DOCUMENT

FOR

PUBLIC HEARING

PROJECT
MAHARKUND MANGANESE ORE MINE
(10.62 HA)
AT
VILLAGE –MAHARKUND
TEHSIL – SAONER; DISTRICT-NAGPUR (MS)

Proponent

M/s Veet Rag Homes Pvt. Ltd.
267, Ganesh Phadnavis Bhavan,
Near Trikoni Park
Dharampeth, Nagpur 440010 (M.S.)

Consultant

Enviro Techno Consult Private Limited
68, Mahakali Nagar-2, Near Manewada Square
Nagpur 440 024

Accreditation : NABET/QCI Listed at Sl. No. 45, Nov. 07, 2016

February 2017

EXECUTIVE SUMMARY

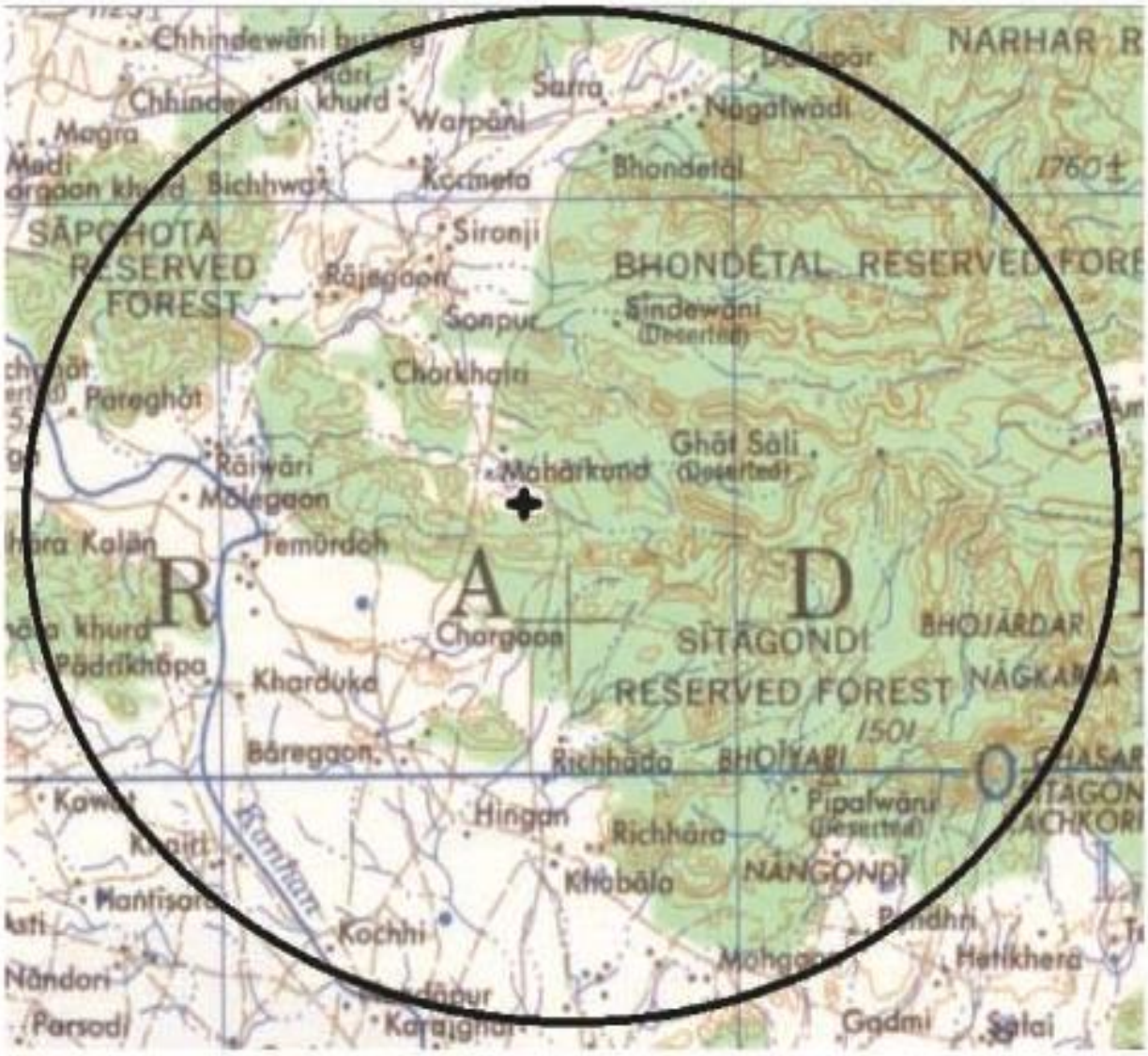
Introduction :

M/s Veet Rag Homes Pvt. Ltd., (VRHPL), Nagpur have proposed manganese mining over a of 10.62 ha which they hold near village Maharkund in Saoner tehsil of Nagpur district. As per the prevailing MOEF & CC, VRHPL had made a presentation to State Environmental Assessment Committee regulations on September 7-9th 2016 in its 134th meeting, the proposal was considered under 1(a)-B 1 category of the schedule of EIA Notification 2006. PP gave a detailed presentation about their proposal for extracting manganese on an area of 10.62 ha, owned by the PP to generate manganese ore @ 85 T/day. The PP holds the lease since 2002, valid for 50 years.

This lease near Maharkund was held by others prior to M/s VRHPL. Deposits at the Maharkund were worked by some earlier lease holder on a very small scale and then abandoned. M/s VRHPL have been in possession of the lease since 2002. They have not worked the lease till today. Validity of lease has been extended up to 50 years. This is a private revenue land surrounded by forest. Lease latitude is 21º 30' 44.731''-21º 30' 55.824''N and longitude is 78º 59'4.788-78º 59'15.617"E. It is covered in toposheet no. 55 K/14 is shown in **Figure 1**. Area is 10.62 ha with gentle slope to NW. Highest and lowest RL are 369 m RL and 351m respectively. Local geology is folded & metamorphosed rocks of Sausar series. Manganese ore belongs to Mansar stage litho sequence is soil followed by Mansar & Lohangi formations. ROM may contains psilomilane, wad and occasionally pyrolusite. It is soft and friable. Total reserves are 1,93,000 T. Ore analysis is generally Mn : 25.46-41.21%; Fe : 8.67-24.42%; SiO_2 : 10.49-29.37%. Ore body is 1-2 m wide and

is soft. Mining plan/scheme has been approved by I.B.M vide letter no. NGP/MP/MPLN-782/NGP dated 23/12/15 I.BM.

