSL). The water table varies from 290m to 295m MSL. Workings are expected to be done 10m below the water table i.e 285m MSL by the end of 5th year of working. It is proposed to install two electric operated pumps and one diesel pump of 15 – 50 H.P. Drained rain water will be allowed to flow towards south side into the sump. The water accumulated in the sump will be utilised for dust suppression. Conceptual plan showing ground water table is enclosed as **Figure 2.5**.

2.8. NATURE AND QUANTITY OF TOPSOIL

The soil is sandy in nature in loose form mixed with grit and small pebbles. It is observed that the top soil thickness in the lease area is in the range of 1.0 – 1.5m. It is estimated that the total topsoil generation will be about 49,500 m³ which will be utilised for spreading over the dumps for afforestation.

2.9 STACKING OF MINERAL REJECTS & DISPOSAL OF WASTE

OB/Waste: The over burden consisting of hanging wall quartzite gneiss. This contains no mineral of economic importance. The bed rejects arising out from sorting and sizing of ROM comprises Gondites, Manganiferrous quartzite and some proportion of Schist. The total waste generation during life of mine is estimated as 1.10357 million m³

2.9.1 LAND CHOSEN FOR DISPOSAL OF WASTE

Two important factors are taken into consideration while selecting dumping site.

- (i) The land should be barren (non-mineralized)
- (ii) Beyond the ultimate pit limit.

Based on the above, waste dump will be located towards south west of the applied area. The manner of disposal of overburden will be mechanical means. 3 dumps will be created of soil, OB/waste & bed rejects.

Soil Dump	-	100 m x 100 m x 6 m
OB/Dump	-	230 m x 170 m x 7 m
Bed rejects	-	190 m x 40 m x 6 m

The ultimate dump slope will be maintained at 28° . Each slope will have inward slope with catch drains at the inward side of the terrace. The catch drains of the individual terrace will be connected to the garland drain outside the periphery of the dump.

The dump will be designed in retreating manner so as to have quicker availability of dead terraces for earlier stabilization by plantation. The bed rejects amounting to 40% of ROM will be stacked separately and mine waste towards south west.

2.10 USE OF MINERAL

The mineral is intended for sale to Bhilai and Rourkela Steel Plants and Ferro Manganese plants as well as following industries in India and abroad.

- a) Ferro Manganese plants at M.E.L., Kanhan, Tumsar and Joda.
- b) Steel Plants in India.

2.11 SITE SERVICES

Mine office, Office & stores, First aid, rest shelter, drinking water facilities, Urinals etc will be constructed and maintained in the mining lease area

2.12 EMPLOYMENT POTENTIAL

The total number of employees required for the proposed project area is 110.

CHAPTER 3: BASELINE DATA

DESCRIPTION OF BASELINE ENVIRONMENT

3.1 INTRODUCTION

The baseline environmental study is carried out in a radius of 10 km around the mine lease boundary. The study area map & topographical map of 10 km radius are enclosed as **Figure 3.1 & 3.2**, respectively.

3.2 STUDY PERIOD

The baseline environmental study was carried out during summer 2009.

3.3 AIR ENVIRONMENT

CLIMATE AND METEOROLOGY

The study area enjoys a typical tropical climate with distinct summer, rainy and winter seasons. Micrometeorological data within the project area was monitored through an automatic weather monitoring station set up at mine site during summer season 2009. Wind speed, wind direction, temperature and relative humidity were recorded in the met-station and parameters like cloud cover and rainfall were recorded by visual observations and rain gauge respectively.

Hourly average, maximum and minimum values were recorded continuously for 24 hours duration. The data generated is computed to obtain wind roses of the area. The plotted wind rose diagram representing 16 directions is depicted in **Figure 3.3**

TABLE 3.1: SUMMARY OF MICRO METEOROLOGICAL DATA MONITORED AT SITE DURING STUDY PERIOD

S. No.	Parameters	Data
1	Maximum temperature (0C)	47.1
2	Minimum temperature (0C)	13.4
3	Maximum Relative Humidity (%)	87
4	Minimum Relative Humidity (%)	5
5	Total Rainfall (mm)	Nil
6	Predominant wind direction	NW (blowing from)

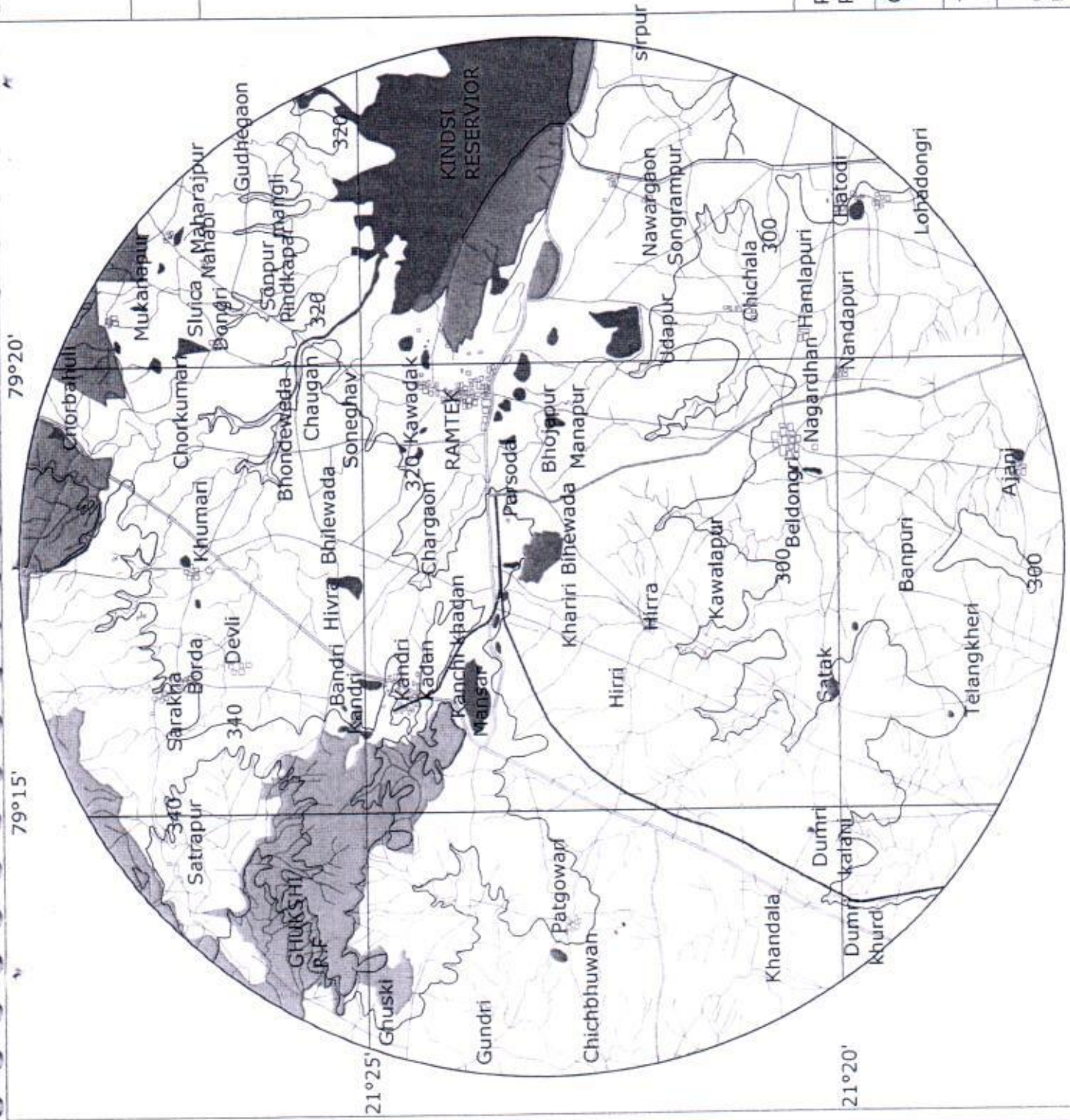
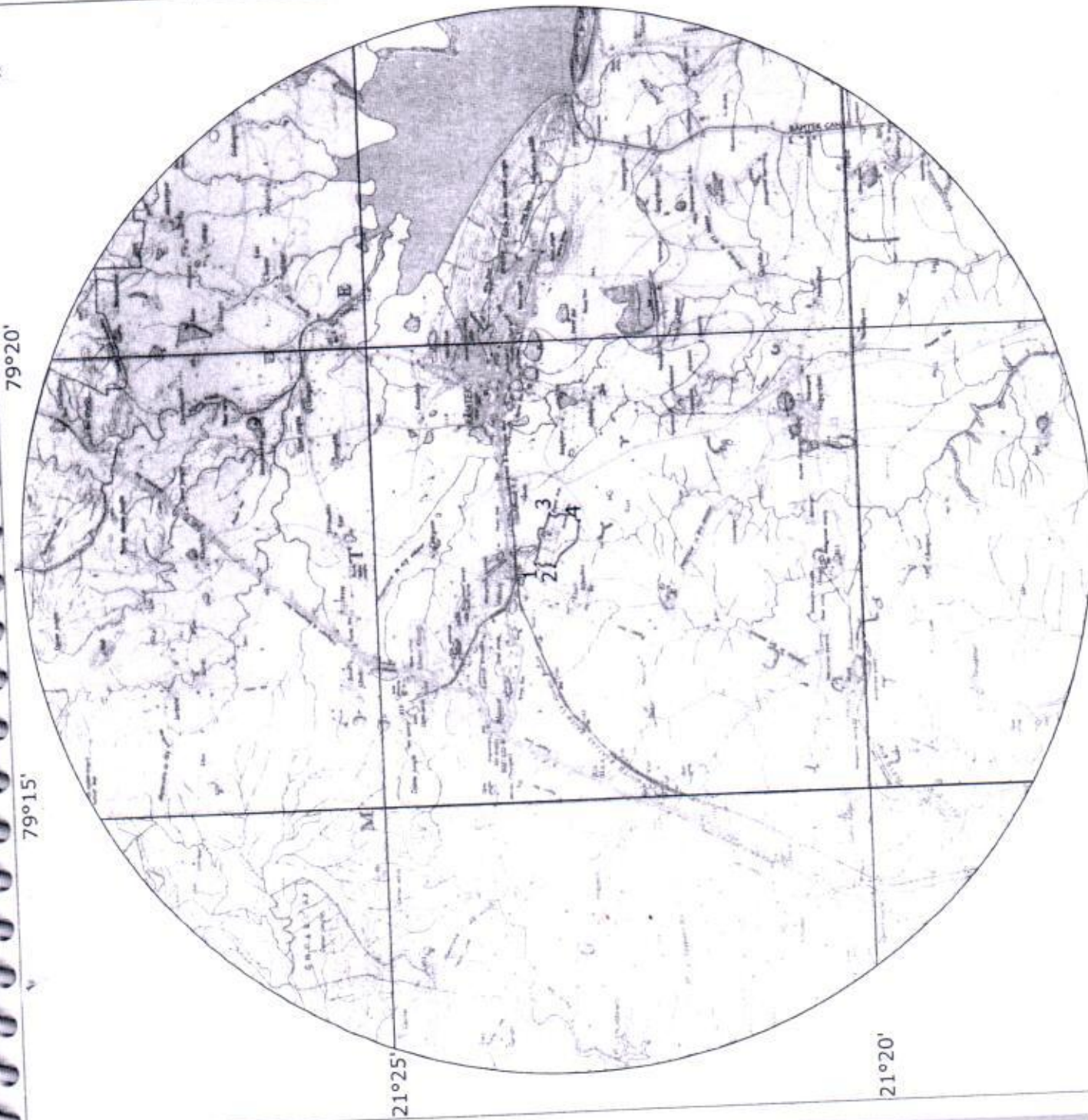


FIGURE-3.1

PROJECT:	PARSODA MANGANESE MINE
CLIENT:	MANGANESE ORE INDIA LIMITED
TITLE:	STUDY AREA MAP
CONSULTANT:	BHAGAVATHI ANA LABS LTD., HYDERABAD



TOPOGRAPHICAL MAP

LEGEND



MINE LEASE

COORDINATES OF MINE LEASE

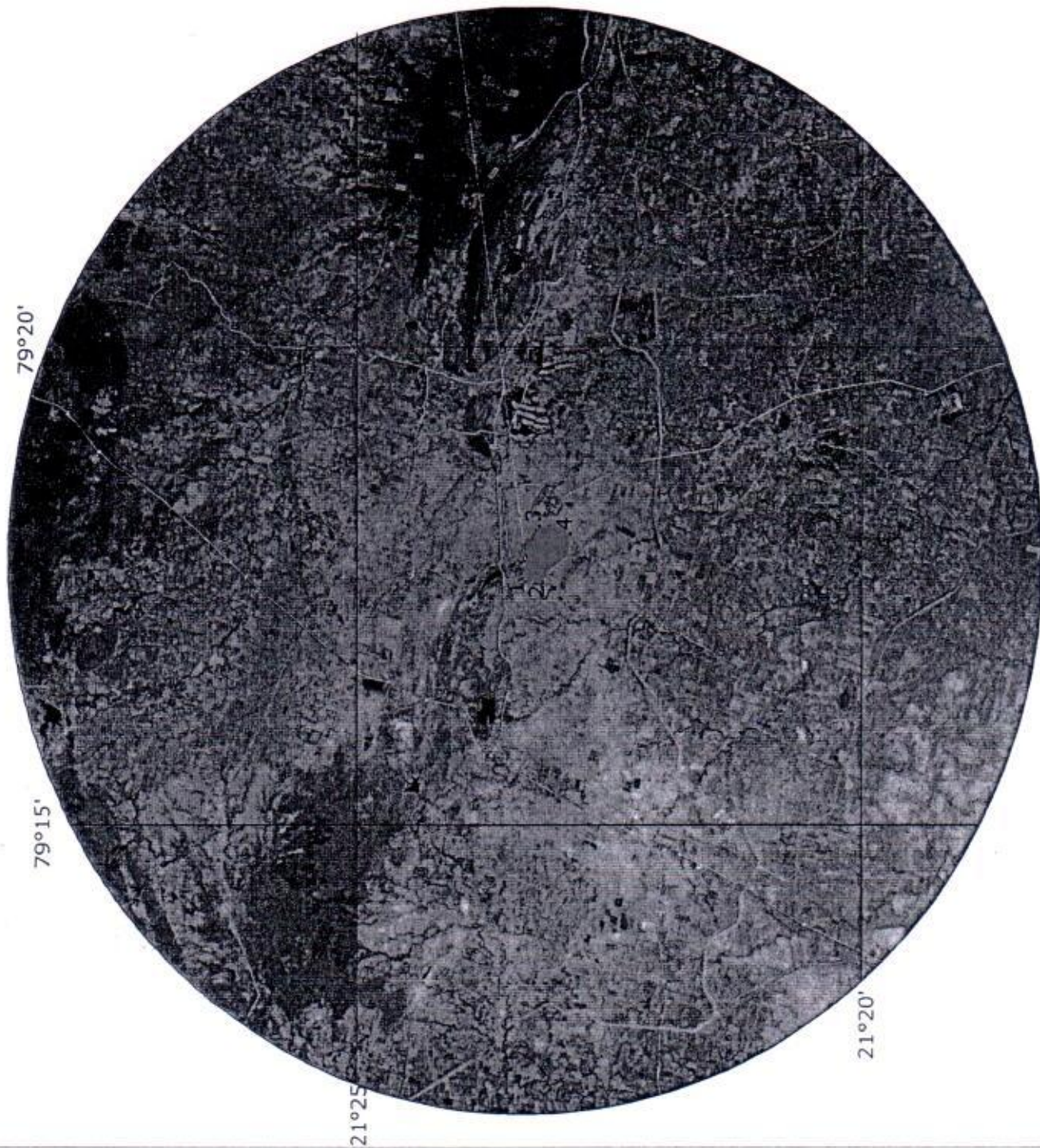
1. 21°23'24.7 "N, 79°17'42.6"E
2. 21°23'12.5"N, 79°17'39.9"E
3. 21°23'16.10"N, 79°18'03.0 "E
4. 21°22'58.0"N, 79°18'0.2"E

FIGURE-3.2

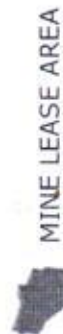
PROJECT:
PARSODA MANGANESE MINE

CLIENT:
MANGANESE ORE INDIA LIMITED

TITLE: TOPOGRAPHICAL MAP



GOOGLE MAP



MINE LEASE AREA



ENGINEERING COLLEGE

COORDINATES OF MINE LEASE

1. 21°23'24.7 "N, 79°17'42.6"E
2. 21°23'12.5"N, 79°17'39.9"E
3. 21°23'16.10"N, 79°18'03.00"E
4. 21°22'58.0"N, 79°18'0.2"E

FIGURE-3.2(a)

PROJECT:

PARSODA MANGANESE MINE

CLIENT:

