

**DOCUMENT  
FOR  
PUBLIC HEARING**

**OF  
KACHURWAHI- WADEGAON O.C. MANGANESE ORE MINING  
(78.50 ha)  
By  
O.C. & U. G. BY OTHER THAN  
FULLY MECHANIZED MINING METHOD  
Village Kachurwahi, Tehsil Ramtek, Dist. Nagpur (MS)**

**PROPONENT**

**M/S VEET RAG HOMES PRIVATE LIMITED  
20, IT PARK, PARSODI,  
NAGPUR 440 022**

**CONSULTANT**

**ENVIRO TECHNO CONSULT PRIVATE LIMITED  
68, MAHAKALI NAGAR 2, NEAR MANEWADA SQUARE  
NAGPUR 440 024**

**ACCREDITED BY QCI / NABET FOR EIA  
LISTED AT SL. NO. 44 DATED SEPTEMBER 05, 2016**

**SEPTEMBER 2016**

## Executive summary

### 1. Introduction

- ✚ M/s Veet Rag Homes Private Ltd. (VRHPL) of Nagpur propose manganese ore mining over 78.5 ha lease which has been granted to them by Govt. of Maharashtra for a period between 30.06.2003 and 29.06.2053.
- ✚ Location of lease is shown in **Figure 1**. Google imagery is shown in **Figure 2**.
- ✚ Mining plan and progressive mine closure plan has been approved by IBM Nagpur vide letter no. NGP/LST/MPLL-798/NGP dated 21.10.2015.
- ✚ Deposits were worked earlier by a British company. There are pits and a few dumps.
- ✚ Manganese deposits in the lease occur as float ore, dumps and also *in-situ*. Therefore, open cast and underground mining is possible.
- ✚ Geological sequence is red soil- > pre Cambrian pegmatite-> Sausar series consisting of muscovite schist, silliminite of Mansar & manganese horizon.

### 2. Reserves

- ✚ Mineable reserves by O.C & U.G. mining = 152,987 T
- ✚ Dump ore area details = 0.93ha, height : 2 m & volume : 0.018 Mm<sup>3</sup>  
Float ore area details = 0.3012ha, depth : 3 m & volume : 9036 m<sup>3</sup>
- ✚ Probable recovery- dump ore @10% &5% from float ore.

### 3. Mining method

- ✚ Will be O.C. for float, dump & residual deposits working, depth will be 3-4 m and benches size will be 6x6m.
- ✚ Open cast working will be up to MRL- 278 m and resulting pit will be developed for U.G. entry.
- ✚ Drilling & blasting for dump mining is proposed.
- ✚ Preparation for U.G. working will be completed in first 3 years.
- ✚ A vertical shaft up to 150 m in the winzes will be provided.

### 4. Proposed production

- ✚ Ultimate production will be @ 50,000 TPA.
- ✚ Mine life will be 15-16 years.

- Resulting dump volume in five years will be 18,770 m<sup>3</sup> and excavation = 8580 m<sup>3</sup>.
- Manual sorting & back filling by O.B./waste is proposed.
- Bifurcation of production from dumps would be as follows:

Year	From Dump	From float ore	Open cast	Underground	Total
3 <sup>rd</sup>	1000	100	0	2340	3440
4 <sup>th</sup>	1000	100	10,000	2340	13440
5 <sup>th</sup>	1000	100	10,000	2340	13440
Total	3000	300	20,000	7020	30,320