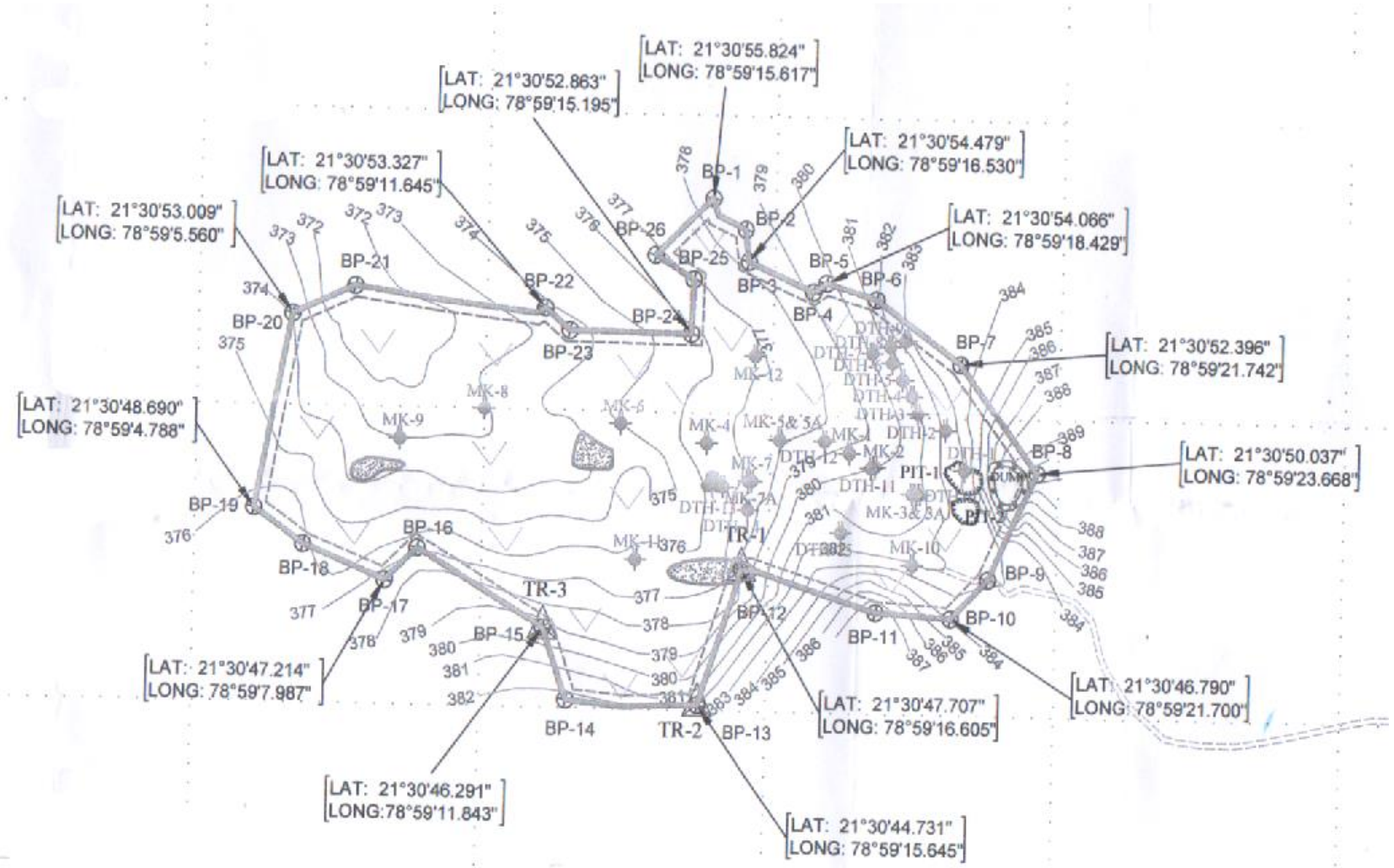
FIGURE 1



Topographical map no. 55 K/14

Location of lease is shown in Figure 1. It can be reached from Nagpur via Khapa and village Badegaon. Site can be reached from Badegaon by a seasonal road. Site is 46 km from Nagpur. Nearest railway station is Khapa. Lease area is 10.62 ha. Project boundary with coordinates is shown in **Figure 2** and Google imagery of the area is in **Figure 3**

FIGURE 2.