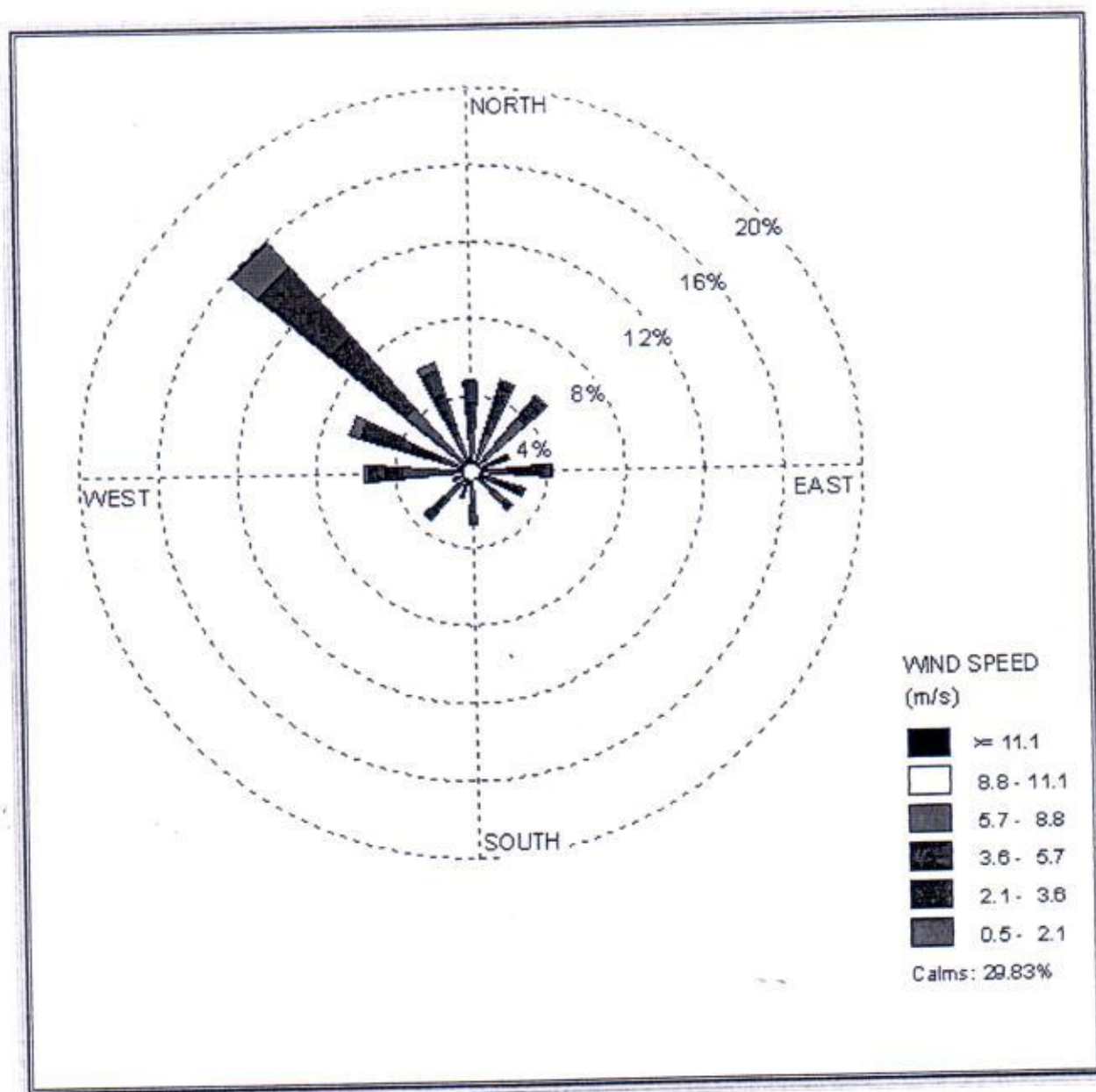
MANGANESE ORE INDIA LIMITED

TITLE:GOOGLE MAP

CONSULTANT:

BHAGAVATHI ANA LABS LTD, HYDERABAD

FIGURE 3.3: WIND ROSE DIAGRAM



Scenario of the existing Ambient Air Quality in the study area of 10 km radius around mine site has been assessed through a network of 7 Ambient Air Quality locations. The design of monitoring network in the air quality surveillance program was based on the following considerations.

- ☞ Topography / Terrain of the study area
- ☞ Human Settlements
- ☞ Wind pattern
- ☞ Representation of Regional Background levels
- ☞ Accessibility of monitoring site

Pre-calibrated R.D. Samplers have been used for monitoring the existing AAQ status. Maximum, Minimum, Average and Percentile values have been computed from the raw data collected at all individual sampling stations to represent the Ambient Air Quality Status. The significant parameters viz., Suspended Particulate Matter (SPM), Particulate Matter (PM₁₀), Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x) and Carbon monoxide (CO) were monitored in the core and buffer zones.

3.4 CRITERIA FOR SITE SELECTION OF AMBIENT AIR QUALITY MONITORING STATIONS

The number of ambient air quality monitoring stations to be put up for generating the baseline data and for further monitoring is arrived at using the model suggested by USEPA (1975b). The model suggests that the minimum number of stations should be four. However, the exact number has to be arrived at by knowing the wind rose (wind blowing directions and their respective frequencies) at site and the distances of the residential and sensitive areas from the project site in the buffer zone. This model suggested by Houghland and Stephens, 1976 (Ref. The Design of Air Quality Monitoring Network," R.E. Munn, 1981) is simple and reliable. It suggests setting up of monitoring stations at those locations where the probability of occurrence of maximum GLCs (Ground Level Concentrations) is high. The probability factor was found by determining the 'Coverage Factor (A_{jk})' for residential locations around the proposed site, which are liable to be affected by pollutants. Coverage Factors 'A_{jk}' for all the potential locations were calculated by the following formula.

$$A_{jk} = \text{Freq. (k)} / (1 + D_j)$$

Where,

A_{jk} = Coverage factor of monitoring station in the 'k'th downwind Sector from source

Freq. (k) = Frequency of wind direction in the 'k'th sector

D_j = Distance from the station to the source in km

Seven probable monitoring stations were selected all around the project site with due consideration to the wind direction and the distance from the site. For each of these stations coverage factor ' A_{jk} ' was calculated and presented in **Table 3.2**. The stations, which gave higher A_{jk} values, were taken as monitoring stations.

TABLE 3.2: COVERAGE FACTORS FOR AMBIENT AIR QUALITY MONITORING STATIONS

S.No.	Monitoring stations	Distance in (D_j) km	Direction w.r.t. mine	Frequency k %	A_{jk}	AAQM Ranking
1	Ramtek	3.3	ENE	0.0112	0.002605	--
2	Khariri Bihewada	1.1	S	0.05182	0.024676	II
3	Kandri Kadan	3.42	NW	0.02801	0.006337	IX
4	Kawdak	2.8	NE	0.03361	0.008845	V
5	Manapur	2.7	ESE	0.06583	0.017792	III
6	Mansar	1.8	NW	0.02801	0.010004	IV
7	Udapur	3.8	SW	0.15966	0.033263	I
8	Patgowari	6.5	W	0.04202	0.005603	X
9	Chargoan	2.3	N	0.02801	0.008488	VII
10	Nawargaon	6.7	ESE	0.06583	0.008549	VI
11	Kawalapur	2.8	S	0.02801	0.007371	VIII

Apart from the mine lease area six other stations- Ramtek, Khariri Bihewada, Manapur, Kawadak, Mansar mine, Chargaon were chosen as the ambient air quality monitoring stations based on AAQM ranking. The ambient air quality sampling locations are given in the **Figure 3.4** and their distances and directions with respect to the ML area are given in **Table 3.3**.

The baseline ambient air quality test results monitored during the study period are well within the prescribed National Ambient Air Quality Standards for industrial area and Residential area at the present scale of operation

TABLE 3.3: AMBIENT AIR QUALITY MONITORING LOCATIONS

S. No	Location	Direction w.r.t Mines	Distance w.r.t Mines (km)
A-1	Mine Lease Area	--	-
A-2	Ramtek	ENE	3.3
A-3	Khariri Bihewada	SW	1.1
A-4	Manapur	ESE	2.7
A-5	Kawadak	NE	2.8
A-6	Mansar	NW	1.8
A-7	Chargaon	N	2.3

Results of ambient air quality in detail are given in **Annexure I**. The 98th Percentile values of ambient air quality are given in **Table 3.4**

**TABLE 3.4: SUMMARY OF AMBIENT AIR QUALITY
(98TH PERCENTILE VALUES)**

UNITS: $\mu\text{g}/\text{m}^3$

Name of sampling location	SPM	PM ₁₀	SO ₂	NO _x
Mine Lease Area	130.5	40.37	8.3	14.6
Ramtek	131.5	39.76	7.9	16.6
Khariri Bihewada	132.0	42.42	6.8	7.1
Manapur	132.1	42.42	6.4	8.9
Kawadak	130.5	41.82	8.6	12.2
Mansar Mine	136.1	44.00	9.1	12.9
Chargaon	135.6	44.27	9.4	13.4

The baseline ambient air quality test results monitored during the study period are well within the prescribed New National Ambient Air Quality Standards notified on 18th November 2009

3.5 NOISE ENVIRONMENT

A preliminary reconnaissance survey was undertaken to identify the major noise generating sources in the area. The noise at different noise generating sources based on the mining activities, commercial activities, traffic, etc have been identified. The monitoring of noise levels around the core zone and buffer zone were carried out to assess the baseline status & impact of noise generated due to the activity.

The noise level readings are given in **Annexure II**. Monitoring locations are shown in the **Figure 3.5** and their directions and distances with respect to the ML area are given in the **Table 3.5** and the summary of Noise levels during study period is given in **Table 3.6**

TABLE 3.5: DETAILS OF NOISE QUALITY MONITORING LOCATIONS

S. No	Location	Direction w.r.t Mines	Distance w.r.t Mines (km)
N-1	Mine Lease Area	--	-
N-2	Ramtek	ENE	3.3
N-3	Khariri Bihewada	SW	1.1
N-4	Manapur	ESE	2.7
N-5	Kawadak	NE	2.8
N-6	Mansar Mine	NW	1.8
N-7	Chargaon	N	2.3

The details of Noise levels are summarized below:

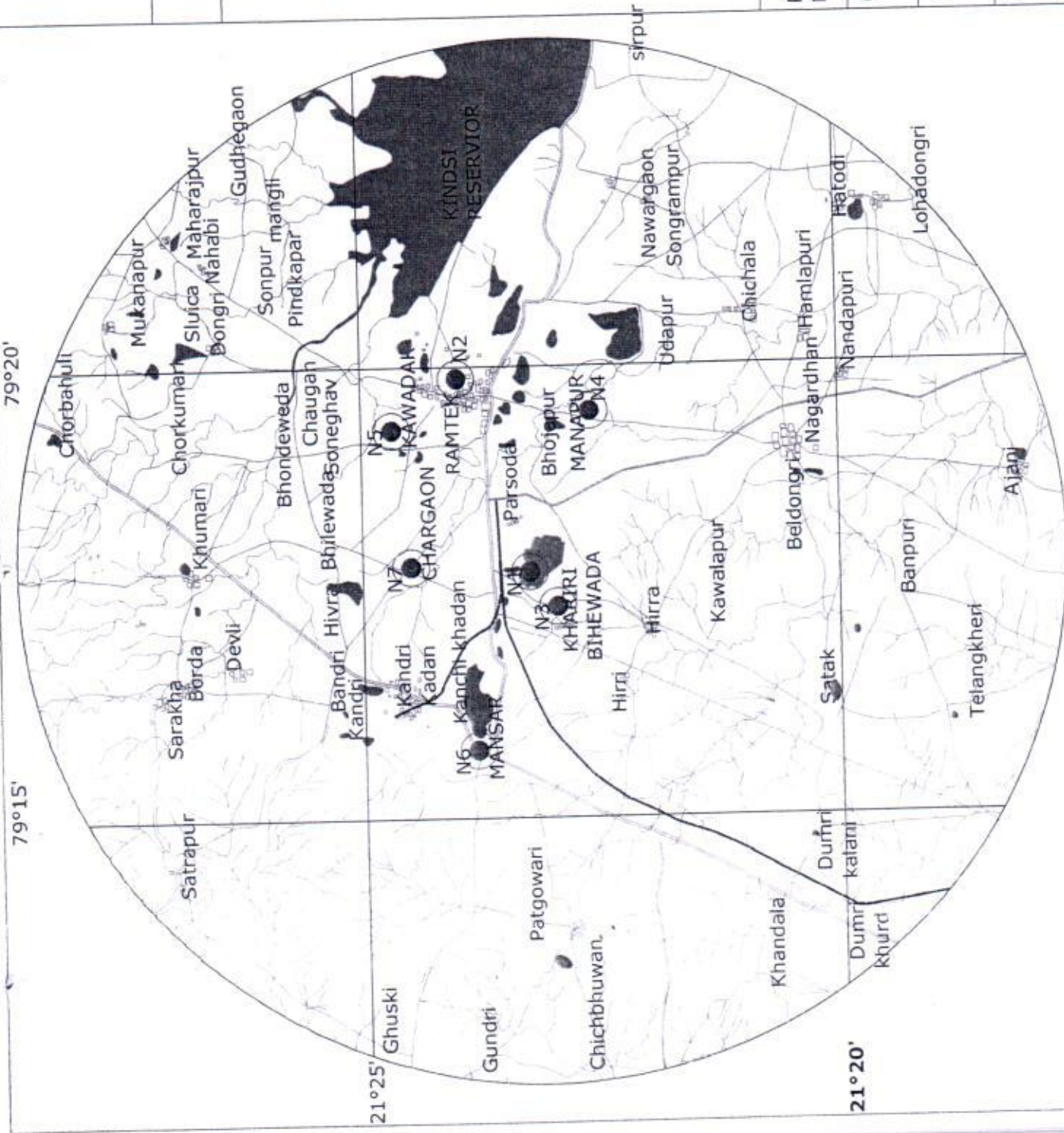
TABLE 3.6: NOISE LEVELS DURING STUDY PERIOD UNITS: dB (A)

	N1	N2	N3	N4	N5	N6	N7
Ld	52.6	52.9	50.7	51.4	51.0	50.8	50.8
Ln	42.0	42.2	40.8	42.0	42.2	42.2	42.5

It was noted that the noise values obtained were within the prescribed Ambient Air Quality Standards with respect to Noise.

3.5.1 TRAFFIC DENSITY

The characteristics and volume of traffic in the buffer zone was studied during the monitoring period, on Munsar-Tumsar state Highway road. Summary of the traffic study is given in **Table 3.7**.



AMBIENT NOISE LEVEL
MONITORING STATIONS

L E G E N D

- MINING AREA
- ROAD
- RAILWAY LINE
- VILLAGES
- WATER BODY
- NALA

FIGURE-3.5

PROJECT:
PARSODA MANGANESE MINE

CLIENT:
MANGANESE ORE INDIA LIMITED

TITLE: AMBIENT NOISE LEVEL
MONITORING STATIONS

CONSULTANT:
BHAGAVATHI ANA LABS LTD, HYDERABAD

Type of Vehicle	Total traffic on Munsar-Tumsar state Highway (in 24 hrs)
HMV	1200
LMV	1140
2 & 3 Wheelers	1135
Total	3475

Perusal of the above monitored data shows that the traffic density Munsar-Tumsar State Highway road in a working day is 3475.

3.6 WATER ENVIRONMENT

The area forms the southern slope of Munsar ridge. Rain water falling on slopes is drained by small gullies and streams. Ramtek tank is located at a distance of 6.0 km in the NE direction of the area. The general slope of the applied area is towards south. The overflow of the area goes to Bhagi nallah in south at 7.0 Km through non perennial seasonal water courses.

Ground water table as seen in the dug wells is 20-25m below general ground level. Ground water recharge in the wells is poor due to schist formation in the area, which does not permit ground water percolation from one aquifer to another. The water percolating into the pits from the unsaturated zone is therefore seasonal.

3.6.1 SURFACE WATER

No surface water source such as rivers, streams, nallah, tank or any water reservoir exists in the lease area except the seasonal runoff of rainwater. The main drainage of the area is through different seasonal watercourses flowing towards south direction. Since there is no watercourse in the lease area, diversion is not required.

3.6.2 GROUND WATER

The ground water table in the lease area varies from 290 m RL to 295 m RL. Mining will be done 10 m below the ground water table.