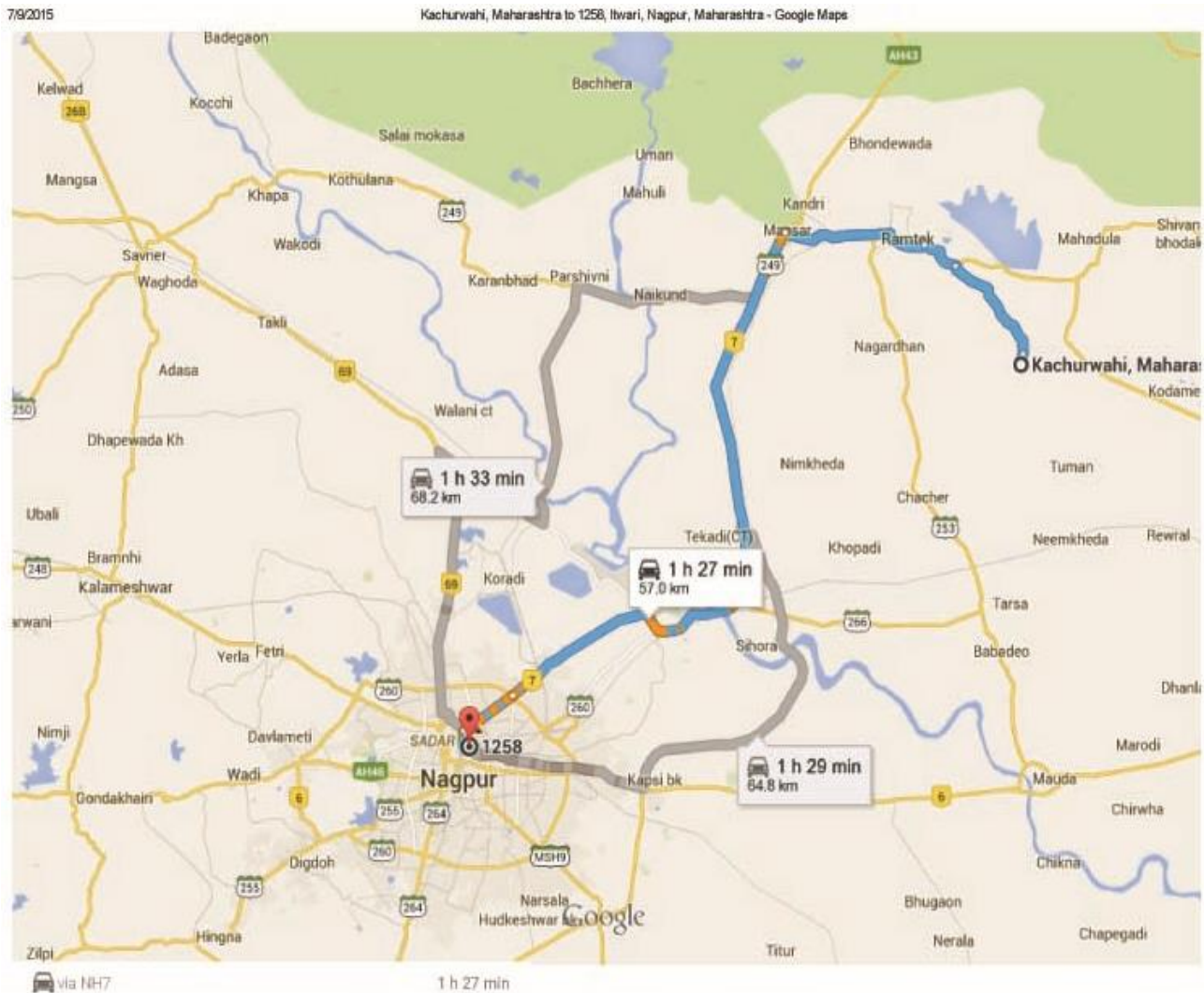