Project boundary with coordinates

FIGURE 3

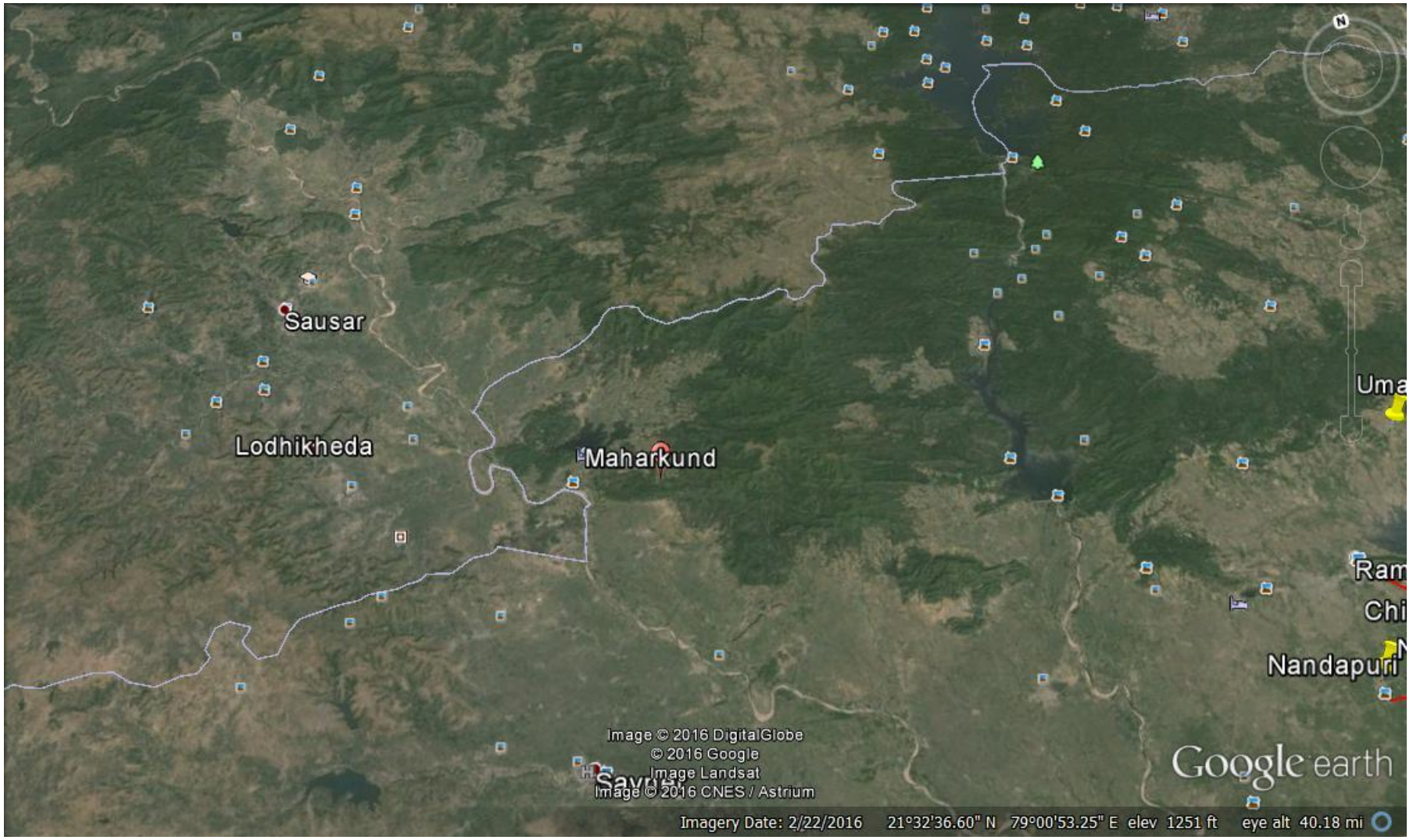

Sausar
Lodhikheda
Maharkund
Nandapuri
Image © 2016 DigitalGlobe
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Image Landsat
Image © 2016 CNES / Astrium
Google earth
Imagery Date: 2/22/2016 21°32'36.60" N 79°00'53.25" E elev 1251 ft eye alt 40.18 mi

Manganese is required in steel and ferro alloys industry. There are a number of units around Nagpur. Quality of ore at Maharkund deposits is acceptable to these and will meet the requirements of regional manufacturers.

Scope of study was as per model TOR. In addition, EAC had prescribed details of i) management of natural drainage and mine pit water and ii) management of solid waste.

Maharkund lease (10.62 ha) comprises of folded and highly metamorphosed rocks of Precambrian meta sediments of Sausar series. Proved reserves are 1,93,915 T. Manganese varies from 25.46 to 41.21 per cent; iron from 8.67 to 24.42 per cent and silica from 10.49 to 29.37 percent. Width of manganese ore body is 1-2 m. This lease has been previously worked but not in the recent past i.e. not after 2002.

It is proposed to mine manganese @ 25,539 T/year or @ 85 T/day.. It is proposed to provide office, rest shelter, stores, first-aid facility etc. Present land use over the lease is in following table.

Use	Present, m^2
Under old pit	674.66
Waste dump	742.02
Reject stack	0
Infrastructure	0
Road	124.13
Plantation	0
ROM stack	0
Total	1540.81

Proposed mining method will be A category mechanized mining without drilling and blasting. Ore body and overburden is soft. Bench height will be six

m. and width will exceed bench height. Resulting overburden will be removed by back-hoe or loader. Soil generation during two years 1072.5 m^3 and overburden will be 178,551 m^3. Land use till 2017 will be as under.

Use	2016-17, m^2	Conceptual, m^2
Under pit	9199.08	9316.1
Waste dump	30067.56	6127.82
Reject stack	2037.23	2037.23
Infrastructure	1468.39	1468.39
Road	2736.29	2376.29
Plantation	1091.16	1714.66
ROM stack	419.5	419.5
Total	47019.31	23819.99

Mining plan has been prepared as per the location/environmental setting of lease, occurrence of ore body and of other segments of environment.

Base line environmental quality was studied during October–December 2016 as per MOEF & CC norms. It included ambient air quality and micrometeorology, examination of surface and ground water quality within the study area, Land use within study zone, physical & chemical analysis of soil samples, measurement of ambient noise levels, quality of life in Maharkund.

Air environment :

There are no industrial sources within the buffer zone. Wind rose was used to select sampling stations for ambient air quality monitoring. Predominant direction was W, followed by NW & WNW. Average wind speed was 9.2

km/hour. Wind rose is shown in **Figure 4** AAQ was monitored at villages shown in **Figure 5.**