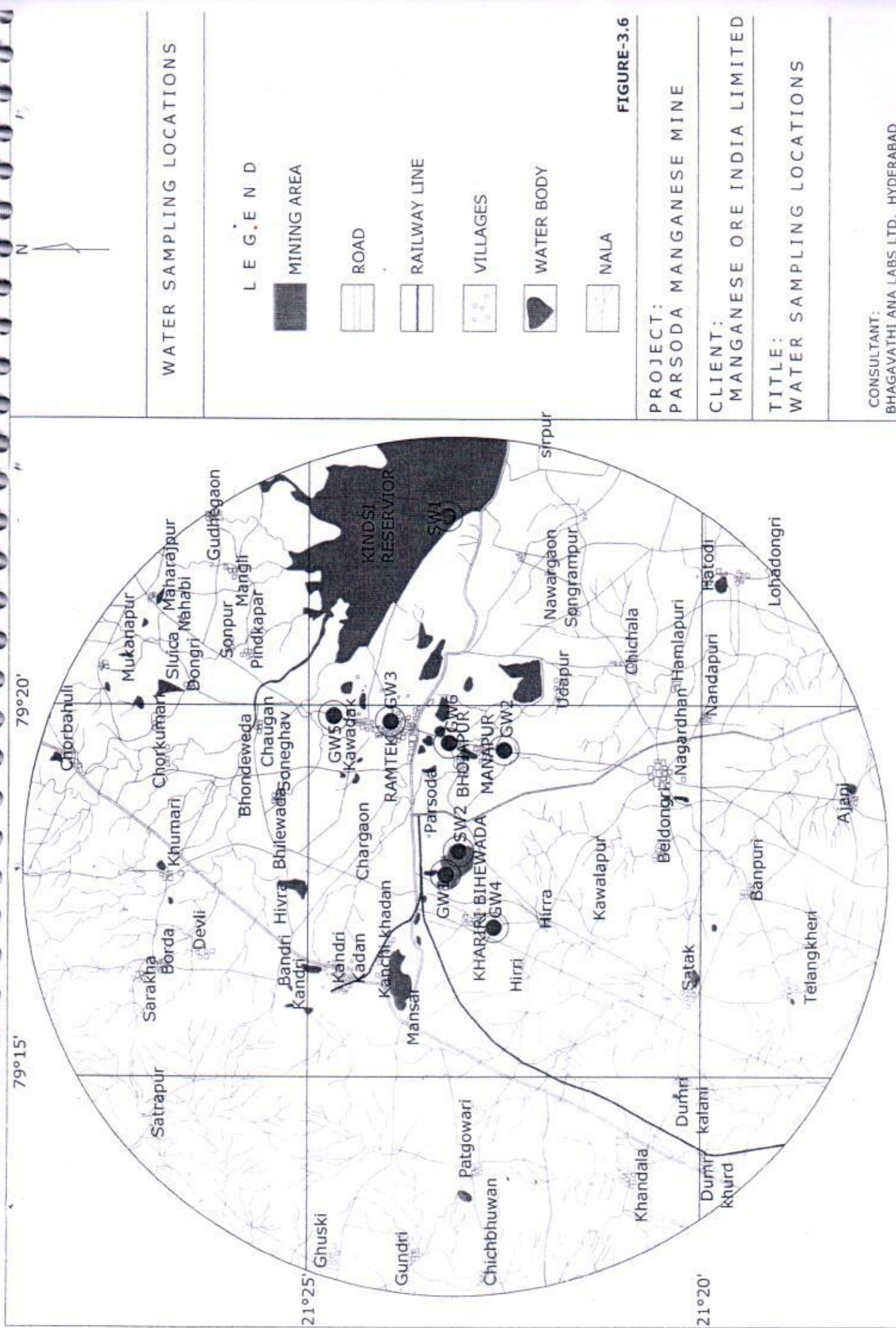
The location details of water samples collected is given in **Table 3.8** and locations are shown in the **Figure 3.6**. Surface Water Quality results are given in **Table 3.9** and Ground Water Quality results are given in **Table 3.10**

TABLE 3.8: DETAILS OF WATER QUALITY MONITORING STATIONS

S. No	Code	Location	Source
1	SW1	Kindsi Reservoir	Surface Water
2	SW2	KL Pit	Surface Water
1	GW1	Mine Lease Area	Dug Well
2	GW2	Manapur	Dug Well
3	GW3	Ramtek	Dug Well
4	GW4	Khariri Bihewada	Dug Well
5	GW5	Kawadek	Dug Well
6	GW6	Bhojapur	Dug Well

TABLE 3.9: WATER QUALITY DATA-SURFACE WATER

S. No.	Parameter	Units	SW1	SW2
1	Colour	Hazen units	5	5
2	Taste	--	Agreeable	Agreeable
3	Dissolved Oxygen	mg/l	6.1	5.7
4	pH	--	7.74	7.99
5	Turbidity	NTU	4	3
6	Odour	--	UO	UO
7	TDS	mg/l	190	206
8	Total Hardness as CaCO ₃	mg/l	85	100
9	Alkalinity	mg/l	110	125
10	Nitrate as NO ₃	mg/l	1	2
11	Chlorides as Cl	mg/l	15	10
12	Sulphates as SO ₄	mg/l	7	12
13	Calcium as Ca	mg/l	20	26
14	Magnesium as Mg	mg/l	8.5	8.5
15	Fluoride as F	mg/l	0.50	0.45
16	Phenolic compounds as C ₆ H ₅ OH,	mg/l	<0.001	<0.001
17	Mercury as Hg	mg/l	<0.001	<0.001
18	Cyanide as CN	mg/l	<0.01	<0.01
19	Lead as Pb	mg/l	<0.01	<0.01
20	Cadmium as Cd	mg/l	<0.01	<0.01
21	Chromium as Cr	mg/l	<0.01	<0.01
22	Copper as Cu	mg/l	<0.01	<0.01
23	Zinc as Zn	mg/l	<0.01	<0.01
24	Iron as Fe	mg/l	0.20	0.15
25	Manganese as Mn	mg/l	<0.01	<0.01
26	Selenium as Se	mg/l	<0.01	<0.01
27	Arsenic as As	mg/l	<0.01	<0.01
27	Mineral Oil	mg/l	Absent	Absent
28	Residual Free, Chlorine	mg/l	Nil	Nil
29	Aluminum as Al	mg/l	<0.01	<0.01
30	Boron as B	mg/l	0.04	0.05
31	Total Coliform	MPN/100ml	50	30



CONSULTANT:
BHAGAVATHI ANA LABS LTD, HYDERABAD

TABLE 3.10: WATER QUALITY DATA-GROUND WATER (a)

S. No	Parameter	Units	GW1	GW2	GW3
1	Colour	Hazen units	10	<5	<5
2	Taste	--	Agreeable	Agreeable	Agreeable
3	pH	--	7.40	8.01	7.96
4	Turbidity	NTU	7	1	<1
5	Odour	--	UO	UO	UO
6	TDS	mg/l	280	610	580
7	Total Hardness as CaCO ₃	mg/l	125	350	295
8	Alkalinity	mg/l	175	225	280
9	Nitrate as NO ₃	mg/l	3	17	30
10	Chlorides as Cl	mg/l	20	78	63
11	Sulphates as SO ₄	mg/l	5	100	35
12	Calcium as Ca	mg/l	26	64	88
13	Magnesium as Mg	mg/l	15	46	18
14	Fluoride as F	mg/l	0.80	0.90	0.90
15	Phenolic compounds as C ₆ H ₅ OH,	mg/l	<0.001	<0.001	<0.001
16	Mercury as Hg	mg/l	<0.001	<0.001	<0.001
17	Cyanide as CN	mg/l	<0.01	<0.01	<0.01
18	Lead as Pb	mg/l	<0.01	<0.01	<0.01
19	Cadmium as Cd	mg/l	<0.01	<0.01	<0.01
20	Chromium as Cr	mg/l	<0.01	<0.01	<0.01
21	Copper as Cu	mg/l	<0.01	<0.01	<0.01
22	Zinc as Zn	mg/l	<0.01	<0.01	<0.01
23	Iron as Fe	mg/l	0.40	0.10	0.08
24	Manganese as Mn	mg/l	0.01	<0.01	<0.01
25	Selenium as Se	mg/l	<0.01	<0.01	<0.01
26	Arsenic as As	mg/l	<0.01	<0.01	<0.01
27	Mineral Oil	mg/l	Absent	Absent	Absent
27	Residual Free, Chlorine	mg/l	Nil	Nil	Nil
28	Aluminum as Al	mg/l	0.01	<0.01	<0.01
29	Boron as B	mg/l	0.06	0.07	0.06
30	Total Coliform	MPN/100ml	Absent	Absent	Absent

TABLE 3.10: WATER QUALITY DATA-GROUND WATER (b)

S. No	Parameter	Units	GW4	GW5	GW6
1	Colour	Hazen units	<5	5	5
2	Taste	--	Agreeable	Agreeable	Agreeable
3	pH	--	7.96	7.67	7.73
4	Turbidity	NTU	1	2	2
5	Odour	--	UO	UO	UO
6	TDS	mg/l	890	870	890
7	Total Hardness as CaCO ₃	mg/l	395	565	580
8	Alkalinity	mg/l	530	360	380
9	Nitrate as NO ₃	mg/l	1	42	6
10	Chlorides as Cl	mg/l	58	135	140
11	Sulphates as SO ₄	mg/l	53	66	80
12	Calcium as Ca	mg/l	78	166	150
13	Magnesium as Mg	mg/l	49	36	50
14	Fluoride as F	mg/l	0.80	0.90	0.70
15	Phenolic compounds as C ₆ H ₅ OH,	mg/l	<0.001	<0.001	<0.001
16	Mercury as Hg	mg/l	<0.001	<0.001	<0.001
17	Cyanide as CN	mg/l	<0.01	<0.01	<0.01
18	Lead as Pb	mg/l	<0.01	<0.01	<0.01
19	Cadmium as Cd	mg/l	<0.01	<0.01	<0.01
20	Chromium as Cr	mg/l	<0.01	<0.01	<0.01
21	Copper as Cu	mg/l	<0.01	<0.01	<0.01
22	Zinc as Zn	mg/l	<0.01	<0.01	<0.01
23	Iron as Fe	mg/l	0.10	0.12	0.10
24	Manganese as Mn	mg/l	0.01	<0.01	<0.01
25	Selenium as Se	mg/l	<0.01	<0.01	<0.01
26	Arsenic as As	mg/l	<0.01	<0.01	<0.01
27	Mineral Oil	mg/l	Absent	Absent	Absent
27	Residual Free, Chlorine	mg/l	Nil	Nil	Nil
28	Aluminum as Al	mg/l	< 0.01	<0.01	<0.01
29	Boron as B	mg/l	0.08	0.07	0.07
30	Total Coliform	MPN/100ml	Absent	Absent	Absent

3.6.3 ASSESSMENT OF WATER QUALITY

3.6.3.1 SURFACE WATER

The surface water quality parameters were assessed as per the Indian standard IS 10500 (Drinking Water Standard). The observations are given below:

- ☞ It is observed that the pH of the ground water samples is in the range of 7.74 to 7.99
- ☞ Total dissolved solids (TDS) in the samples were in the range 190 to 206 mg/l
- ☞ Total hardness of the ground water samples was found to vary between 85-100 mg/l
- ☞ Fluoride concentration was found to vary between 0.45 to 0.50 mg/l
- ☞ Heavy metal concentrations in all the samples were found to be within the limits.

3.4.3.2 GROUND WATER

The ground water quality parameters were assessed as per the Indian Standard IS 10500 (Drinking Water Standard). The observations are given below:

- ☞ It is observed that the pH of the ground water samples is in the range of 7.4 to 8.01
- ☞ Total dissolved solids (TDS) in the samples were in the range 280 to 890 mg/l. TDS concentration in all the villages are above the desirable limit of 500 mg/l but within the maximum permissible limit as per IS 10500
- ☞ Total hardness of the ground water samples was found to vary between 125-580 mg/l. Total hardness of the water sample was found to be on the higher side than the prescribed desirable limit of 300 mg/l as per 10500 in villages Manapur, Khariri Bihewada, Kawadek & Bhojapur
- ☞ Fluoride concentration was found to vary between 0.70 to 0.90 mg/l
- ☞ Heavy metal concentrations in all the samples were found to be within the limits.

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- ☞ Heavy metal concentrations in all the samples were found to be within the limits.

3.7 SOIL QUALITY

SOIL AND AGRICULTURE

Soils in the Buffer zone area, underlain by Gondwana Sandstones are mainly sandy - silty - clayey soils and in the area covering the schistose formations are of mixed type with silty clays and clayey soils. The thickness of soils range from 1.5 to 2.0 meters and are fertile for agriculture. Mine lease area having high surface relief possess residual soil comprising very fine grained grey clay of 1.0 - 1.5 meters in thickness. It also shows characteristic hexagonal mud cracks and scows / pits along the cracks by the downward flow of rain water. The areas situated at higher elevation than the irrigation canal network depend mainly on the monsoon rainfall and grow rainfed crops such as Soyabean, Pulses, Cotton, Cereals, and Jowar. Paddy is the main crop under irrigation canal network, utilization of ground water for irrigation is minimum. There are no traditional farm ponds for harvesting rain water to support rabi crop.

The soil sampling locations are given in **Table 3.11** and shown in **Figure 3.7**. The soil quality results are given in **Table 3.12**

TABLE 3.11: SOIL SAMPLING LOCATIONS

Code	Location	Direction	Distance (km)
S1	Mine Lease Area	---	---
S2	Ramtek	ENE	3.3
S3	Kanchi Kadam	NW	2.6
S4	Manapur	ESE	2.7
S5	Khariri Bihewada	SW	1.1

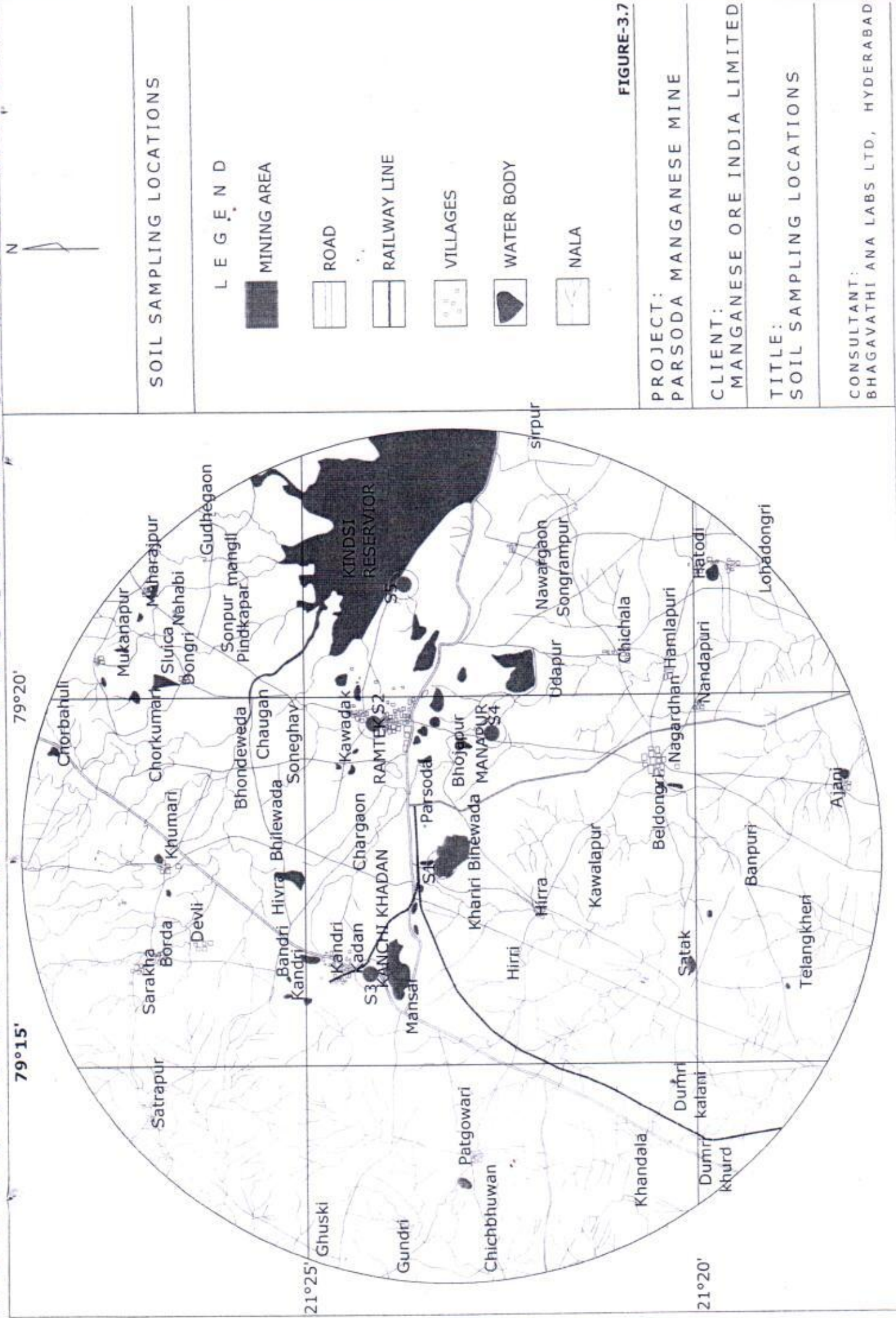


TABLE 3.12: SOIL QUALITY DATA (a)

S. No	Parameter	S1	S2	S3
1	Texture	Sandy Loam	Sandy clay	Sandy Loam
2	pH (1:2 Soil Water Extract)	7.96	7.89	7.43
3	Electrical Conductivity, μmhos	150	190	210
4	Nitrate as N, Kg/ha	40	90	170
5	Phosphorous as P_2O_5 , Kg/ha	6	12	18
6	Potash as K_2O	340	260	320
7	Sodium as Na_2O	40	110	35
8	Calcium as Ca	3720	4340	3120
9	Magnesium as Mg	780	1020	560
10	Water soluble Chlorides as Cl, ppm	28	36	43
11	Organic Carbon, %	0.10	0.18	0.32

TABLE 3.12: SOIL QUALITY (b)

S. No	Parameter	S4	S5
1	Texture	Silt clay	Sandy clay
2	pH (1:2 Soil Water Extract)	7.90	7.89
3	Electrical Conductivity, μmhos	110	190
4	Nitrate as N, Kg/ha	30	90
5	Phosphorous as P_2O_5 , Kg/ha	5	12
6	Potash as K_2O	370	260
7	Sodium as Na_2O	50	110
8	Calcium as Ca	1840	4340
9	Magnesium as Mg	360	1020
10	Water soluble Chlorides as Cl, ppm	21	36
11	Organic Carbon, %	0.08	0.18

Soil quality of study area shows the following observation:

- ☞ All the samples having pH in range of 7.43– 7.96
- ☞ All the samples having average concentration of Electrical Conductivity and Organic Carbon
- ☞ Soil texture of the study area is pre-dominantly Sandy Clay
- ☞ Concentration of Nitrogen, Phosphorus and Potassium are under better, medium and very less category as per standard soil classification
- ☞ Overall it is observed that the soils of the region are suitable for agriculture

3.8 LAND UTILISATION PATTERN

(a) MINE LEASE AREA

The mine was worked earlier by manual means and an area of 1.75 ha is under excavation, 0.25 ha under dumps, 0.10 ha under roads, 3.0 ha under green belt and 1.0 ha under site services. Out of 53.75 ha land 25.0 ha is under agricultural usage. Mostly, cotton is grown in this area.. The present land utilisation pattern in the mine lease area is given in **Table 3.13**

TABLE 3.13: PRESENT LAND UTILISATION PATTERN- ML AREA (Ha.)