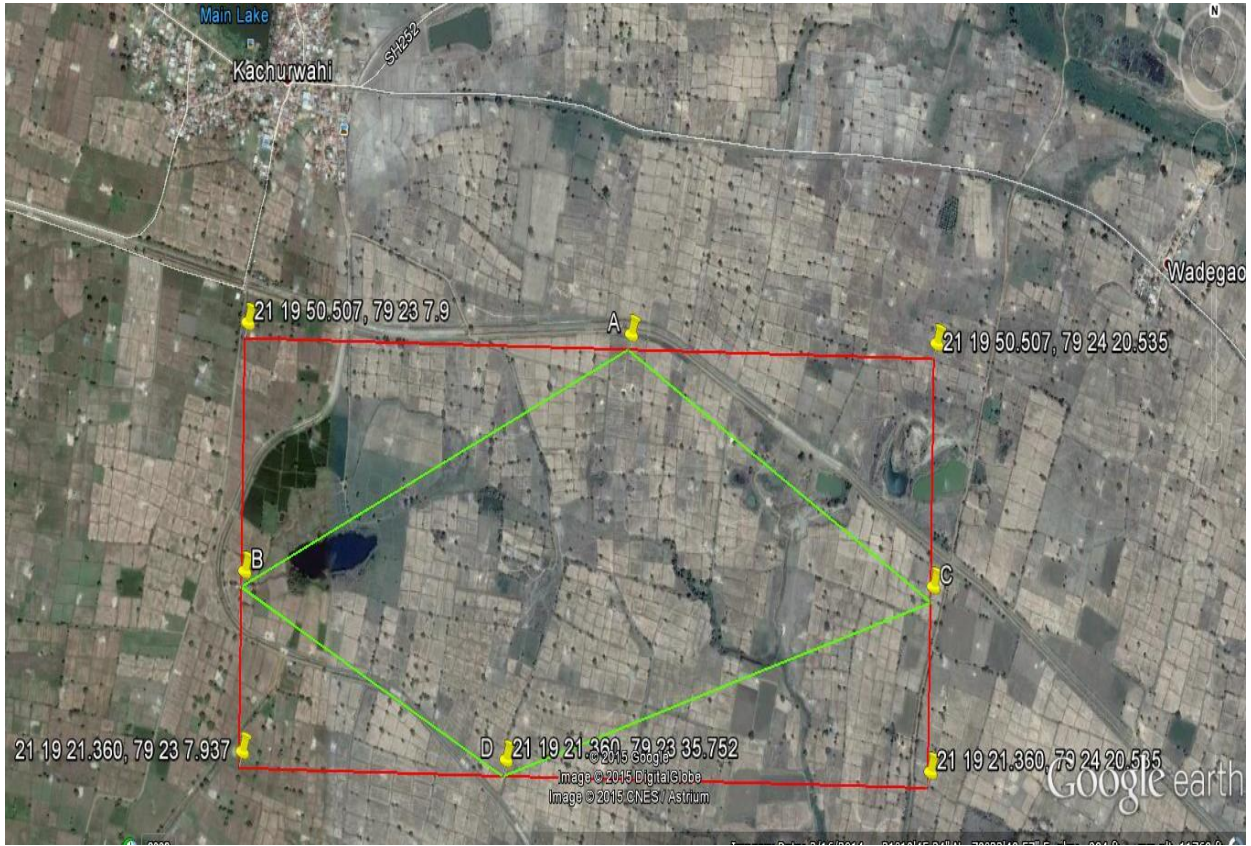