FIGURE 4

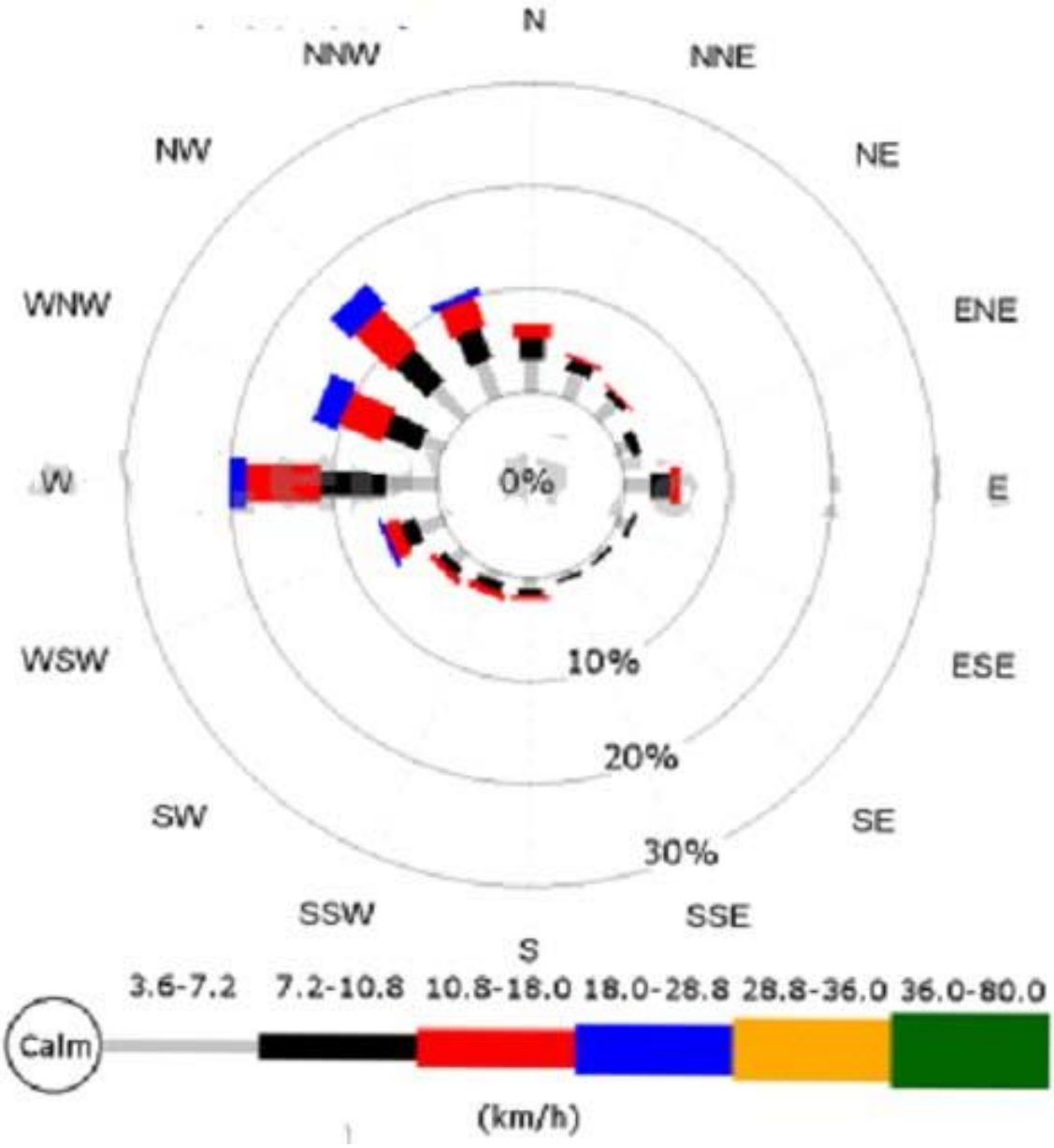
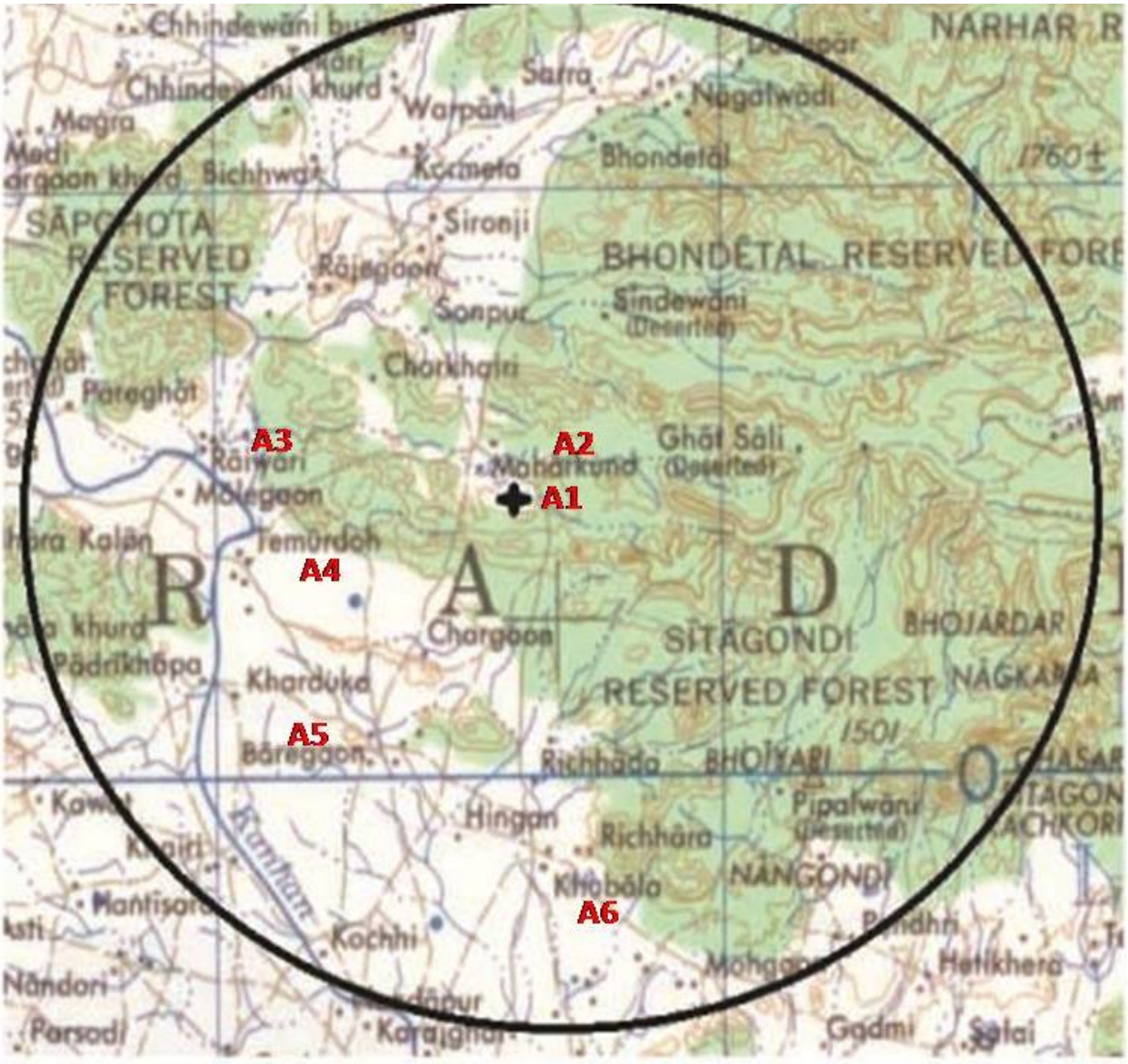


FIGURE 5



Sampling Code	Sampling stations	Distance, km
A1	Lease	--
A2	Maharkund	1
A3	Raiwadi	4.6
A4	Tembhurdoh	4.4
A5	Badegaon	3.5
A6	Khubala	5.6

Summary of base line ambient air quality data at these stations is given in **Table 1** below.

Ambient air quality data

A1: Lease area				
Week	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	SO_2 µg/m^3	NOx µg/m^3
Minimum	38.4	7.6	6.0	4.6
Maximum	48.9	9.8	7.6	6.7
Average	44.1	8.8	6.5	5.7
98 percentile	48.8	9.8	7.5	6.6
A2: Village Maharkund				
Minimum	42.3	8.0	5.8	5.2
Maximum	53.4	11.7	6.4	7.3
Average	47.8	9.7	6.1	6.2
98 percentile	52.9	11.6	6.4	7.2
A3 : Raiwadi				
Minimum	36.2	7.2	6.3	7.0
Maximum	52.5	11.3	9.8	12.1
Average	45.0	8.9	7.9	8.6
98 Percentile	52.1	11.0	9.8	12.0
A4 : Tembhurdoh				
Minimum	31.8	6.4	5.1	5.2
Maximum	47.9	9.3	7.9	7.3
Average	39.9	7.7	6.7	6.2
98 Percentile	46.8	9.3	7.7	7.3
A5 : Badegaon				
Minimum	29.8	6.2	4.8	5
Maximum	44.7	8.9	6.5	7.6
Average	38.5	7.6	5.9	6.1
98 percentile	43.9	8.7	6.4	7.5
A6 : Khubala				
Minimum	33.9	6.2	4.9	5.1
Maximum	47.1	9.7	6.4	7.7
Average	41.2	8.1	5.6	5.9
98 Percentile	46.9	9.7	6.3	7.6

Noise levels :