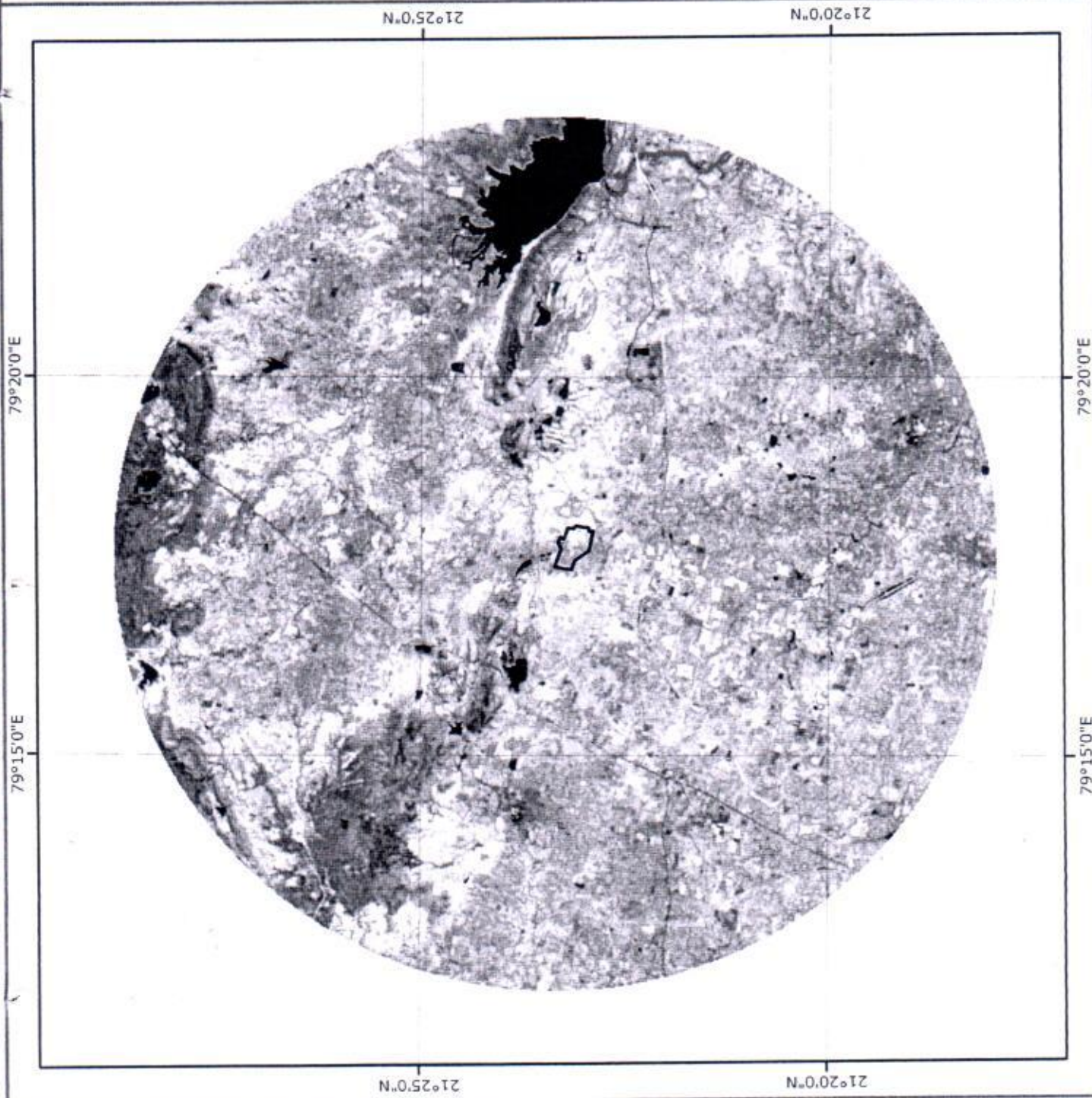
S. No	Particulars	Present
1	Area excavated	1.75
2	Overburden dump/Mineral stack	0.25
3	Roads	0.10
4	Green belt	3.0
5	Others (Site services)	1.0
6	Undisturbed area	47.65
	Total	53.75

(b) STUDY AREA

The village wise land use details of the study area is given in **Annexure III**. The land use of 10 km radius study area based on census 2001 records is given in **Table 3.14**

TABLE 3.14: LANDUSE PATTERN OF STUDY AREA (AS PER CENSUS 2001)

DESCRIPTION	AREA (HA)	PERCENTAGE (%)
Forest area	5941.09	24.75
Irrigated area	4798.09	19.99
Unirrigated area	8538.07	35.57
Cultivable waste land	2215.24	9.23
Area not available for cultivation	2509.78	10.46
Total	24002.43	100.00



SATELLITE IMAGERY

Legend



MINE LEASE AREA

Satellite Imagery Source Details

SATELLITE: IRS P6

SENSOR: LIS III

PATH / ROW: 100 / 057

DATE OF PASS: 23 MAR 2011

Scale:-



FIGURE-3.8

PROJECT:

PARSODA MANGANESE MINE

CLIENT:

MANGANESE ORE INDIA LTD

TITLE:

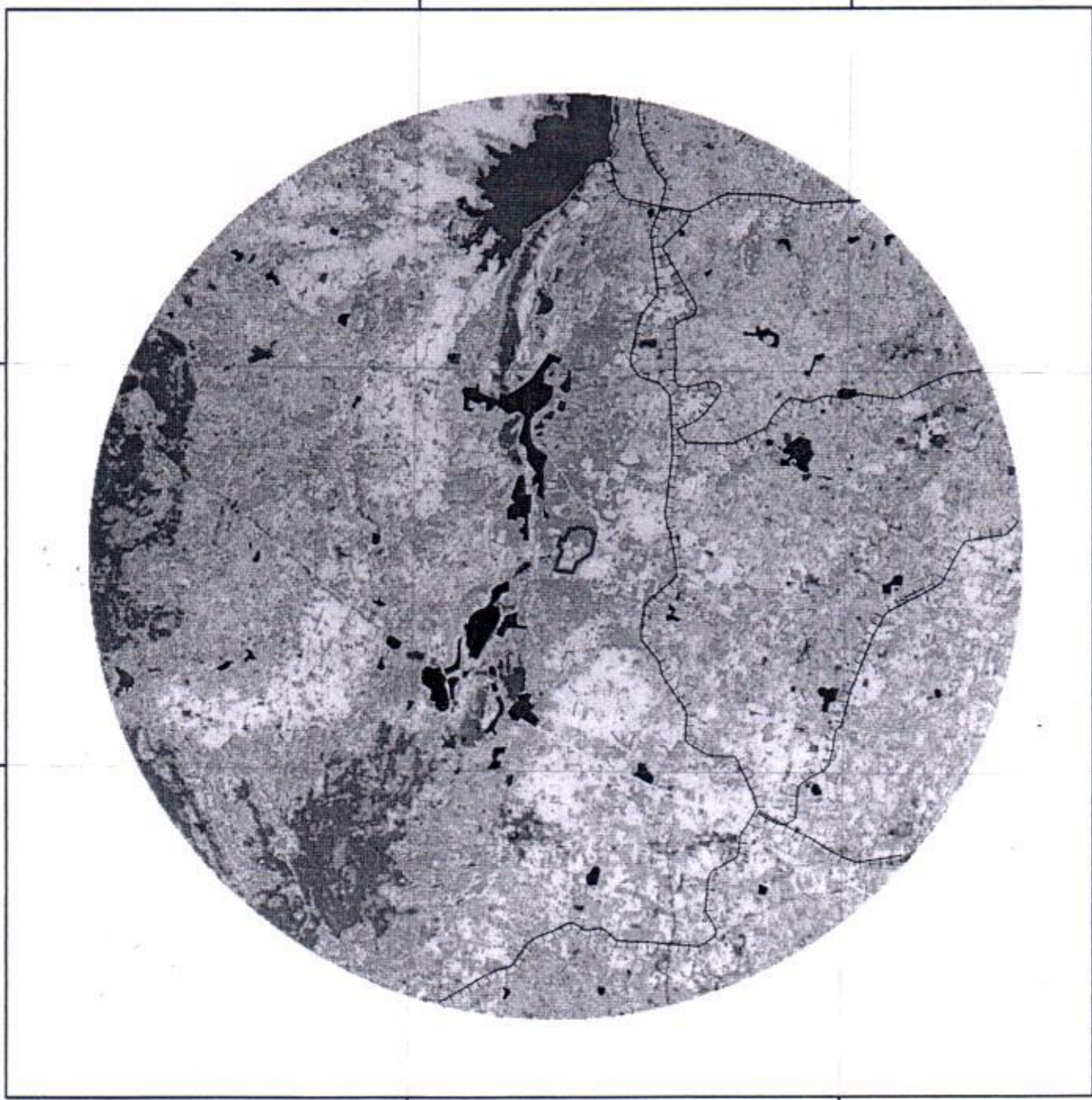
SATELLITE IMAGERY

79°15'0"E

79°20'0"E

21°25'0"N

21°20'0"N



LANDUSE/LANDCOVER

Legend



MINE LEASE AREA



CANAL

21°25'0"N

21°20'0"N

LULC CLASS	AREA Ha	AREA %
Agriculture Double Crop	10174.18	32.39
Agriculture Single Crop	6062.29	19.30
Plantation	4300.83	13.69
Fallow land	3032.19	09.65
Land with/without Scrub	3112.65	09.91
Other Mining Area	680.25	02.17
Built Up Land	956.36	03.04
Water Body	687.06	15.35
Forest	2410.11	07.67

Scale:-



FIGURE-3.9

PROJECT:
PARSODA MANGANESE MINE

CLIENT:
MANGANESE ORE INDIA LTD

TITLE:
LANDUSE/LANDCOVER

3.8.1 LAND USE AS PER SATELLITE IMAGERY

Satellite : IRS P VI
Sensor : LISS III

TABLE 3.15: LAND USE AS PER SATELLITE IMAGERY

S No	Land Use Land Cover Class	Area in Ha	% of Usage
1	Agriculture- Single Crop	11812.90	22.65
2	Agriculture-Double Crop	987.66	1.89
3	Plantations	787.66	1.51
4	Agricultural fallow	8163.96	15.66
5	Degraded Scrub	455.02	0.87
6	Land with/ without scrub	26765.99	51.33
7	Mining Areas	239.45	0.46
8	Water Body	535.00	1.03
9	Built up	2395.35	4.59
	Total	52143.00	100.00

Satellite imagery showing all the relevant features in the study area is enclosed as **Figure 3.8** and interpreted land use details are given in **Figure 3.9**

3.9 BIOLOGICAL ENVIRONMENT

3.9.1 BASELINE STATUS

To establish the baseline ecological status of the study area, a biological study has been carried within the study area, to assess the impacts of the existing mine production and that of the proposed one on the vegetation structure of the area.

3.9.2 FLORA

The study area has mixed forest, Bamboo and Teak can be seen. The observed flora of the study area is typically Dry Deciduous type. Babool, Sejha, Mango, Pipal and Mahua are the common trees present in the study area. The forest density in the

study area ranges between "Blank" and 0.1. The area is predominantly agro-system with poor irrigation facilities. There are no National Parks, Wild Life Sanctuaries or Biosphere Reserves within the study area of 10 km radius. A consolidated list of plant species of the study area is given below.

TABLE 3.16: FLORA IN THE STUDY AREA

S. No.	Name of the species	Common Name
Trees		
	Babul/Babhool	Acacia arabica
	Bad/wad	Ficus bengalensis
	Behada	Terminalia belerica
	Biba/Bhilawa	Semecarpus anacardium
	Bija	Pterocarpus marsupium
	Chinch/imli	Tamarindus indica
	Chichwa	Albizzia odoratissima
	Dhoban	Dalbergia paniculata
	Garari (poisonous)	Cleistanthus collinus
	Gular	Ficus glomerata
	Hiwar	Acacia sp.
	Hirda/Harra	Terminalia chebula
	Jambhul/Jamun	Eugenia jambolana
	Kalakarai	Casearia elliptica
	Kakai	Flacourtia indica
	Karanj	Pongamia pinnata
	Khair	Acacia catechu
	Kusum	Schleichera oleosa
	Neem	Azadirachta indica
	Palas	Butea frondosa
	Pangara	Erythrina variegata
	Rohan	Soymida febrifuga
	Sag/sagwan/teak	Tectona grandis
	Saja/Ain	Terminalia tomentosa
	Salai	Boswellia serrata
	Shisham	Dalbergia sissoo

	Sitaphal	Annona squamosa
	Subabul	Leucaena leucocephala
	Tendu	Diospyros melanoxylon
Shrubs		
	Aal (Indian mulberry)	Morinda citrifolia
	Bhawarmal	Hamiltonia suaveolens
	Dikamali	Gardenia resinifera
	Gautri	Grewia hirsuta
	Jilbili	Woodfordia fruticosa
	Kaladhotra	Datura metel
	Katumber	Ficus hispida
	Khatara	Dodonea viscosa
	Muradheng/marophal	Helicteres isora
	Neel	Indigofera tinctoria
	Rui	Calotropis procera
	Sindhi/Chhindi	Phoenix sylvestris
	Waghnakhi	Martynia annua
Source: DFO, Nagpur		

3.9.3 FAUNA

Predominant animals of the study area include wild goat, rabbit, jackal, fox, etc. Several types of avi-fauna are found in the forests on the hill slopes, including egret, pigeon, dove, cuckoo, koel, owl, woodpecker, sparrow, myna, etc. Aquatic species like Carp, Rohu, Catla, Kalbasu, etc. were observed in the surface water ponds and perennial streams.

TABLE 3.17: FAUNA IN THE STUDY AREA

Fauna	Scientific name	Schedule
Mammals		
Stripped hyaena	Hyaena hyaena	II
Jackal	Canis aureus	II
Fox	Vulpes vulpes	II
Jungle cat	Felis chaus	II
Palm squirrel	Funambulus palmarum	IV

Fauna	Scientific name	Schedule
Dog	Canis familiaris	IV
Cat	Felis domesticus	IV
Indian Hare	Lepus nigricollis	IV
Fruit Bat	Rousettus leschenaulti	IV
Mouse	Mus musculus	V
Reptiles		
Lizard	Hemidactylus sp	IV
Viper	Viper russeli	III
Chameleon	Chameleon zeylanicus	IV
Green tree snake	Dendrophis sp	IV
Avifauna		
Pond Heron	Ardeola grayii	IV
Indian cuckoo	Megaloima merulinus	IV
Rock Pigeon	Columba livia	IV
Red jungle crow	Gallus gallus	IV
Sparrow	Passer domesticus	IV
Common Kite	Milvus migrans	IV
Myna	Acridotheres tristis	IV

Source: DFO, Nagpur

3.10 SOCIO ECONOMIC ENVIRONMENT

TABLE 3.18: SOCIO-ECONOMIC DETAILS WITHIN THE STUDY AREA

(10 km RADIUS)

S.NO	DESCRIPTION	NUMBERS
DEMOGRAPHIC DETAILS		
1	Total Villages	45
2	Total no. of House Hold	10270
3	Total Population	48222
4	Total SC Population	6157
5	Total ST Population	9303
6	Total Literate Population	28421
Census 2001		

EIA/EMP Report of Parsoda Manganese Ore Mine of M/s Manganese Ore (India) Ltd.