Figure 1 : Geographical location



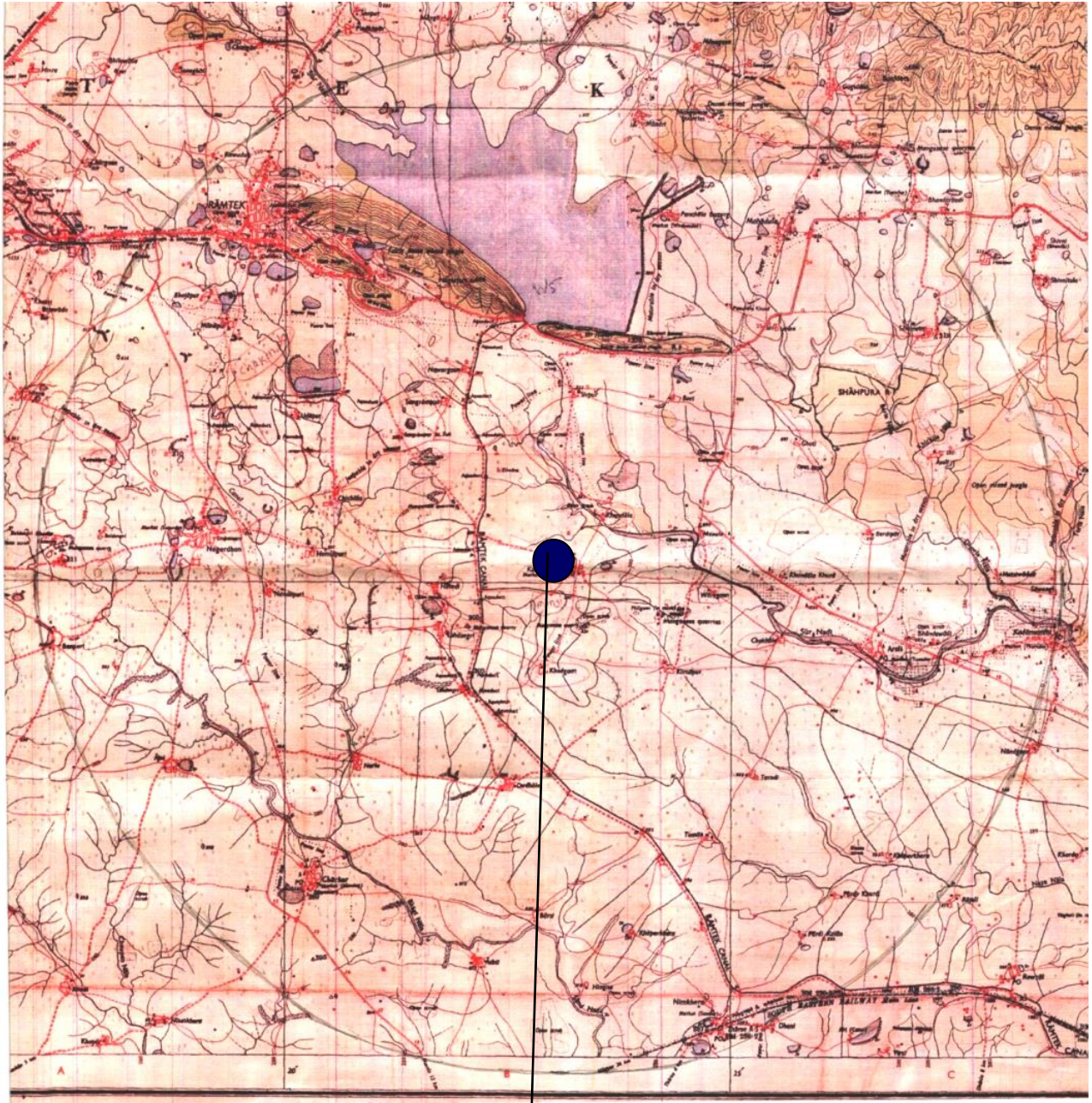
**Figure 2 : Google imagery**

**5. Environmental setting:**

5.1 Lease is a part of plain terrain. Average elevation is 330 m above MSL. Slope is towards NE. Main drainage is by the River Sur which is about 2.5 km in N-NE direction. Location of lease on Survey of India topo sheet No. 55 O/7 is shown in **Figure 3**.

Coordinates of the project site are :

BPP - 06	21 <sup>0</sup> 19' 50.507"	79 <sup>0</sup> 23' 48.303"	NORTH
BPP - 37	21 <sup>0</sup> 19' 33.630"	79 <sup>0</sup> 23' 07.937"	EAST
BPP - 46	21 <sup>0</sup> 19' 33.982"	79 <sup>0</sup> 24' 20.535"	WEST
BPP - 30	21 <sup>0</sup> 19' 21.360"	79 <sup>0</sup> 23' 35.752"	SOUTH