There are no industrial sources of noise in the buffer zone. There is no human activity which would create noise except routine village domestic chores. Traffic also is minimal. Background noise levels over the lease and in village Maharkund were measured by standard noise meter. Sampling stations are depicted in **Figure 6**. Equivalent noise levels during day and night were calculated and are given below in

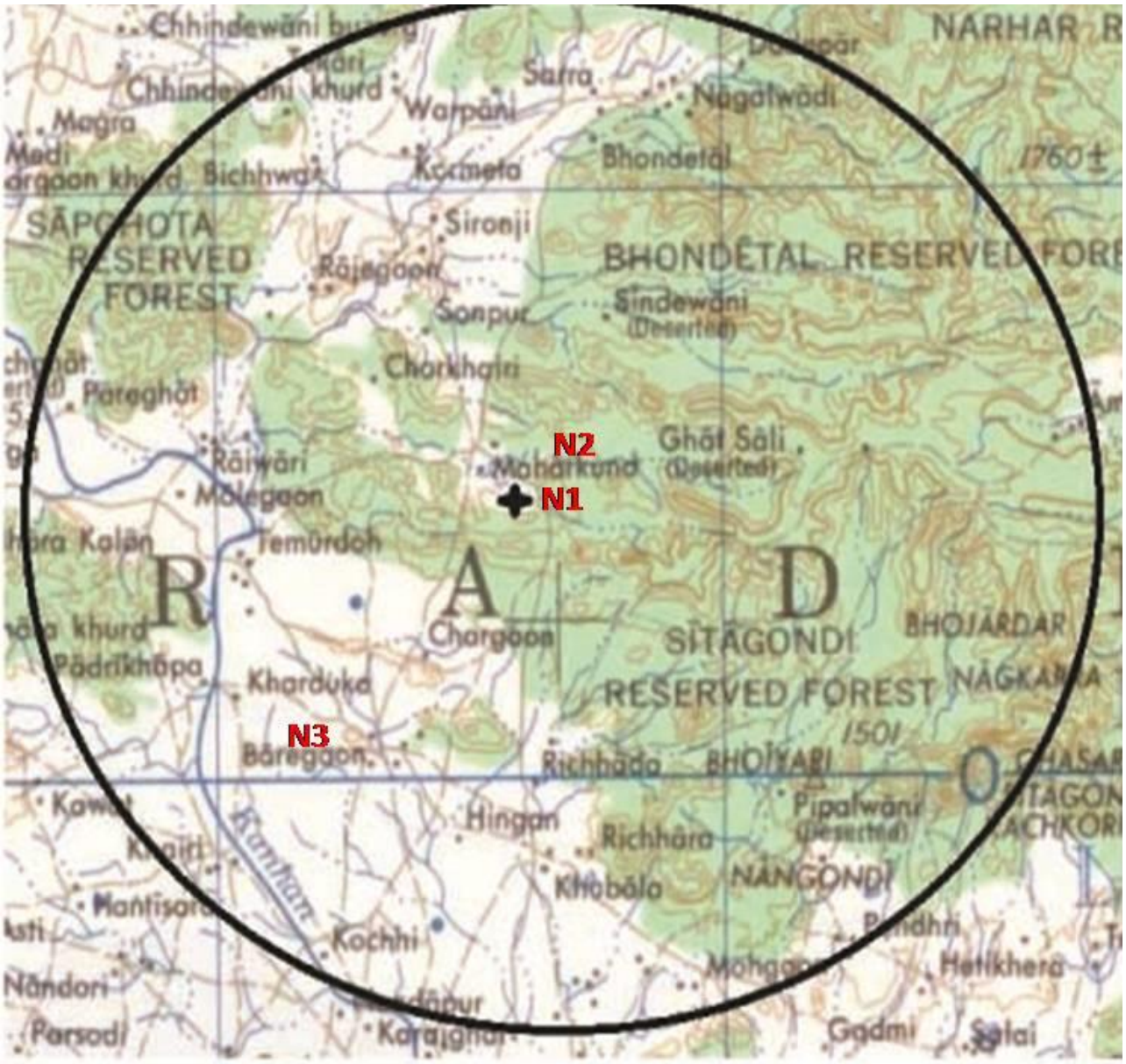


Table 2 : Noise levels

Sampling stations	N1 Lease	N2 Maharkund	N3 Badegaon
Average	36-45	36-49	37-46
Ld	40.7	42.8	43.5
Ln	39.2	39.4	38.3
Ldn	45.8	46.5	45.9

Water:

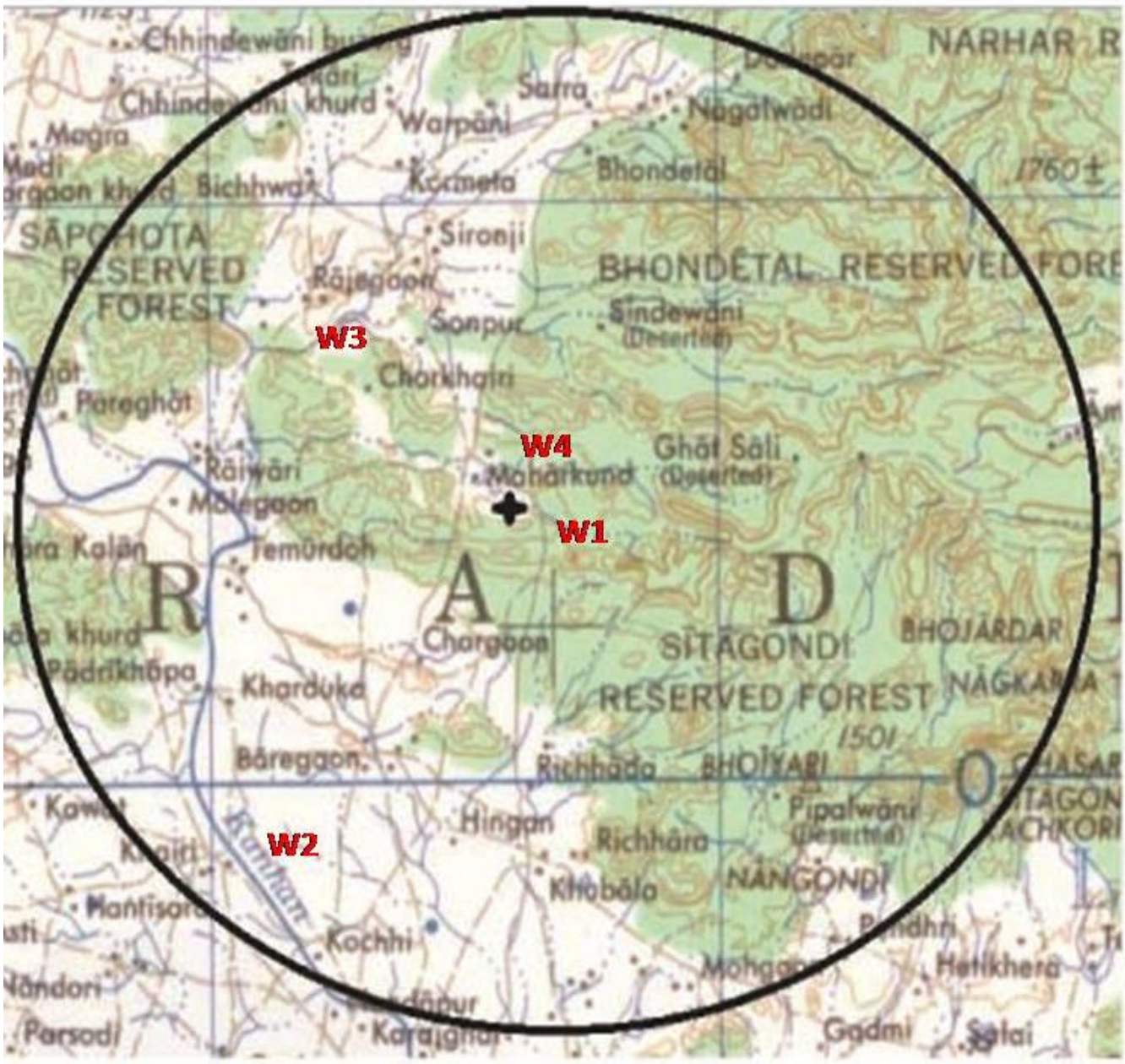
There are a few surface drains around the lease. They are Khekra nalla to NW at about 3.96 km and the Kanhan river at 4.2 km to the west. Khekra nalla meets the river at about 4.3 km. There is small irrigation dam called Maharkund at 1.32 km to NE of the lease. Also there is one seasonal drain called Surewani to NNE of lease at 3.4 km.