Based on census data and field survey following observations have been drawn:

- ☛ 4 villages having medical facilities
- ☛ Primary Health Sub Centre is available in 1 village
- ☛ Educational facilities are available in 42 villages. Total 45 primary schools are present in the study area
- ☛ Drinking water from dug well and hand pump are available in 45 and 43 villages respectively
- ☛ The study region is well facilitated with road and rail network
- ☛ Full fledged dispensary of MOIL for workers as well as local people. Hospital at Ramtek, engineering college at Ramtek and ITI in Munsar towards NNW at 600m

Mining and other industrial activity play a significant role in enhancing the socio-economic life of region. Besides rain fed agriculture as a major source of income, people are engaged in small scale industries like making of stone chips, bricks, wooden furniture, earthen pots, bamboo baskets, weaving of cloths and carpets etc.

3.10.1 DISEASE PROFILE IN THE STUDY AREA

Disease profile in the study area has been collected from the primary health centres from various villages. The collected data is enclosed as Annexure 5. Based on the reports it is observed that

- Leprosy is reported in the area and is seen in all age groups i.e from 13 yr – 55 yr both male & females
- TB is reported in middle age group i.e 32 – 50 yrs
- Filariasis is reported in the age group of +40 to 62 years, mainly in males

3.11 OCCUPATIONAL HEALTH

3.11.1 BASE LINE DATA OF MINE WORKERS

Based on regular health check up report of all the employees working in near by existing Munsar/Parsoda mine:

Pathological and Dermatological cases were observed during the last 2 years of mining operations.

Anaemia, Hook worm were the pathological cases, where as Itching problem and fungal infection were the dermatological cases observed in the workers.

In order to evaluate the impacts on mining on the health of workers, baseline health studies shall be carried out on every worker before joining their duties. The baseline health status, their habits will be recorded and a log book will be maintained and the same shall be updated every quarter.

3.11.2 DISABILITY EVALUATION

- Degree of dyspnea
- Amount of cough and sputum, wheezing
- Smoking age started, pack/day, age stopped
- Past pulmonary illnesses
- Concurrent medical conditions
- Medications
- Occupational and environmental exposures
- Chest physical examination findings
- Chest roentgenogram & x- rays
- Pulmonary function studies
- Baseline audiograms
- Urinalysis

Thus, a baseline condition will be established for all the workers and the records shall be maintained in order to evaluate any occupational diseases due to mining activity or aggravation of the existing condition due to mining

CHAPTER 4: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 ANTICIPATED IMPACTS ON AIR ENVIRONMENT

The impacts on the air environment from this mining activity will depend on factors like production capacity; machinery involved for drilling & blasting and use of loader cum excavator. Apart from these, there will be other associated activities viz., transportation of ore and waste that contribute to pollution. The proposed project will adopt other than fully mechanised method of mining.

Air pollution sources in the operating mine are classified into three categories

- ☛ Drilling and blasting activities
- ☛ Removal of vegetation from the area designated for mining and other purposes
- ☛ Removal, handling, transportation of ore and disposal of wastes

To assess the impact due to Manganese production of 40,000 TPA on air environment, predictions have been carried out using ISC - AERMOD MODEL.

ISC - AERMOD VIEW

ISC - AERMOD View is a complete air dispersion-modelling package, which seamlessly incorporates the popular USEPA Models, ISCST3, ISC-PRIME and AERMOD into one interface without any modifications to the models. These models are used extensively to assess pollution concentration and deposition from a wide variety of sources.

The AERMOD Model

The AMS/EPA REGULATORY MODEL (AERMOD) was specially designed to support the Environmental Regulatory Modelling Programs.

EIA/EMP Report of Parsoda Manganese Ore Mine of M/s Manganese Ore (India) Ltd.

AERMOD is a regulatory steady - state modelling system with three separate components;

- ☞ AERMOD (AERMIC Dispersion Model),
- ☞ AERMAP (AERMOD Terrain Pre-processor),
- ☞ AERMET (AERMOD) Meteorological Pre-processor).

Application of AERMOD

ISC-AERMOD MODEL with the following options has been employed to predict the cumulative ground level concentrations due to emissions from the proposed activity.

- ☞ Area being rural, rural dispersion parameters are considered
- ☞ Predictions have been carried out to estimate concentration values over radial distance of 10 km around the project area
- ☞ Uniform polar receptor network has been considered
- ☞ Emission rates from the sources were considered as constant during the entire period
- ☞ The ground level concentrations computed without any consideration of decay coefficient
- ☞ Calm winds recorded during the study period were also taken into consideration
- ☞ 24-Hourly mean ground level concentrations were estimated using the entire meteorological data collected during the study period
- ☞ Digital Elevation Map of the study area is used to represent the graphical output of the GLC's using the Terrain Processor

4.1.1 EMISSIONS DETAILS

Excavation, loading and transportation through tippers and screening and crushing are the major sources, which are of significance. Therefore, the emissions considered for modeling are from excavation, transportation and screening.

The emissions will be mainly due to total production of 40,000 tonnes/annum of Manganese and handling of around 2,30,000 tons/ annum of waste. Hence, for the

predictions of impacts, the emissions due to handling of the said ore and waste have been considered.

The emissions are computed based on AP-42 emission factors.

Operational hours, activity rate, ambient wind speed and moisture content have been considered for estimation of emissions from area sources. For line source, apart from operational hours and activity rate, moisture and silt content of the haulage road have been considered.

Predictions are carried out for the worst-case scenario of simultaneous operation of excavators (area sources) and tippers for transportation from mine pit to loading point (line sources).

Particle size concentration assumed in the modelling consisted of five separate particles size classes 1.25, 3.75, 7.5, 12.5, and 20 micrometers with a particle concentration of 0.0262, 0.0678, 0.1704, 0.1536 and 0.5820 respectively.

The number of working days has been taken at 300 days per year with 8 hours of operation / day, hence the concentrations predicted are considered to be the worst case. With control measures, the emissions have been taken at 30% of uncontrolled emissions for handling and 10% of uncontrolled emissions for transportation.

EMISSION ESTIMATION

(Basis – AP-42: Emission Estimation Technique Manual For mining)

Area Source Emissions during production and development are given in the **Table 4.1** and **4.2** and Haulage emissions are given in the **Table 4.3** and **4.4**.

TABLE 4.1: AREA SOURCE EMISSION – PRODUCTION

	Present	Proposed	Incremental
Quantity, TPA	--	40000.00	40000.00
Operational Hours per year	--	2400.00	2400.00
Activity rate, t/hr	--	16.67	16.67
Emission of Dust, gm/t	--	0.118	0.118
Emission of Dust gm/hr	--	1.97	1.97
Area of Influence, m ²	--	25	25
Uncontrolled Emission rate, gm/sec/m ²			0.00002185
Controlled Emission rate, gm/sec/m ²			0.000006556

TABLE 4.2: AREA SOURCE EMISSION – DEVELOPMENT

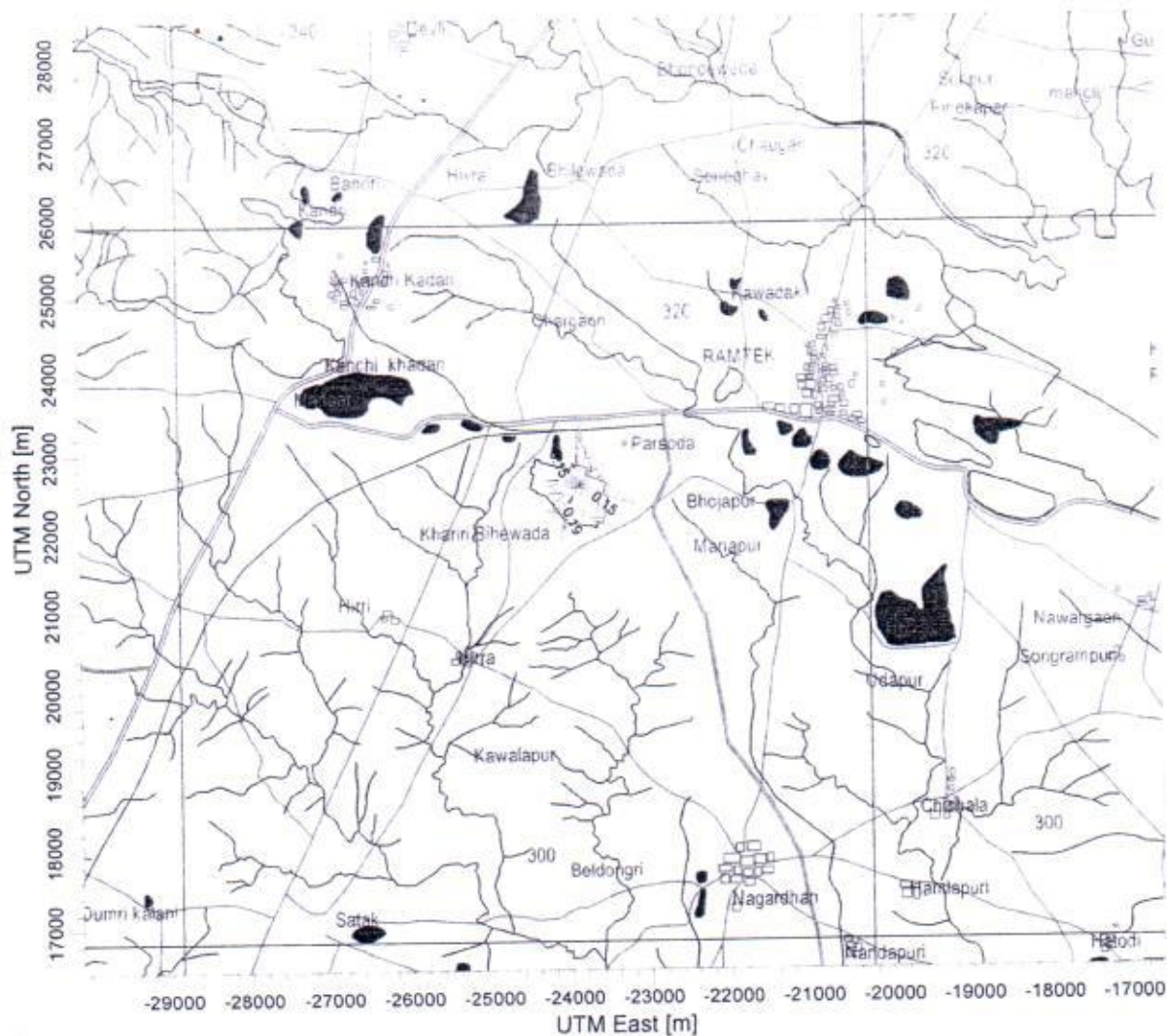
	Present	Proposed	Incremental
Quantity, TPA	--	230000.00	230000.00
Operational Hours per year	--	2400.00	2400.00
Activity rate, t/hr	--	95.83	95.83
Emission of Dust, gm/t	--	0.118	0.118
Emission of Dust gm/hr	--	11.31	11.31
Area of Influence, m ²	--		25
Uncontrolled Emission rate, gm/sec/m ²			0.0001256
Controlled Emission rate, gm/sec/m ²			0.00003769

TABLE 4.3 : HAULAGE EMISSIONS – MANAGANESE

	Present	Proposed	Incremental
Quantity, TPA	--	40000.00	40000.00
Operational Hours per year	--	2400.00	2400.00
Capacity of each Tipper (T)	--	10	10
Total No of Tippers/year	--	4000	4000
Lead length /trip, Km	--	2	2
Total VKT/Year	--	8000	8000
Emission kg/VKT	--	0.9195	0.9195
Total emission kg/year	--	7356	7356
Uncontrolled emission rate gm/sec/m			0.0008514
Controlled emission rate, gm/sec/m			0.00008514

PROJECT TITLE

PREDICTED ISOPLETH DIAGRAM SHOWING GLC's OF PM10 CONCENTRATION
PROJECT : PARSODA MANGANESE MINE OF M/s MANGANESE ORE (INDIA) LTD



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m³

0.150 0.188 1.318 2.448 3.578 4.708 5.838 6.968 8.098 9.229

COMMENTS:

SOURCES

4

RECEPTORS

3600

OUTPUT TYPE

SCALE

1:84,785

Concentration

0

3 km

MAX

PROJECT NO

9.22888 ug/m³

TABLE 4.4: HAULAGE EMISSIONS – TRANSPORTATION OF WASTE

	Present	Proposed	Incremental
Quantity, TPA	--	230000.00	230000.00
Operational Hours per year	--	2400.00	2400.00
Capacity of each Tipper/dumper. (T)	--	35	35
Total No of Tippers/year	--	6571.43	6571.43
Lead length /trip, Km	--	1.5	1.5
Total VKT/Year	--	9857.14	9857.14
Emission kg/VKT	--	1.4105	1.4105
Total emission kg/year	--	13903.5	13903.5
Uncontrolled emission rate gm/sec/m			0.002146
Controlled emission rate, gm/sec/m			0.0002146

Note: * Emission factor computed based on wind speed of 1 m/sec, moisture & silt content of 5%.

4.1.2 DATA ANALYSIS OF PREDICTED CONCENTRATIONS

Predictions have been carried out using ISC-AERMOD Model for study period. The predicted concentrations of particulate matter are presented below. The maximum predicted value of increase in PM_{10} due to proposed mining operations would be about $9.23 \mu\text{g}/\text{m}^3$. This concentration will be observed within the core zone of mine area where mining operations are being carried out. The concentration was found to reduce to a value of less than $0.18 \mu\text{g}/\text{m}^3$ at a distance of about 1.0 km from the mining operations. The impact of mining operation would be negligible beyond 1.5 km.

The predicted ground level concentrations as a result of mining operations are shown in the **Figure 4.1** and overall scenario is given in the **Table 4.5**.

TABLE 4.5: OVERALL SCENARIO (projected on 98th Percentile Value)
(UNITS: $\mu\text{g}/\text{m}^3$)

LOCATION	BACK GROUND LEVEL OF PM 10	PREDICTED CONCENTRATION	RESULTANT CONCENTRATION
Mine Lease Area	40.37	9.23	49.6
Ramtek	39.76	<0.15	<39.91
Khariri Bihewada	42.42	0.15	42.57
Manapur	42.42	<0.15	<42.57
Kawadak	41.82	<0.15	<41.97
Munsar Mine	44.00	<0.15	<44.15
Chargaon	44.27	<0.15	<44.42

4.1.3 PROPOSED MITIGATE MEASURES FOR DUST SUPPRESSION

- ☞ Regular sprinkling of water at the mine pits and also on the haulage roads
- ☞ Regular maintenance of the transport vehicles
- ☞ Controlled blasting techniques
- ☞ Not more than 10 holes will be blasted at a time and no hole will be charged with more than 350 gm of explosives at a time
- ☞ Practicing Wet drilling
- ☞ Provision of dust masks to the workers
- ☞ Maintenance of the external OB dump with leguminous plantation and water sprinkling.
- ☞ Avoiding overloading of tippers and covering of loaded tippers with tarpaulins during ore transportation
- ☞ Limiting the speed of transport vehicle
- ☞ Maintenance of wide green belt all along the mine lease boundary, OB yard and along the main transport roads
- ☞ Periodical monitoring of air quality to take steps to control the pollutants

4.2 NOISE ENVIRONMENT

4.2.1 ANTICIPATED IMPACTS

The noise levels are dependent upon the deployment of mining machinery and heavy-duty vehicles in any mine. The main sources of noise in this mine are given below.

Anticipated Noise Levels From Mining Equipments

Type	Name / Capacity	Quantity	Anticipated Noise Level [in dB(A)] at 1m away from the source
Drilling Machine	Compressor and Jack Hammer Drill	01	95
Transportation Vehicles	Dumper/Tippers (35t / 10t)	06	85

In order to protect the workers from higher noise levels, project proponent will adopt the following noise abatement measures.

- ☞ Maintenance of drilling machine twice in a month
- ☞ Working in small areas of less than 5 ha
- ☞ Provision of earmuffs/ear plugs to workers in noise prone zones in the mine

Anticipated noise levels at mine boundary resulting from operation of the excavation have been computed using point source model. Computation of noise level at the mine boundary is based on the assumption that there are no attenuation paths between the source and the mine boundary.

Basic phenomenon of the model is the geometric attenuation of sound. Noise at a point generates spherical waves, which are propagated outwards from the source through the air at a speed of 1,100 ft/sec, with the first wave making an ever-increasing sphere with time. As the wave spreads the intensity of noise diminishes as the fixed amount of energy is spread over an increasing surface area of the sphere.

The assumption of the model is based on point source relationship i.e., for every doubling of the distance the noise levels are decreased by 6 dB (A). Point source propagation is defined by the following equation:

$$Lp2 = Lp1 - 20 \log r2/r1$$

Where Lp1 and Lp2 are sound pressure levels at points located at distances r1 and r2 respectively from the source.

Based upon the above mentioned formula the anticipated noise level at ML boundary from nearest pit boundary will be less than 43.2 dB (A), which is less than the prescribed limits for industrial area. The nearest village is Parsoda village 1.1 km from the ML area, where the existing noise level in day hours is 42.5 dB (A).