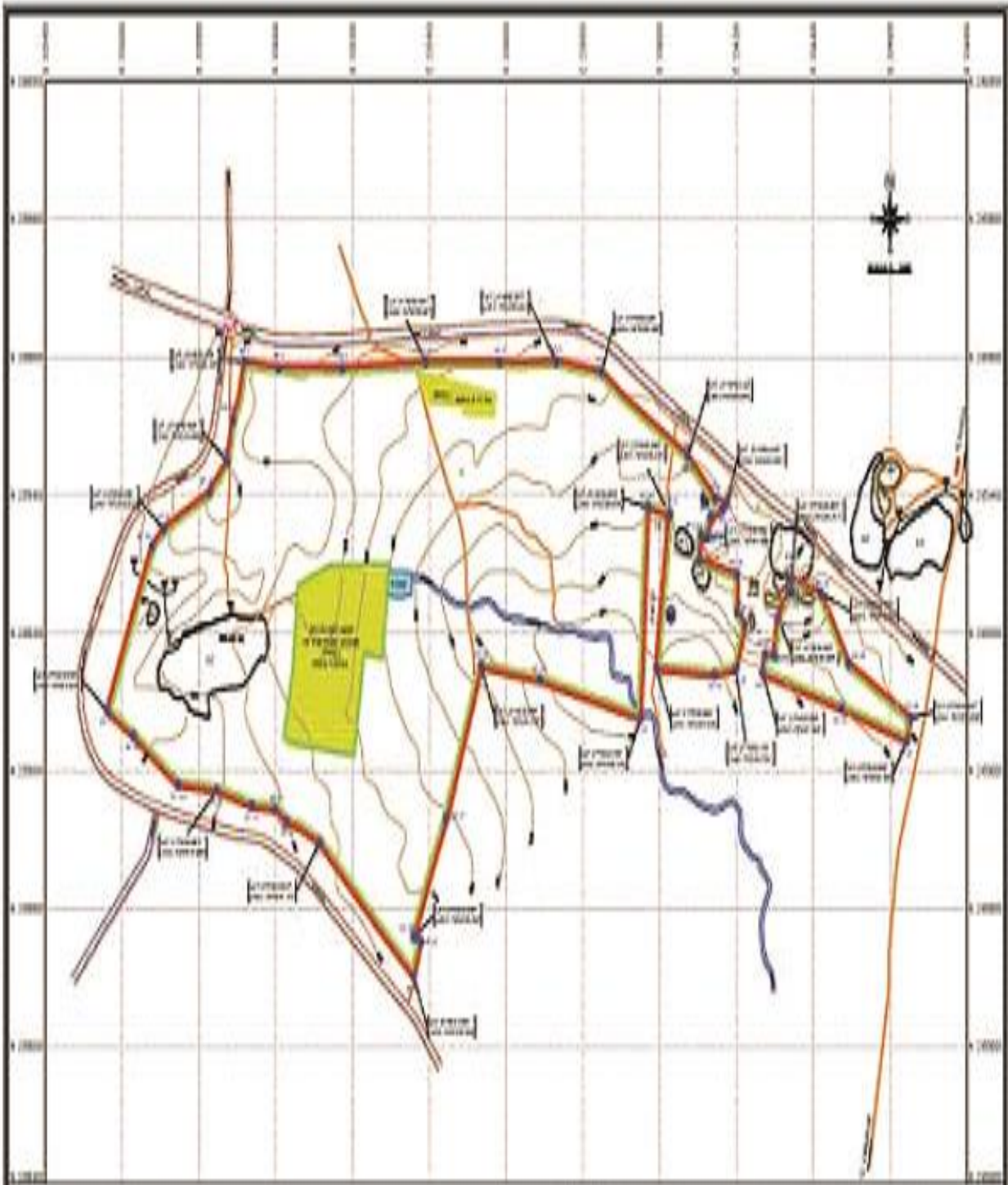


**Figure 3 : Location of lease**

5.2 Lease is private land and owners have agreed to part with land after direct negotiations. Lease is approachable by Mansar-Tumsar state road. Nearest railway station is Ramtek. There is no public road or railway within lease. Nearest road is 500 m to north side of lease.