Water samples were collected from i) pit in the lease, ii) well in Maharkund village, iii) Khekra nalla, iv) Kanhan river and v) a bore well in village. Water samples were preserved. Unstable parameters like dissolved oxygen, temperature etc were estimated at site. Other parameters were estimated by method prescribed by BIS. Water quality is given below in **Table 3** and shown in **Figure 7**.

Following is concluded regarding water quality in above mentioned sources.

1. All surface sources were acceptable for water supply after conventional treatment .
2. Ground water encountered in wells and mine pit also were acceptable as per BIS 10500 (2012).
3. Manganese ion concentration was within limits because its solubility in normal water is limited.

FIGURE 7



WATER SANPLING STATIONS

Table 3 : Water quality

Sr. No.	Parameters	Unit	IS-10500-2012		Sampling stations			
			Desir-Able	Permis sible	Seasonal drain near mine	Kanhan river	Khekra nalla	Dug well in Maharkund
1.	Temperature	°C			27.0	27.0	28.0	29.0
2.	Colour	Hazen	05	25	SM	SM	SM	CL
3.	Odour		UO	UO	UO	UO	UO	UO
4.	Taste		AG	AG	AG	AG	AG	AG
5.	Turbidity	NTU	05	10	25.0	30.0	8.0	<1
6.	pH		6.5-8.5	NR	7.9	8.0	7.9	8.2
7.	Dissolved oxygen	mg/L	*	*	5.8	6.1	5.6	2.4
8.	BOD	mg/L	*	*	4.8	5.2	5.8	<2
9.	COD	mg/L	*	*	12.8	15.4	14.8	<5
10.	Elec. conductance	µS	*	*	135.0	132.0	260.0	640.0
11	T. D.S.	mg/L	500	2000	95.0	97.0	120.0	390.0
12.	T. S.S.	mg/L	*	*	15.0	14.0	12.0	3.0
13.	Alkalinity as $CaCO_3$	mg/L	200	600	24.0	28.0	38.0	48.0
14.	Hardness ,$CaCO_3$	mg/L	300	600	108.0	104.0	128.0	156.0
15.	Calcium as Ca	mg/L	75	200	34.0	32.0	70.0	48.0
16.	Magnesium as Mg	mg/L	30	100	9.0	8.0	7.0	9.0
17.	Chlorides as Cl	mg/L	250	1000	70.0	18.0	25.0	27.0
18.	Sulphate as SO_4	mg/L	200	400	7.0	7.5	8.0	15.0
19.	Nitrate as NO_3	mg/L	45	100	0.8	0.6	1.2	0.1
20.	Fluoride as F	mg/L	1.0	1.5	0.2	0.15	0.2	0.2
21.	Iron as Fe	mg/L	0.3	1.0	0.1	0.1	BDL	BDL
22.	Copper as Cu	mg/L	0.05	1.5	BDL	BDL	BDL	BDL
23.	Zinc as Zn	mg/L	5.0	15	0.02	0.02	BDL	0.2
24.	Manganese as Mn	mg/L	0.1	0.3	0.1	BDL	BDL	0.1
25	Boron	mg/L	1.0	5.0	BDL	BDL	BDL	BDL
26.	Oil & Grease	mg/L	0.01	0.05	NIL	NIL	NIL	NIL
27.	Coliforms	MPN/ 100ml	--	--	460	150	460	240
28.	Cadmium	mg/L	0.01	NR	BDL	BDL	BDL	BDL
29.	Lead	mg/L	0.05	NR	BDL	BDL	BDL	BDL
30.	Chromium	mg/L	0.05	NR	BDL	BDL	BDL	BDL
31.	Arsenic	mg/L	0.05	NR	BDL	BDL	BDL	BDL
32.	Pesticides	mg/L	ABSENT	0.001	ABSENT	ABSENT	ABSENT	ABSENT

NR : No Relaxation * : No specific limit prescribed CL : Colourless
UO : Unobjectionable AG : Agreeable BDL : Below detectable level

Land / terrestrial:

Total lease area is 10.62 ha. It is a private revenue land and is in possession of project proponent. Mining plan has been approved by IBM Nagpur.