It is estimated that on the existing road, additional traffic load due to this project will be maximum to 20 number of HMV. Hence, the total traffic load in future will be around 3495 on the existing road.

4.2.2 PROPOSED MITIGATING MEASURES

- ☞ Controlled blasting techniques with sequential blasting to reduce noise level and blast induced ground vibrations.
- ☞ Use of low density explosives to have a heaving effect than an explosion
- ☞ Restricting the blasting operations to noon times to avoid the periods of temperature inversions.
- ☞ Use of sharp drilling bits and delivery of compressed air at optimal pressure during drilling.
- ☞ Provision of earmuffs/ear plugs to workers in noise prone zones in the mine.
- ☞ Timely maintenance of drilling machines and transporting vehicles as per manufacturers recommendations
- ☞ Limiting of speed of haulage vehicles/tippers.

4.3 WATER ENVIRONMENT

4.3.1 ANTICIPATED IMPACTS

Mining activities cause adverse impacts due to mine drainage and siltation due to storm water. The impact on water environment has been considered under the following heads:

- ☞ Water consumption.
- ☞ Waste water generation
- ☞ Impact on ground water table
- ☞ Impact on surface water bodies
- ☞ Impact on drainage

4.3.2 WATER CONSUMPTION

The water consumption at the mine is in the following areas

- ☞ Water sprinkling at mine pit areas and haulage roads
- ☞ Green belt development and rehabilitation of dumped areas with afforestation

TABLE 4.6: WATER REQUIREMENT (KLD)

Activity	Water requirement, m ³ /d	Source
Dust suppression	9.0	Ground water
Green Belt / Plantation	2.5	
Domestic	5	
Total	16.5	

4.3.3 WASTEWATER GENERATION

There is no process wastewater generation from mining activities.

4.3.4 IMPACT OF HYDROLOGICAL REGIME ON GROUND WATER ENVIRONMENT

Mining is always associated with ground water problems, particularly when it is below water table. The impact of mining on ground water is dependent mainly on the mine dimensions and depth, nature of rock formations to hold ground water in storage and ground water recharge and discharge processes. The ore body is in the fine grained

schistose formation, it is not a potential aquifer for economic yield, if a bore well is constructed tapping this zone. Although permeability is very poor and rate of recovery is very slow, large open area of wetted surface in the quarry is likely to result in the accumulation of significant quantities of suspended water from the transition zone and inflow from the zone of saturation. This seepage water collected during mining is required to be pumped out to continue mining operations. In this process of mine water pumping, dewatering of adjoining area and consequent decline of ground water levels takes place. The pumped out water if discharged directly into any water body or agricultural fields, it is likely to cause turbidity or siltation issues to the environment. Visit to the similar working mines in the same ground water has shown that the MOIL authorities are encountering ground water seepage problems. At 135 level quarry situated at Wahitola MOIL Colony, much beyond the proposed mine area seepage water is to be pumped out for 5 to 6 hours using 50 HP pump, whose pit surface and bottom reduced levels are 336 and 307 m AMSL having dimensions 60 x 10 m. Satak Mine situated at a distance of nearly 4 Km down stream of the proposed mine has encountered seepage at a depth of about 25 m onwards. Mining was under progress with intermittent pumping of collected water.

The proposed mine ultimate depth is 50 m from the surface and it is anticipated that the mine working will go 10 m below the water table after 5th year of mining. As the mine width increases and mine face advances with depth, more and more water accumulates with lapse of time, although the formation specific yield is low. The quantity of water collected in the quarry will vary depending on the dry and wet conditions in the area. Collected water has to be pumped out by utilizing Electric Pump and Diesel driven pumps of capacity ranging from 15 to 50 HP.

4.3.5 IMPACT ON HYDROLOGICAL REGIME & SURFACE WATER ENVIRONMENT

There are no surface water storage bodies, nallahs and canals within the mine lease area. Kindsi reservoir is outside the zone of influence at higher elevation, the irrigation canal network is much below the lease area. There is no impact on the quality and quantity of water bodies in the Buffer zone. The two abandoned quarries of 30 x 12 m and 16 x 22 m dimensions of Parsoda Mine beyond the lease area are

in upper reaches. Both the pits are having nearly 16 m water column collected from rain water inflow and seepage from the wetted perimeter of mine face. In addition, there is another large quarry pit known as Kamthi Lady Pit (KL Pit) further upstream to Parsoda I quarries, of dimensions 150 x 40 m having 20 m water column. Water stored in these 3 quarries instantaneously release to contribute into the proposed Parsoda quarry in the form of seepage.

4.3.6 Storm Water Runoff & Silt Load

Total silt load from the mining area is calculated based on the annual runoff, fraction of runoff joining the natural streams and amount of permissible standards of suspended solids in water.

Table 4.7: Silt Load

Annual Rainfall of the Area	:	1112 mm = 1.112m
Coefficient of runoff	:	0.8
Area of Catchment	:	53.75 ha = 537500 m ²
Runoff	:	= 1.112 * 0.8 * 537500
Annual rainfall water availability		= 478160 m ³ / annum
Considering 50% is joining the natural stream	:	= 239080 m ³ / annum
		= 0.2391 MCM/year
Considering suspended solids in runoff water as 200 mg/l during monsoon season and 15% will be trapped in check dams & settling ponds	:	170 * 0.2391 = 40.65 t/yr

4.3.7 MITIGATION MEASURES

The pollution anticipated in the surface drainage water is the suspended solids, due to wash off from the dumps. For this purpose retaining wall with garland drain is proposed surrounding the toe of the waste dump. The discharge from this drain is diverted to a settling tank unused pit workings, which allows the sediments to settle. This sedimentation tank will have baffle walls to increase the settling rate and also if found necessary coagulants like Alum, limestone powder will be added. Further more the following suggested plans are required to be implemented.

- a. During quarrying the ore body the permitted height of 7.5m and width of 15m are to be followed for the Over Burden and Ore Bench, respectively to prevent collapse, slippage and debris wash off. Similarly the haul road gradient has to be maintained at 1 in 16 and ramp slope to be kept at 1 in 10 to avoid loose material mixing with storm water.
- b. Waste dump side slope is required to be kept 28° , surface is to be stabilized with fast growing grasses. Retaining wall of 6 to 9" stone masonry is to be built around the toe of dump.
- c. Individual terraces should not exceed 30° slope and are to be connected to garland drain. The terraces are to have inward slope with catch drains directing to the garland drain. Retention wall of rubble check is to be constructed around Over Burden dump, across the gradient.
- d. Garland drain of 1 m width and 0.5 m depth has to be provided to the southern boundary of lease area. The drain has to have silt traps on its way
- e. A check dam is to be provided to the end of the lease area with a bund height of 1 m and width of 10 m to store water drained from the lease area and also pumped out water
- f. 7.5 m width barrier zone all around the periphery of the lease area with growth of 50 trees in 500 Sq.m shall reduce the migration of silt from the mine area.
- g. Clean water released from the mine area may be supplied to the down stream users for irrigation of the adjacent agricultural fields.
- h. In order to prevent dust from water sprinklers may be used periodically during operation periods.

4.3.8 WATER CONSERVATION MEASURES

The excavated pit will act as water reservoir and help in ground water recharge.

4.3.9 RAINWATER HARVESTING

Rain water is the only natural source of fresh water which is easily available for harvesting with minimum effort and with less expenditure. It is also the main recharge source for ground water. As the availability of fresh water is becoming scarce, rain water harvesting technology and implementation of innovative techniques gained importance in the recent periods. People have become conscious

and adopting these methods out of their own enlightened self interest. Government has mandated to harvest rainwater to conserve and augment ground water resources. Harvested rain water can be stored and directly used to meet their requirements. It can also be made to reach ground water by adopting suitable site specific recharge techniques.

The mine catchment area is not over exploited in terms of ground water development. Water levels are shallow. Since the area has not faced any depletion, adopting augmentation techniques by rain water harvesting methodology is found not necessary. However, since there is pumping of water from the mining operation it is desirable to recharge to the extent of depletion by following rain harvesting methods as suggested:

- a. Recharge pits along the surface gradient, by training of surface flow into the pits at appropriate locations.
- b. Silt traps along the garland drain will serve the sediment to settle and infiltrate the impounded water.
- c. Check dam to the end of southern lease boundary benefits the down stream area aquifer horizons through recharge.
- d. Quarry pit of 12 ha in extent shall be a major rainwater collection pit to artificially recharge the groundwater regime.

There is also scope of recovery of water through recharge from the upstream abandoned quarry water storages to the extent of depletion of ground water caused by the mining operation of proposed Parsoda mining project.

4.4 LAND ENVIRONMENT

4.4.1 ANTICIPATED IMPACTS

The mine lease area will be used for mining and its related activities. Hence there will be a change in the land utilisation pattern.

The change in land utilisation pattern for mining activities at the end of plan period and conceptual period is given in **Table 4.8**

TABLE 4.8: LAND UTILIZATION PATTERN (Area in ha.)

S. No	Particulars	Present	End of 5th year of mining	End of Mine Life
1.	Area excavated	1.75	5.25	12.0
2.	Overburden dump/Mineral stack	0.25	7.25	7.70
3.	Roads	0.10	0.50	0.50
4.	Green belt	3.0	5.0	12.35
5.	Others (Site services)	1.0	2.0	0.20
6.	Undisturbed area (including 25 ha of agricultural land)	47.65	33.75	21.00 (agricultural land)
	Total	53.75	53.75	53.75

Land is one of the most important resources for the human beings, as this is needed for all the activities. Mining activities especially the opencast methods affect the land in various ways.

- ☛ Topography and landform scenario changes due to digging of open pits and dumping of overburden rock mass in the form of the heaps
- ☛ The drainage pattern on the surface undergoes a change due to the alterations in the surface topography due to mining and associated activities
- ☛ The land-use pattern undergoes a change due to the use of the land for mining, dumping, and other mining and associated activities
- ☛ The land-use in the surrounding areas may get affected due to the impacts of mining on soil quality & water regime

Mine wastes is in the form of hang wall quartzite gneiss etc. A total of 2,30,000 TPA of OB waste will be generated. It is estimated that the soil generated would be around 49,500 m³ during the life of mine. 20.05 ha area will be afforested while 21.0 ha of the lease area will be maintained as agricultural Land and complete excavated area of 12.0 ha will be utilized for water harvesting. That would increase the water availability in the region.

Construction of retaining walls with garland drains for the waste dumps, erection of check dams and gully plugs along the natural drainage system shall restrict the soil erosions and allow discharge of clean water into the surrounding environment.

4.4.2 UTILIZATION OF TOPSOIL

The total thickness of soil in the area varies from 1.0m to 1.5m. This soil will be removed in advance and stacked separately with a height not exceeding 3m. To improve the quality of top soil stored, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks and shall be used in afforestation work, as early as possible. A parapet wall / retaining wall and a garland drain will be constructed all around to prevent the wash off.

4.5 BIOLOGICAL ENVIRONMENT

4.5.1 ANTICIPATED IMPACTS

The lease area is mostly covered with out crops of Manganese and there is no tree growth in the mineralized area. The tree species within the core zone represent the common type of flora species along with small shrubs and bushes. Due to mining activities community structure of the vegetation will not change. But the number of plant species of the area may be reduced to certain extent due to the clean up of the land for different mining activities.

Summarized impacts on Biological Environment are furnished below:

- Removal of vegetation (flora) existing in the area required for mining and other purposes
- Dust in atmosphere, contributed by mining and associated activities, when deposited on the leaves of the plants in the surrounding areas may retard their growth
- Noise and vibrations due to blasting and operation of the machines drive away the animals and birds
- Water scarcity caused due to the impacts of opencast mining on water regime affects the growth of vegetation and agriculture in and around the complexes.

4.5.2 PROPOSED MITIGATING MEASURES

The dumps will be re-habilitated with dense plantation of the local species. Water reservoirs will be created in the abandoned mine pit that shall increase the water availability. With this proposed plan, the scanty vegetated land will be converted to a densely planted area that will improve the biodiversity. Thus, the project shall ultimately enrich the bio-diversity and contribute to the improvement of the eco system of the area. The benefits envisaged from the mitigating measures on Biological Environment are summarized below:

Ultimate reclamation planned leaves a congenial environment for development of flora & of fauna through afforestation and creation of water resources.

The proposed parapet walls / retainer walls, check dams and gully plugs, settling pits and the water reservoir created by the abandoned workings will help to augment the ground water and to reduce contamination of silt in the surface water.

4.6 SOCIO-ECONOMIC ENVIRONMENT

4.6.1 ANTICIPATED IMPACTS

The objective is to demonstrate the range of potential impacts on communities and families by the mining project. The actual impacts experienced at a given project site will depend on a variety of factors. Some of the most important are:

- ☛ The existing situation (baseline condition)
- ☛ The process of community engagement and capacity building
- ☛ Need Based Assessment

The Mine lease is located in non-forest land within active mining zone of Ramtek Tehsil of Nagpur District. The study area is predominantly a mining zone with allied activities and followed by agriculture.

Many small scale industries based on mining, cement industry, machinery fabrication, leather goods, electric, printing press, Road transportation etc. have come up in the

study region. Local people are engaged in these activities as a source of income. Average annual income of each entrepreneur is about Rs. 50,000/-.

4.6.2 COMMUNITY ENGAGEMENT

Out of total 53.75 ha of lease area 25.0 ha is under agricultural activity. Most of this land is under cultivation. Out of the total lease area of 53.75 ha, around 25.0 ha is agricultural land. It is proposed to utilise 4.0 ha for mining activity and rest of 21.0 ha land will not be disturbed. Kavi Kulguru Kalidas Engineering College is at a distance of 500 m from the lease boundary in east and ITI is at a distance of 600m towards NNW. A vegetation barrier of 30m width with 3-tier plantation is proposed towards side facing the college and agricultural lands in the vicinity. The villages surrounding the mine lease area are dependent on rain fed agricultural and mining activities for their livelihood. This proposed project shall give direct employment to more than 110 skilled & unskilled labour's and indirect employment to more than 100 Skilled and Unskilled people in transportation and allied activities. Unskilled manual labour will be employed from the local community. The local skilled labour will have additional opportunity to enter into automobile maintenance profession to cater to the needs of the transport trucks. The proposed project will be a continual source of income to the local population, who otherwise depends primarily on rain fed agricultural income that is uncertain and irregular. Thus, there will be beneficial impact to the community due to development of the mining activity.

4.6.3 RESETTLEMENT & REHABILITATION

The mine lease area is a private land. M/s MOIL has paid requisite compensation has to the farmers.

4.6.4 NEED BASED ASSESSMENT

During field study it observed that the surrounding village community have following requirement:

- ☐ Employment opportunities
- ☐ Medical Facilities

4.6.5 PROPOSED MEASURES

Manganese Ore (India) Ltd. has undertaken developmental activities within the study area under its corporate social responsibility. Manganese Ore (India) Ltd takes into account the concerns of its workers into their day-to-day life. It believes in improving the living standards of the surrounding local community and implements various community development programs. such as repairing of common building structures viz temple, school, Panchayat ghar, etc.