Present features of lease are :

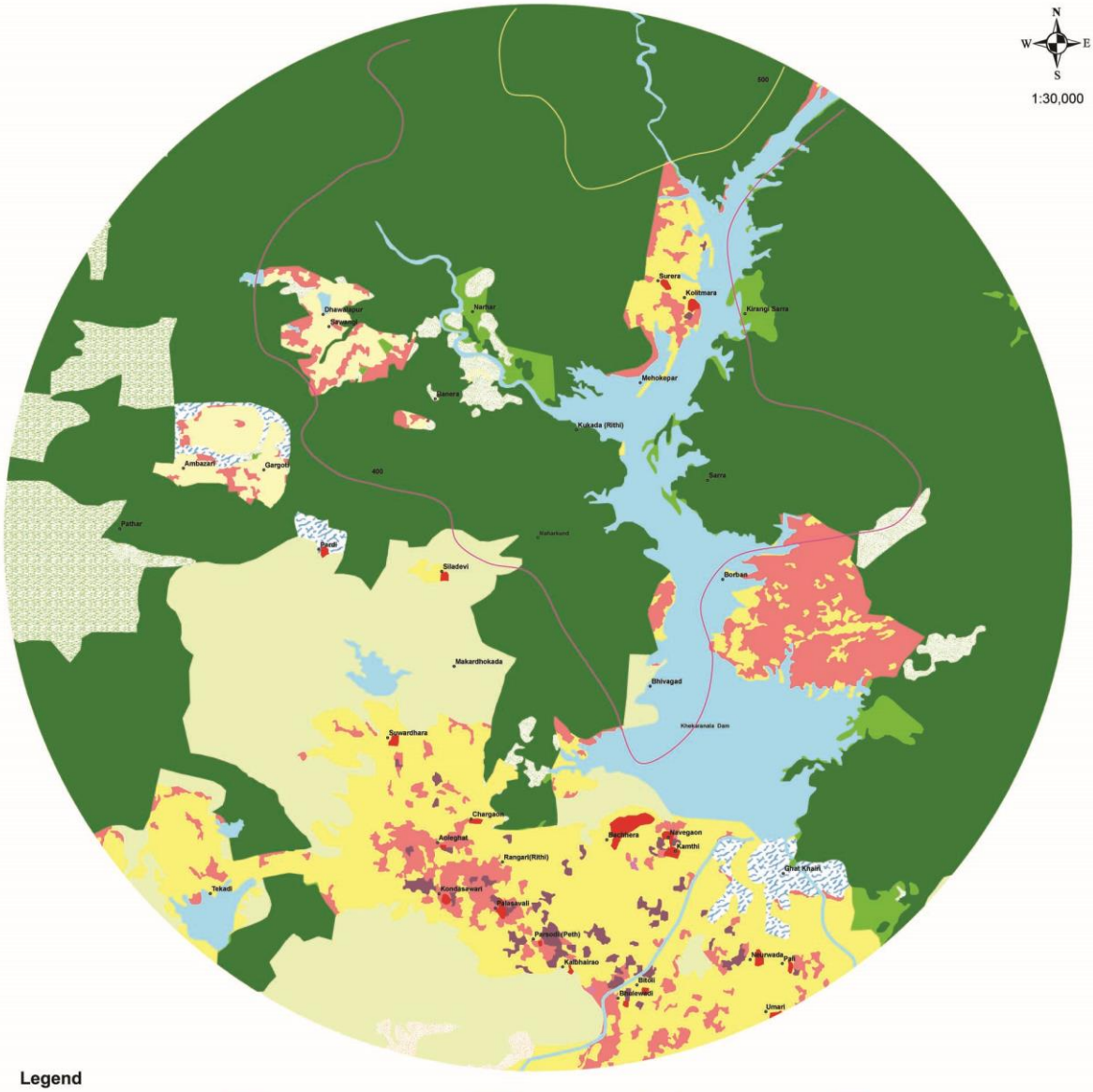
Area under pit	:	674.66 m^2
Waste dump area	:	742.02 m^2
Road	:	124.13 m^2

Litho sequence over the lease is soil followed by Mansar and Lohangi formations of manganese deposits. Soil cover in the lease varies from 0 to 2 m.

Land use pattern within 10 km radius is shown in land sat imagery in **Figure 8**. Statistics of land use is given in **Table 4.**

FIGURE 14

Land Use Land Cover Map Around 10 Km. of Site Near Maharakund Village, Tahsil- Saoner, Dist. Nagpur



Land use data **:** Description of Land Use of Site Around 10 Km. of Maharkund Village,Tahsil-Saoner, Dist: Nagpur

Table 4 : Land use data

Sr. NO.	Description	Area (Sq.M)	Area (Sq.Km.)
1	Agricultural Land- Double Crop	3602487.51	360.25
2	Agricultural Land- Summer Crop	10107.56	1.01
3	Agricultural Land-Double Crop	218926.49	21.89
4	Agricultural Land-Kharif Crop	75592965.17	7559.30
5	Agricultural Land-Kharif Crop(Forest)	1183361.67	118.34
6	Agricultural Land-Rabi Crop	402393.50	40.24
7	Built-up -Rural	193722.73	19.37
8	Forest-Dense/Closed	198380515.98	19838.05
9	Forest-Open	1056816.14	105.68
10	Forest-Plantation	4186047.59	418.60
11	Forest-Scrub Forest	1647570.71	164.76
12	Forest-Tree Clad-Dense	10363130.21	1036.31
13	Gullied/Ravinous land	162966.16	16.30
14	Wastelands-Dense scrub	848224.93	84.82
15	Wastelands-Open scrub	1304926.58	130.49
16	Water bodies-Canal	7332079.42	733.21
17	Water bodies-Tanks/Reservoir	7513757.65	751.38
	Total	314000000.00	31400.00

Soil

Soil appears to dark blackish brown at some locations within lease and are light coloured over Lohangi formations. Soil samples were collected from 0-30, 30-60 and 60-90cm depth for routine soil analysis. Soil characteristics is given below in **Table 5.**

Table 5 : **Soil characteristics**

Sr. No.	Parameters	Unit	Unbroken over ML			Agricultural field		
			0-30 cm	30-60 cm	60-90 cm	0-30 cm	30-60 cm	60-90 cm
	PHYSICAL PROPERTIES							
1.	Particle Size Distribution Gravel	%	18.2	18.4	18.5	4.5	4.8	4.1
	i. Sand	%	24.6	24.1	23.8	31.7	30.0	30.2
	ii. Silt	%	58.3	59.2	60.3	26.7	28.2	23.4
	iii. Clay	%	17.1	16.7	15.9	41.6	41.8	46.4
	Texture		Silty	Silty	Silty	Clayey	Clayey loam	Clayey
2.	Bulk density	g/cm^3	22.4	22.0	21.6	29.3	29.0	28.6
3.	Permeability	mm/hr	12.8	12.5	12.3	15.6	15.2	15.8
4.	Available water retention capacity i. 1/3 bar ii. 15 bar	 % %	 62.8 1.7	 636 1.6	 64.0 1.6	 46.3 1.4	 44.8 1.5	 43.2 1.4
II	**CHEMICAL PROPERTIES**							
1.	pH		6.9	6.8	6.8	7.2	7.1	7.1
2.	Elect. Conductivity	µS/cm	0.78	0.75	0.74	0.64	18.4	20.8
3.	CEC	meq/100g	12.3	12.0	11.8	15.6	12.6	14.6
4.	Exchangeable (Ca+Mg)	m eq /100g	8.6	8.2	7.9	10.2	12.6	14.6
5.	Exchangeable (K)	m eq/100g	0.72	0.75	0.79	1.24	1.25	1.26
6.	Organic carbon	%	0.36	0.34	0.32	0.42	0.41	0.40
7.	Available nitrogen	Kg/ha	100.8	89.6	107.5	268.8	246.4	201.6
8.	Available phosphorus	Kg/ha	35.8	33.6	29.1	40.3	38.1	38.0
9.	Available potassium	Kg/ha	1747.0	1700.0	1658.0	1030.0	963.0	940.0

Socio economic status:

Village wise statistics, land uses and demography of eight villages in the buffer zone is given in **Tables 6 & 7**.

Table 6 : Village wise statistics

Name	Area, ha	Population	House hold	Forest, ha	Irrigated, ha	Un-irrigated ,ha	Waste land, ha	Not available for cultivation, ha
Maharkund	522	198	35	242	11	59	122	88
Temburdoh	862	1033	212	356	18	292	58	138
Badegaon	1016	2731	580	71	40	676	167	62
Raiwadi	466	709	157	149	13	198	61	45
Bichava	573	794	184	52	2	319	166	34
Sironji	351	894	186	23	14	224	67	11
Surra	277	389	80	14	3	138	96	26
Khubala	1118	1653	355	241	87	517	225	48

Occupational pattern of persons in these villages is given in following table

Table 7 : Village wise demography

Name	Mining	Manufacturing , Processing H.H. industry	Manufacturing, Processing Other than H.H. industry	Const.	Trade & Comm.	Transport, Storage, Comm..	Others	Marginal workers	Non workers
Maharkund	0	-	-	-	-	-	-	-	78
Temburdoh	-	-	3	3	3	-	1	-	78
Badegaon	12	29	20	22	32	12	97	132	334
Raiwadi	0	1	107	-	2	-	3	-	151
Bichava	0	1	-	-	7	3	43	174	300
Sironji	-	4	7	328	6	3	25	38	368
Surra	-	5	1	-	-	1	2	3	172
Khubala	1	18	2	2	8	1	14	139	784

Impact quantification :

Air

Existing pits will be deepened. Removal by loader and subsequent loading is likely to raise dust within the pit area only. Manganese ore is heavier and will tend to settle within the opened pit.

Predicted emissions from 10.62 hectare lease would be as follows:

Activity	Area emission rate$, g/sec/$m^2$
Loading	$3.00x10^{-10}$ $
Truck dumping	$3.00x10^{-10}$ $
Total	$6.00x10^{-10}$ $

N.B:- $- Emission factors for Open Cut Mining-State Pollution Control Commission of New South Wales, Australia.

These emission rates were used to calculate contribution of particulate matter to air i.e. ground level concentrations in the downwind direction. It was found that contribution of particulate matter even at 10 m from the lease would be negligible.

This shows that ambient air quality would not be adversely affected.

Care would be taken to sprinkle water over O.B. and the ore during their loading either in truck or at the dump site. The dump would be allowed to stabilize physically and then plantation is proposed.

Noise:

Drilling, blasting and other noise sources associated with mining will not be required during this project. Further, there are no sensitive receptors around the lease. Maharkund village is one km from lease.

Water:

Present pit area is about 675 m^2. Rainfall in the area is about 1100mm/yr. It is possible that 742 m^3 rain water is collected in the pit annually.

Quality wise this water will have following characteristics similar to that in the open dug well in Maharkund. Hence, it can be released by dedicated pipeline into the seasonal drain around the lease e.g. a local drain which joins Khekra nalla. Khekra nalla is to north-west of the site at 3.98 km. There is an irrigation dam over this nalla.

This will ensure additional storage in the dam. It will be necessary to pump out water of the pit to enable mining. Maximum quantity of water which will have to be pumped out of the pit would be 112 m^3/d,

There will not be any adverse impact of de-watering mine pit on water quality. Hydraulics of local drains will not be affected either. Only a dedicated pipe line will be laid to carry pit water to the nearest drain.

Land use:

This lease is a part of waste land without any industrial activities within 10 km. this lease was worked earlier and has been officially granted to the proponent.

Solid waste will be mostly rejects @ 2553.9 TPY, O.B. @ 89275.5m^3/yr. This will be transported by trucks to a dump area which will be about 3 hectare. Rejects will be stored over an area 0.2 hectare within the mining lease itself. Plantation area would be 0.1 hectare.

Backfilling of the pit is not envisaged because ore body continues to 39 m down. There would not be any adverse impact due to the above mentioned solid waste on terrestrial environment.

Socio- economics:

About 40 persons will be directly employed in a mine or related activities. This will be beneficial in absence of any industry.

Flora & Fauna:

Nearest habitat is at Pench National Park which is 44 km km from Maharkund as the crow flies.

Pench Park is rich in fauna and flora. Faunal species include tiger, leopard, jackal, hyena etc and flora includes Mahua, palash, teak, neem etc. These floral species are extended and are staggered up to lease.

A budget of Rs. 100,000/- has been allotted per year for meeting environmental monitoring costs.

Risk assessment:

Study of method and magnitude of proposed open cast mining operations at Maharkund which has been elaborated in the mining plan shows that the project does not pose any hazard and risk. This will be clear from the following Table which summarizes the terms used in risk assessment and the situation at Maharkund.

Term	Meaning	Maharkund situation
Hazard	a property or a situation with potential to cause harm	There is no structure within 1.5 km; tree felling, site preparation etc. is not required.

Risk	a combination of the probability or frequency of occurrence of a particular hazard & the magnitude of the adverse effects arising to human health or the environment	Chapter 4 on predicted impacts on air, water, land etc. do not indicate any adverse impact. Proposed mining will be @ 92 tonnes /day

Social impact assessment; R & R action plans:

R & R is not involved.

Activities during mining were examined if they would cause i) population growth, ii) density, iii) affect aesthetics, iv) quality of life, v) create conflicts with the lifestyle, vi) lead to additional requirements like water, wastewater & solid disposal etc. Present quality of life in Maharkund surroundings is like a typical rural area.

It is expected that about 40 people will get direct employment. Indirect employment like transportation, plantation etc. to an equal number is possible.

Project benefits :

This project will ensure jobs for both technical and semi-technical local persons who are otherwise unemployed. Import of this ore will reduce and hence the cost of production will also reduce proportionately.

Environmental costs:

This project will not be detrimental to environment. Tree felling will not be required. There will not be any change in prevailing environmental constituents viz. air, water, land, flora & fauna, social structure.

Environment management plan :

Administratively, proponent will ensure that the retained mining engineer will ensure the items of the proposed environment- friendly mining at Maharkund. Besides, proponent will enter into contract with an environmental consulting firm for verification of satisfactory implementation of control measures.

Environmental policy :

To ensure manganese mining ore Maharkund lease (10.61 ha) with regard to i) prevailing environmental quality, ii) taking care not to alter air quality, noise levels during mining and ore handling & transportation, iii) manage removal of water from mine pit and its safe transmission to nearby drain.