4.7 OCCUPATIONAL SAFETY & HEALTH ENVIRONMENT

4.7.1 ANTICIPATED IMPACTS

An assessment of Occupational Health and Safety w.r.t this mine are tabulated below

S. No.	Requirement	Explanation	
		Instant	Long term
1	What principal environmental and occupational risks are likely to be created	Accident due to pit wall sliding Accident due to sliding of dump slope Accident due to transportation of mine material	Continuous exposure to air pollutants generated from mining activity (lung related diseases viz. silicosis, asthma, etc. Hearing loss due to continuous exposure to noise generating equipment
2	Rank the risks to public health in order of severity	These potential hazards are limited to mine lease area and the general public are restricted from entering the mine lease area. The public health and safety will therefore not be affected due to these hazards identified.	
3	How will risks be assessed	As per the design of hazard risk assessment matrices for ranking occupational health risks in mining and mineral processing.	
4	Measures to communicate	All the risks and steps for prevention & control	

S. No.	Requirement	Explanation
	these risks to people and steps for prevention & control	will be communicated during induction Vocational training, which is a statutory requirement. Periodic refresher training for all workers and on the job training. Display of appropriate sign boards at suitable locations.
5	How would the health impact assessment undertaken, if needed	Regular monitoring, Reconnaissance survey, Periodic health camp.
6	Does project provide a hiring a person with established credentials to be able to undertake such activities	Part time doctor for periodic health check up will be hired and Company's Safety Officer will be made in-charge to look after the requirements.
7	Name specialized agency to undertake an environmental health study, if needed	National Institute of Miners Health, Nagpur.
8	Budget for environmental and occupational health activities	Rs. 9.5 lakhs per year
9	List of hazardous operations / activities that are likely	None
10	How many workers will be employed in each hazardous job ; give numbers	None.
11	How long are they expected to be employed	Employed on Permanent basis.
12	Would a safety committee be constituted	Yes
13	Who will be the members of safety committee	Mine Manager. Safety Officer Worker's representative

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S. No.	Requirement	Explanation	
14	What will be the function of safety committee and who will head it	Function	To implement the proposed OHAS management plan and take proper mitigative measure as plan
		Head	Mine Manager
15	Will there be a budget to allow it to hold meetings	Budget has been allocated under Recurring Annual Cost For Occupational Health and safety	
16	Is there a provision of induction training for workers health and safety	Yes Vocational training as per the MINES ACT and company's in-house recruitment and induction program.	
17	How workplace exposures will be assessed	Through regular monitoring	
18	How these will be communicated and explained to the workers	The findings will be communicated through Safety committee meetings and through individual interactions. Also, the findings will become a part of the induction program.	
19	Who will conduct training and education in occupational health and safety	Qualified Vocational Training Officer appointed Statutorily and Medical officer	
20	Where will health surveillance be undertaken including tests, i.e. X-Rays, Pulmonary function tests and tests for hearing and identifying Tuberculosis	All the mine workers will be examined in the occupational health centre at tehsil medical hospital annually. For additional tests that are not available will be done at specialised diagnostic centres tied up by the company at district head quarter.	
21	What occupational illness are anticipated in view of the hazardous exposure	Respiratory disorder Hearing impairments	
22	Who will pay for the tests and the treatment of non occupational illness	All expenditure related to health check up and treatment of the mine workers shall be borne by organization.	
23	Who will compensate the workers for health	All workers will be covered under ESI/Medical Reimbursement. Mine management will make	

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S. No.	Requirement	Explanation	
	impairment due to injury or illness	their contribution towards subscriptions.	
24	The amount of compensation: List the minimum and maximum amount stipulated	As per ESI Act/ Workmen Compensation Act	
25	How will and how long the records of health checkups be maintained and what will happen to records when the project ends	Individual health record of every worker will be maintained till the end of service. The health check report will be handed over to the employee at the end of the project.	
26	Who will identify occupational diseases early, to prevent serious damage	Company's Medical officer	
27	What measures are to be undertaken for following		
I	Preventing heat stress	Not Applicable	
ii	Preventing noise exposure	Individual	Provision of ear muff / ear plug, Reducing the exposure time
		Common	Transport vehicles will be equipped with silencers and regularly maintained
iii	Preventing injuries	Occupational Health and Safety Policy and Preventive actions shall be displayed at relevant places; Awareness program will be conducted during the annual safety weeks and Environmental protection weeks.	
iv	Providing ergonomic support	Operator cabins along with seating arrangements will be maintained properly.	
28	Who will undertake administration of Personal Protective Equipment	Mines Manager / Mines safety officer	
29	What if any action is	At the end of service health certificate will be	

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S. No.	Requirement	Explanation
	proposed when the project ends, workers become exposed and have latent disease which may appear in future	provided from District Medical Officer after thorough check-up from the OHS budget of organization. If worker are found to be exposed with latent diseases, due compensation shall be paid.

Since, the present project is mining of Manganese Ore the associated impacts due to Chronic manganese exposure will be mainly neurologic and the symptoms includes reduced response speed, irritability, mood changes, and obsessive compulsive behaviour.

4.7.2 PROPOSED MITIGATION MEASURES

Occupational Health & Safety measures to control dust inhalation

For the safety of workers at site, engaged at strategic locations/dust generation points like loading and unloading points, etc., dust masks would be provided. Dust masks would prevent inhalation of particulate matter thereby reducing the risk of lung diseases and other respiratory disorders. Regular health monitoring of workers will be carried out. There would be periodic job rotation of employees from dust and noise generating areas to other areas as a precaution to avoid continues exposure. PET scans, Blood & Urine test shall be conducted on yearly basis to detect the manganese exposure symptoms in the workers engaged in strategic locations.

CHAPTER 5: ENVIRONMENT MANAGEMENT PLAN

5.1 INTRODUCTION

Environmental Management Plan (EMP) has been designed within the framework of various Indian legislative and regulatory requirements on environmental and socio-economic aspects so as to attain sustainable development.

This chapter covers the proposed measures required for mitigating the anticipated pollution levels on air emissions, waste water discharge characteristics, noise levels, land use, socio economics etc in connection with the mining and mining related activities in the study area.

5.2 AIR QUALITY MANAGEMENT

Mitigative measures suggested for air pollution control are based on the baseline ambient air quality monitoring data and estimated concentrations due to mining operations. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that air quality should be monitored on a regular basis to check it vis-à-vis the standards prescribed by CPCB/NAAQ and in cases of non-compliance, appropriate mitigative measures shall be adopted.

As per the results of ambient air quality monitoring data, the background concentrations and projected concentrations after proposed expansion, shall be within the prescribed standards. However, the following measures shall be adopted to minimize the pollution.

5.2.1 CONTROLLING DUST LEVELS

Dust is the major pollutant generated from the mining operations. Dust would be generated during mining, handling and transportation of the material. The environmental control measures, which are being taken and proposed to control the fugitive dust released during the ore production are given below:

The proposed air pollution control & mitigative measures are given below.

Table 5.1: Air Pollution Control Measures

S.No.	Dust Source	Control measure
1.	Mine Area	- Regular water sprinkling in working areas. - Provision of dust masks to workers in dust prone areas. - avoiding excavations operations and loading operation during high wind speeds
2.	Truck Movement	- No overloading of trucks. - Trucks to be covered with tarpaulin while transporting ore. - Enforcing speed limit. - proper maintenance and servicing of vehicles
3.	Plantation	- Native species of the area are proposed for the plantation. - Fast growing tree species are proposed for plantation on dumps and road sides.

5.2.2 MAINTENANCE OF VILLAGE ROADS

Haulage road from the ML area to the PWD road will be maintained. However in the PWD road maintenance will be undertaken in consultation with PWD department.

5.3 NOISE POLLUTION CONTROL

The predicted level of noise level due to the mining activity at mining lease boundary is only 43.2 dB (A). Major sources of noise are plying vehicles. The management plan for controlling noise pollution is as given below.

- ☞ Provision of earmuffs to workers as a measure to protect their ears.
- ☞ Proper gradient of haul roads to reduce cumulative noise levels.

5.3.1 PROTECTIVE MEASURES FOR GROUND VIBRATION/AIR BLAST CAUSED BY BLASTING

Following protective measures will be taken for ground vibration air blast and fly rocks

- ☞ Free face will be sufficiently cleared of any loose material before blasting
- ☞ Number of holes to be blasted at a time will be kept minimum to control the vibration and noise
- ☞ Mostly holes will be fired towards the free face
- ☞ Delay detonators will be used between holes or group of holes and rows of blasting as per the face configuration and advance planning. Short delay in blasting of successive blast holes effectively reduce the vibration problem

- ☞ Proper stemming of holes will be always carried out
- ☞ Blasting will be avoided during foggy weather and high wind velocity
- ☞ Over charging will be avoided. The maximum charge per delay will be kept within limit to minimize ground vibration
- ☞ A safe distance of about 500 m from centre of blasting will be maintained
- ☞ During blasting other activities in the nearby area will be temporarily stopped
- ☞ Drilling parameters like spacing, burden, depth and diameter of hole will be properly designed and spacing/burden is always more than one
- ☞ Holes will be drilled at 10 degree inclination from vertical so more explosive energy is utilized in productive way as in vertical hole only 50 % of energy is utilized in productive way.

5.4 WATER ENVIRONMENT

Baseline water quality data shows that the concentration of dissolved solids & total hardness in samples collected from the villages are more than the desirable limits as per IS 10500. Hence, the management of M/s MOIL intends to develop water softening technique in these villages.

5.4.1 SURFACE AND GROUND WATER BODIES

The applied area is almost plain. No perennial surface water source exists within the core zone or nearby buffer zone. There is no river, nallah, or any surface water source in the applied area. In order to prevent, control and minimize the silt load in the rainfall storm water generated from the mine area the following suggested plans are required to be implemented.

- During quarrying the ore body the permitted height of 7.5m and width of 15m are to be followed for the Over Burden and Ore Bench, respectively to prevent collapse, slippage and debris wash off. Similarly the haul road gradient has to be maintained at 1 in 16 and ramp slope to be kept at 1 in 10 to avoid loose material mixing with storm water.
- Waste dump side slope is required to be kept 28°, surface is to be stabilized with fast growing grasses. Retaining wall of 6 to 9" stone masonry is to be built around the toe of dump.

- Individual terraces should not exceed 30° slope and are to be connected to garland drain. The terraces are to have inward slope with catch drains directing to the garland drain. Retention wall of rubble check is to be constructed around Over Burden dump, across the gradient.
- Garland drain of 1 m width and 0.5 m depth has to be provided to the southern boundary of lease area. The drain has to have silt traps on its way
- A check dam is to be provided to the end of the lease area with a bund height of 1 m and width of 10 m to store water drained from the lease area and also for pumping out water for further use.
- Plantation of 30 m width barrier zone all around the periphery of the lease area, shall reduce migration of silt from the mine area.
- Clean water released from the mine area may be supplied to the down stream users for irrigation of the adjacent agricultural fields.
- In order to prevent dust from water sprinklers may be used periodically during operation periods.

5.4.2 WATER CONSERVATION PLAN

Following measures are proposed as part of the management plan to conserve the water:

After the exhaust of the minerals, abandoned pits will be converted into rainwater storage pits. Rainwater collected will be used for dust suppression and green belt development, thus conserving the water requirement for mine use, so as not to depend upon other natural resources. The sump water will also be available for irrigation purposes of the surrounding areas also.

5.5 MEASURES TO CONTROL SOIL EROSION/SEDIMENTATION OF WATER COURSES

In order to control the erosion/sedimentation of seasonal water courses, garland drain will be provided towards the extreme mining area in southern boundary side. The garland drain will be 1 m in width and 0.5 m in depth. Dumps will be planted initially with grass species for early stabilisation followed by planting native trees. During monsoon season the runoff water will be channelized into a settling pits in order to trap the silt wash off from the lease area.

5.6 TEMPORARY STORAGE AND UTILIZATION OF TOPSOIL

The topsoil generated will be temporarily stacked towards south of the applied area. It will be later used for topping purpose of the backfilled area.

The side of the dumps will be sloped to angle of repose i.e. 28° . Leguminous grass seeds or herbaceous species would be sown on the slopes for protection against erosion and to prevent runoff and wash off of dumps due to rains. The fertility of the soil would be improved by application of suitable fertilizers/manures. Vegetative cover grown on soil dump will store its nutrients value and fertility, so that they can be reused for rehabilitation purpose.

5.7 LAND RECLAMATION & REHABILITATION

The excavated area of 12 ha will be utilised as rain water harvesting pit and the water from this pit will be used for irrigation purpose in the area. Dumps cover an area of 7.70 ha which will be reclaimed by local species from 5th year of mining. Green belt will be developed in an area of 12.35 ha.

5.8 WASTE MANAGEMENT

OB/Waste: The over burden consists of quartzite gneiss. It does not contain any mineral of economic importance. The bed rejects arising from sorting and sizing of ROM comprises Gondites, Manganiferrous quartzite and some proportion of schist.

- ☛ The total solid waste generation during life of mine is estimated as 1.10357 million m^3 .
- ☛ Generated waste will be dumped towards southwest of the Mine Lease area
- ☛ A parapet wall will be constructed at the toe of the dump to avoid material rolling down
- ☛ The dump will be rehabilitated with local species

5.8.1 LAND CHOSEN FOR DISPOSAL OF WASTE

Two important factors are taken into consideration while selecting dumping site.

- (i) The land should be barren (non-mineralized)
- (ii) Beyond the ultimate pit limit.

Based on the above, waste dump will be located towards south west of the applied area. The manner of disposal of overburden will be mechanical means. 3 dumps will be created of soil, OB/waste & bed rejects.

Soil Dump	-	100 m x 100 m x 6 m
OB/Dump	-	230 m x 170 m x 7 m
Bed rejects	-	190 m x 40 m x 6 m

The ultimate dump slope will be maintained at 28° with individual terrace slopes not exceeding 30° . Each terrace will have inward slope with catch drains at the inward side of the terrace. The catch drains of the individual terrace will be connected to the garland drain outside the periphery of the dump. Retaining wall of width 6 to 9" of stone masonry will be provided around the toe of the dump.

The dump will be designed in retreating manner on the minimum calculated area so as to have quicker availability of dead terraces or earlier stabilization by plantation. The bed rejects amounting to 40% of ROM will be stacked towards south west separately.

5.9 BIOLOGICAL ENVIRONMENT

The mine area is thinly vegetated and with no thick vegetation within ML area but grass shrub and bushes grow sparsely. No wildlife is found in ML area. In order to minimize the impacts and to improve the existing ecosystem following actions will be undertaken.

5.10 AFFORESTATION PLAN

During first 5 years of mining, 30m thick green belt will be developed all along the mine lease area. Total 20.05 ha land of the mine lease area will be afforested during the post mining stage. The main aim of the plantation of the mined out areas is to stabilize the area and to protect it from storm erosion and wind erosion.

The stage-wise plantation and its areas are given in **Table 5.2**. Dust tolerant and fast growing species are selected for green belt development.

TABLE 5.2: STAGE WISE TREE PLANTATION

Year	Dump Area		Green Belt		Total	
	Area (ha)	Trees	Area (ha)	Trees	Area (ha)	Trees
1st	--	--	--	--	--	--
2nd	--	--	--	--	--	--
3rd	--	--	2.00	4000	2.00	4000
4th	--	--	2.00	4000	2.00	4000
5th	--	--	4.00	8000	4.00	8000
10th	2.00	4000	4.35	8700	6.35	12700
Post Mining	5.70	11400	--	--	5.70	10400
Total	7.70	15400	12.35	24700	20.05	40100

5.11 ACTION PLAN FOR ARRESTING FUGITIVE DUST - SHELTER BELT DEVELOPMENT

Trees, having compact branching, closely arranged leaves, broad leaves of simple elliptical and hairy structure, shiny or waxy leaves and hairy twigs are efficient filters for dust. The leaf surface is 10-20 times greater than the earth surface occupied by the plants. It is proposed to develop a shelter belt of 30m wide with 3-tier plantation along the boundary. The following species are suggested to arrest the dust pollution:

Cassia fistula, Bauhinia purpurea, Cassia siamea, Polyalthia longifolia, Tamarindus indica, Melia azadirachta, Azadirachta indica, Terminalia arjuna.

It is proposed to develop around 2000 tree saplings / ha. The plantation efforts shall be decided and executed with the assistance of local Forest Dept experts and co-operation of the local community. Efforts to improve the survival of the saplings and their healthy growth will be taken up like watering, fencing, keeping watch and ward.

Monitoring for fugitive dust emission shall be carried out as per revised NAAQ criteria twice in a week for four weeks in a month on regular basis at parsoda village, Khariri Bihewada village, medical centre & schools in these villages.

5.12 OCCUPATIONAL HEALTH & SAFETY CONTROL MEASURES

The most significant occupation health threats are exposure to manganese dust, and Occupational Lung Disease (OLD) and Noise Induced Hearing Loss (NIHL). The management of MOIL will take care in minimizing the impacts.

- ☛ Employees will be adequately trained and educated for involvement in implementation of health and safety guidelines
- ☛ Monitoring the effects of mining activities on safety and health
- ☛ Conducting regular performance reviews through periodical health checkups.
- ☛ Provision of necessary resources for safety and health of employees
- ☛ Implementing safety and health management system and assessing the effectiveness through periodic audits

Noise Induced Hearing Loss (NIHL)

Baseline audiogram forms the basis for future assessment of employees in terms of hearing loss. Using engineering initiatives to reduce noise at source is the priority management tool. The hearing conservation programme includes the provision of Hearing Protection Devices (HPDs) and annual audiometric examination of all employees. Apart from provision of HPDs emphasis shall also laid on training the employees responsibility to protect his/her hearing.

Occupation Lung Diseases (OLD)

There will be regular health camps for all the workers. Lung function tests, chest X-rays etc shall be carried out and any health disorders will be evaluated. Doctor will be hired for occupational health safety to provide necessary medical advice (Occupational Health Specialists) to the mine workers.

5.13 MONITORING FOR MANGANESE EXPOSURE

The mining activities from the proposed mine shall generate dust and particulates of manganese ore in ambient air which may settle in surface waters, soil surface and also on plants & agricultural fields. Manganese contamination is reported to cause neurological disorders in workers of manganese mine. It starts with mild head aches, giddiness, and loss of appetite etc. The workers and staff of the mine shall be explained about the severity of manganese exposure and periodically refreshed about the illness.

An awareness program shall be organized. Occupational Health Specialist, specialist physician on neurological disorders shall be arranged on regular intervals once in 6 months period. **

The administration shall maintain entry level medical health register of employees. This indicates any deviations / symptoms of manganese related disorders.

To detect the contamination of manganese in water, soil and ambient air; samples are collected of ground water from near by wells, lakes/ponds, agricultural fields and ambient air will be analysed. The sampling will be periodically carried out as per Environmental Monitoring Programme.

Besides sampling and testing of water air and soil samples, the ingestion of manganese in workers bodies shall also be tested. The procedure for this shall be drawing of urine samples at periodic intervals from the workers.

The records of samples covering air, water, soil and urine showing unusual concentration shall be preserved noting the place, time and year and also the age of the worker to whom it occurred. The details shall be entered into the register opened up for the purpose.

5.14 QUANTITATIVE EXPOSURE ASSESSMENT

During the follow up of Environmental Monitoring Program, the measurement and collection of samples for Respirable dust shall be undertaken. The action plan in this regard may be as follows:

- The filter paper on which the Respirable dust is collected shall be taken up for Optical Microscopy examination for identification of minerals collected over the paper
- The Optical Microscopic examination of the RSPM shall be done by a Petrographist, expert in such microscopic examination and is able to identify the mineral contents
- Depending upon the concentration of each of manganese and silica in detected samples, the measures prescribed in EMP section particularly for suppression of fugitive dust shall be reviewed and the measures shall be further strengthened for exercising further control of fugitive dust emissions

5.15 MALARIA ERADICATION PROGRAM

Following practice will be adopted to eradicate the malaria in the study area:

1. Early Case Detection and Prompt Treatment (EDPT)

- ☞ EDPT is the main strategy of malaria control - radical treatment is necessary for all the cases of malaria to prevent transmission of malaria.
- ☞ Chloroquine is the main anti-malaria drug for uncomplicated malaria.
- ☞ MOIL is having facility like full fledged Hospital and there will no problem for anti malaria drug distribution and provide necessary treatment for the surrounding rural areas.

2. Vector Control

- ☞ Use of chemical larvicides like Abate in potable water
- ☞ Distribution of mosquito repellent creams, liquids, coils, mats etc.
- ☞ Distribution of bed nets treated with insecticide

3. Community Participation

Sensitizing and involving the community for detection of Anopheles breeding places and their elimination

4. Monitoring and Evaluation of the program

- ☞ Monthly Management Information System(MIS)
- ☞ Field visits by volunteers in association with local health department
- ☞ Feedback to District Health Centre on field observations for correction actions.

5.16 BUDGETARY PROVISION

It is necessary to include the environmental cost as a part of the budgetary cost component. The project authorities propose to undertake the following environmental works to achieve the environmental quality as desired. The budget for environmental protection is given in **Table 5.3.**

TABLE 5.3: BUDGET FOR ENVIRONMENTAL PROTECTION

(Rs. Lakhs)

PARTICULARS	CAPITAL COST	RECURRING COST
Pollution Control		
Dust suppression	2.00	0.50
Gully plugs, Check Dam, Retaining Walls etc	1.00	0.50
Pollution Monitoring	2.50	1.00
Occupational Health		
For routine check up	2.50	1.00
Medical aid as per ESI Scheme	1.50	1.50
Reclamation & Rehabilitation		
Green belt & afforestation	2.00	1.50
Others (Social Development Plan, etc.)	3.00	1.50
Miscellaneous	5.00	2.50
Total	19.50	10.00

CHAPTER 6: ADDITIONAL STUDIES

6.1 RISK ASSESSMENT

(a) INTRODUCTION

Preliminary Risk assessment is based on the philosophy that "Prevention is better than cure". Mining operation may be carried out with utmost safety but there is always some element of danger or risk in it. Minor accidents may take place if preventive measures are not undertaken. No perennial source of surface water is present in the mine lease area. Blasting of ore body has been proposed. The mining operations will be carried out under supervision of authorised personnel as per provisions of MCR 1960, MCDR 1988, Mines Rules 1955, Mines Act 1952. Safety aspects are followed as per MMR 1961.

(b) SOURCES OF ACCIDENTS/DISASTER

There are various factors, which can cause accidents/disaster in this mine. These are as follows:

1. Blasting
2. Mining Machinery and Transportation of Ore
3. Storage of explosives
4. Collapse of benches
5. Failure of dump slope
6. Fall of workers from high benches

1. BLASTING

The common hazard due to blasting is as under

- i. Fly rocks falling beyond danger zone
- ii. Ground vibration
- iii. Dust and noise generation

Controlled blasting has been proposed to prevent flying fragments. It is proposed to follow Regulation 160, 161, 162, 163, 164, 165, 166, 167, 169 & 170 of MMR 1961. There are no inhabitants in the vicinity of mine lease area.

Some of the precautions to be taken are as under.

- i. Preparation of charge and stemming of holes by a qualified blaster
- ii. Blast siren before blasting
- iii. Controlled blasting
- iv. Proper inspection after shot firing
- v. The number of shots exploded will be counted by the blaster to assess misfires

2. MINING MACHINERY AND TRANSPORTATION OF ORE

The mechanical failure and human error may lead to accidents due to mining machinery and transport vehicles such as dumpers and loader cum excavator. The mine machineries will be maintained and checked for efficiency and performance

3. STORAGE OF EXPLOSIVES

While storing explosives, Regulation 154, 155, 156, 157 & 158 of MMR 1961 shall be strictly followed. Following precautions have been proposed.

- i. Explosives will be stored in a magazine duly approved by the licensing authority under the Explosive Act and permitted by DGMS
- ii. The magazine will be in charge of a competent person who shall be responsible for the proper receipt, storage and issue of explosives
- iii. The explosives will be issued only to authorized person

The main hazard associated with the storage, transport and handling of explosive is fire and explosion. The Rules as per the Indian Explosive Act will be followed for handling of explosive, which includes transportation, storage & use of explosive.

4. COLLAPSE OF BENCHES

Opencast working will be done in benches as per Regulation 106 of MMR 1961. In OB bench height shall not exceed 7.5 m and the width 15m an angle of not more than 75° from the horizontal. The width of the bench will not be less than three times the length of the largest machine working in the bench. No loose stone or debris shall be allowed to remain within a distance of 3 m from the edge or side of the excavation.

5. FAILURE OF DUMP SLOPE

Following precautions will be taken to avoid any such incident.

- i. The dumps will be stabilized with fast growing grasses, mulches and bark
- ii. The side will be sloped to angle of repose i.e. less than 28°
- iii. Garland drain with a settling tank will be provided around the dumps to prevent wash off.
- iv. To prevent gully formation along the slope of the dump, a berm will be provided having gentle slope

6. FALL OF WORKERS FROM HIGH BENCHES

The quarry faces as mentioned will be suitably benched as per Regulation 106 of MMR 1961. Following precautions will be taken to avoid such incident.

- i. The top of every opencast working shall be kept securely fenced
- ii. Entrance from a roadway into the mine will be provided with a fence, barrier or gate

(c) OBJECTIVE OF DISASTER MANAGEMENT PLAN

The disaster management plan is aimed to ensure safety of human life and property and protection of environment. Following are the objectives of the disaster management plan.

- i. First Aid to injured
- ii. Rescue operation and provision of adequate medical facilities to the injured
- iii. Safety of the human life in the buffer zone if needed
- iv. Inform to the administration, DGMS and statutory persons as per Rules

(d) EMERGENCY CELL

An emergency cell will be set up which will be led by the 1st class Mines Manager. He will organize a team of responsible and statutory personnel's under him for controlling the incidence.

(e) EMERGENCY COMMUNICATION

Whoever notices an accident, disaster or emergency situation etc, would inform immediate superior and emergency control center led by the Mines Manager. When any accident resulting in serious bodily injury to any person or in loss of life occurs in the mines, the manager shall inspect the accident site as soon as possible and conduct an enquiry into the cause and circumstances. The result of such enquiry with plan of the site of the accident showing details shall be recorded. The Manager shall perform such other duties as have been prescribed in that behalf under the Mines Act 1952 and under MMR.

Notices of accidents will be communicated as per section 23 of Mines Act 1952 and in Form IV A to the District Administration and DGMS authorities as per Regulation 9 of MMR 1961. When it becomes essential, the Mines Manager communicates to the District authority, Police, fire services etc regarding help required or control of the situation.

(f) EMERGENCY FACILITIES

Stretchers and general first aid materials would be maintained in the medical center as well as in the emergency control room. Private medical practitioners help would be sought.

M/s MOIL is having full fledged hospital for dealing emergencies. Government hospital would be approached for necessary help. Besides this, names of medical personal, medical facilities in the area would be prepared & updated. An ambulance will be maintained to transport injured or affected persons. At the end of an emergency, the Mines Manager orders an all clear signal.

(g) DISASTER MANAGEMENT

- i. Safety precautions and provisions of Mines Act 1952, Metalliferous Mines Regulation 1961 and Mines Rules 55 will be followed in mining operations.
- ii. Avoidance of danger as per Regulation 117 of MMR and general precautions and safety as per Regulation 118 and 181 of MMR 1961 will be observed

- iii. Mining operations will be done under supervision of qualified and statutory personnel's as per MMR 1961 and MCDR 1988
- iv. Mine working will be done as per approved Mining Plan following provisions of MCDR 1988 and Regulation 106, 110, 111 & 115 of MMR 1961
- v. Entry of unauthorized persons will be prohibited
- vi. Provisions of all safety appliances and protective wear such as safety boot, helmets, goggles, hand gloves & Ear muffs etc as per Regulation 182 will be made available to the employees and regularly checked for their use
- vii. Cleaning of mine faces will be regularly done
- viii. Handling of explosives, charging and blasting will be carried out by competent persons only
- ix. Provision of magazine at a safe place with fencing and necessary security arrangement
- x. Regular maintenance and testing of all mining equipments as per manufacturer guidelines
- xi. The haul roads will be kept sufficiently wide to ensure free and safe movement with proper alignment and gradient
- xii. Medical appliances/Specified First Aid box as per Section 21 of Mines Act 1952 will be maintained in the mine office. The Mines Manager and other qualified persons will render first aid to injured if needed

6.2 CARE AND MAINTENANCE DURING TEMPORARY DISCONTINUANCE

The quarry faces at top will be suitably fenced or parapet wall will be made in order to avoid any cattle fall or accident in the mines during the course of temporary discontinuance. The mine will be properly guarded by employing security guards.

6.3 HYDROGEOLOGICAL STUDIES

Since the mining intersects ground water table hydrogeological studies were carried out and the report is enclosed as **Annexure 8**

6.4 PUBLIC CONSULTATION

Public consultation for the project is completed on 06.02.2010. Public hearing was advertised on 06.01.2010 & 08.01.2010 in Dainik Lokmat (local news paper, Nagpur, Maharashtra) and in Times of India (English News paper). The proceeding of public consultation process along with response from project proponent is recorded and the same is enclosed as **Annexure 10**

CHAPTER 7: PROJECT BENEFITS

7.1 SOCIO-ECONOMIC BENEFITS

Job opportunities in the proposed project will increase the per capita income and improve the living conditions of the people. Maintenance of village roads through which transportation of ores are under taken will be carried out. Therefore, there shall be a beneficial impact to the community due to development of this mining activity.

Mining will be done with the vision of leaving a positive impact on socio-economics of people living in the nearby villages. A first-aid centre to meet the basic medical needs of employees & villagers will be provided.

7.1.1 SOCIO-ECONOMIC DEVELOPMENT ACTIVITIES

M/s Manganese Ore (India) Ltd is committed to take the following social responsibility for development of income generating sources in the surrounding village area of mine

- ☞ Fodder will be grown around the Mine Lease area
- ☞ Sapling of fruit bearing species will be distributed and planted in the surrounding villages to encourage alternate source of income
- ☞ Temples and schools of nearby villages will be maintained by the company

7.1.2 EMPLOYMENT

Besides the direct employment, company will provide vocational skill training to the un-employed youth of the neighbouring villages through outside agencies. Local villagers residing in the near by villages shall be employed as semi-skilled and unskilled workers. Un-employed youth are given vocational training and encouraged to set up small scale industrial units.

7.1.3 INFRASTRUCTURE MANAGEMENT

Parsoda Manganese Ore Mine under its community development initiatives will provide seeding money for infrastructural projects like construction of Roads, School buildings, Community halls, primary health centres, public water ponds and others.

7.2 NEED BASED ASSESSMENT

The development of the proposed mine will lead to economic up-liftment of the society by providing employment opportunities, enhancing the existing medical, educational and infrastructural facilities in the nearby areas. Based on the needs of the villagers the M/s Manganese Ore (India) Ltd., shall take up the following activities for economic development of the society.

7.2.1 VOCATIONAL TRAINING TO YOUTH

The mine management will provide on job training to the interested youths of the nearby villages and the eligible candidates will be absorbed by the company as per the requirement. The mine management will also allocate funds for helping the youths from poor section for higher studies. These funds will be distributed in the form of scholarship for higher education to the poor.

7.2.2 UPLIFTMENT OF SCHEDULED CASTE / TRIBES AND OTHER WEAKER SECTIONS OF SOCIETY

The management will conduct a social survey to identify the economically backward people in the study area. A programme will be initiated keeping in view the scheduled castes and tribes, and to provide training in their interested fields, so that they can start their enterprise like dairy farming, mushroom farming, sericulture, wood art, home made foods, etc. The management will also provide all monitory assistance to them for establishing their enterprise and also in marketing their products.

CHAPTER 8: ENVIRONMENTAL MONITORING PROGRAM

8.1 ENVIRONMENTAL MONITORING

Environmental parameters viz. air, water, noise, will be monitored regularly in order to evaluate any changes from the baseline status and to take appropriate mid course correction. Monitoring program will be followed till the end of mining operations as per the schedule below:

TABLE 8.1: SUMMARY OF MONITORING PROGRAMME

S.No	Parameters	Schedule / Frequency of Monitoring	Locations
1	Ambient air quality monitoring in and around the mine of for SPM, SO ₂ , NO _x & CO. Mn & Si in PM10 will also be tested as workplace exposure. Air born dust will be monitored at (1). Haulage road (2). Dump area (3). Excavated pit (4) Mining gate.	Twice in a week for 4 weeks for entire 3 months in a season except monsoon as per MoEF & CPCB guidelines	4 in core zone 4 in buffer zone
2	Ambient noise levels	Once in a season except monsoon	4 in Core zone 4 in Buffer zone
3	Water quality & water level monitoring	Once in every season for water quality and water levels twice in an year	Pit water and ground water levels and quality in wells around the mine lease area
4	Inventory of flora	Once a year on all the planted sites and once in five years in study area.	Core & Buffer Zone

S.No	Parameters	Schedule / Frequency of Monitoring	Locations
5	Plantation 1. Year wise plantation. 2. Survival rate	Annually	Within ML area
6	Inspection to check any signs of slope failure and excess erosions along the pit and the waste dumps.	Regularly	Within ML area
7	Efficacy of bunds, garland drains and de-silting pits	Regularly	Within ML area
8	Gully plugs, Parapet walls and Check dams,	Prior to onset of monsoon and after monsoon	Within ML area
9	Socio-economic condition	Once in five years of local population, physical survey.	With in Buffer zone
10	Occupation Health & Safety for workers Health check-up for villagers	Annually Twice in an year	Within the ML area. Near by villages

The monitoring system will also include:

- ☞ Examination of signs of slope failures and excess erosions along the waste dumps.
- ☞ Continued analysis of mine site drainage water at regular intervals to monitor suspended solid content in particular and other parameters in general.
- ☞ Efficacy of check dams, gully plugs, retaining walls and settling pits to improve the silt arresting arrangement.
- ☞ For implementation of Environment Management Plan a small unit called Environment Management Division will be formed under the control of the Mines Manager. The job of this division will be:
 1. Regular environmental monitoring as stipulated by the regulatory authorities
 2. Preparation and submission of environmental report to the regulatory authorities

3. Compliance management with all environmental legislations
4. Implementation of various environmental management programs and reporting the performance to the top management.
5. Co-ordinating the environment related activities within the project as well as with outside agencies
6. Green belt development, etc.

Provision will be made for the testing of urine sample of every worker annually. The Government approved laboratory will be hired to collect and test the samples for Manganese.

8.2 ORGANIZATIONAL SETUP

In order to develop and implement the environmental monitoring and management plan, Parsoda Manganese ore mine shall have an organisation headed by the Mines Manager. A designated environmental officer will coordinate, implement and supervise these activities. The said organization will be responsible for:

- ☞ Regular environmental monitoring as stipulated by the regulatory authorities
- ☞ Preparation and submission of environmental report to the regulatory authorities
- ☞ Compliance management with all environmental legislations
- ☞ Implementation of various environmental management programs and reporting the performance to the top management
- ☞ Co-ordinating the environment related activities within the project as well as with outside agencies
- ☞ Green belt development, etc

CHAPTER 9: DISCLOSURE OF CONSULTANTS

NAME OF THE CONSULTANTS:

1. NAME & ADDRESS OF CONSULTANT / CONSULTANTS

M/s Bhagavathi Ana Labs Limited
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Bhagavathi Ana Labs Limited is a Professional Services Company providing Environmental Consultancy, Environmental Engineering, Analytical and Quality testing, Water Resource studies, Technical Training and Enviro-legal services. Since inception in 1984, the company has completed number of projects spread all over India. The company has qualified and experienced staff of more than 100 people operating across seven centres in India. The Professionals and Technicians include Environmental Engineers, Environmental Scientists, Environmental Planners, Chemists, Mining Engineers, Geologists, Hydro-geologists, Economic and Social Science specialists etc. Bhagavathi Ana Labs Limited is an ISO 9001-2000 Company and is accredited by:

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- ☞ Ministry of Environment and Forests (MoEF), Govt. of India, New Delhi
- ☞ Bureau of Indian Standards (BIS), New Delhi

The firm is in preparation of Environmental Impact Assessment & Management Plan Reports for the last 10 years.