5.3 Present layout of the lease is given in **Figure 4**.

**Figure 4**



## 6.0 Base line environmental quality:

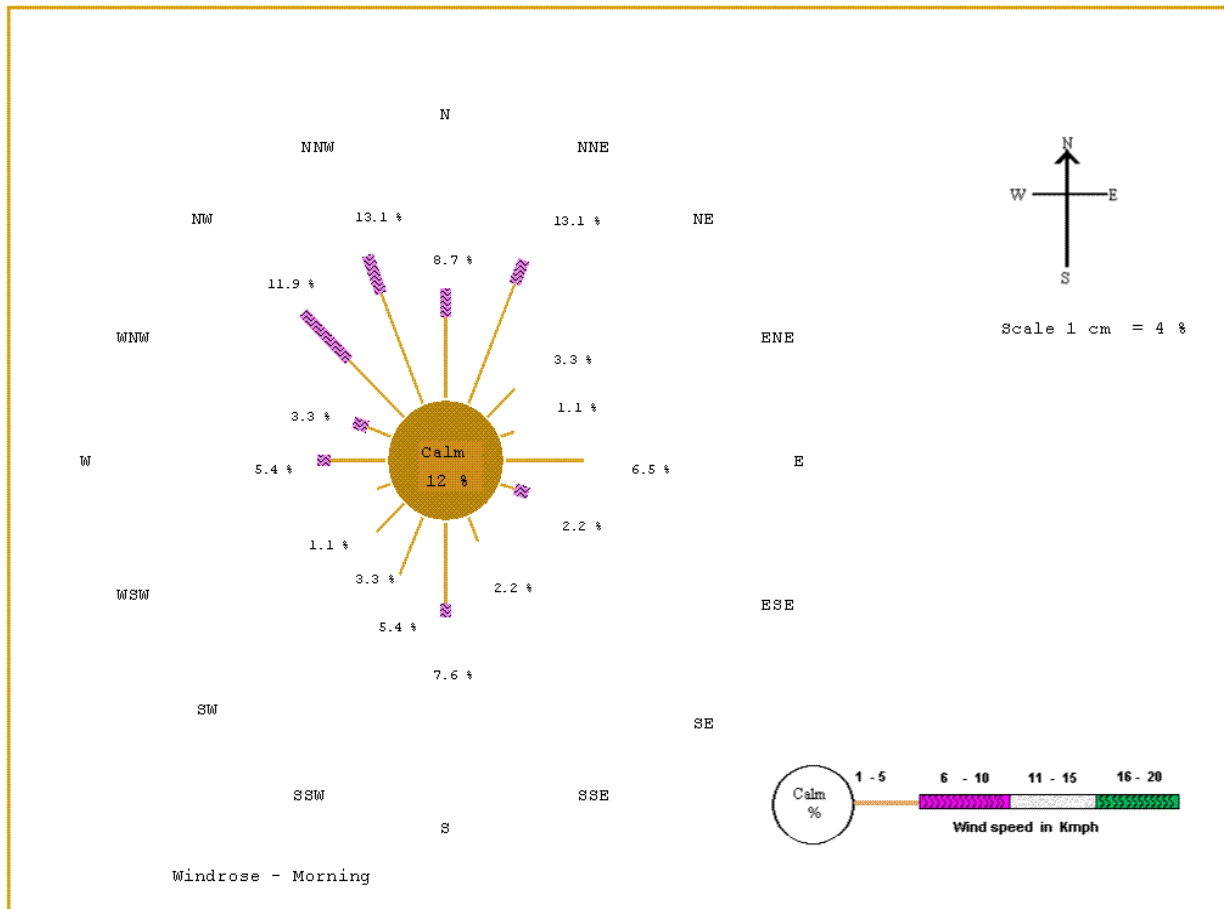
Base line air quality, water quality in surface and ground water surfaces along with regional hydrology, land use, soil quality, noise levels, socio economics status etc. was monitored within 10 km radius from the lease during the period March 07 - June 04, 2016.

### 6.1 Air environment:

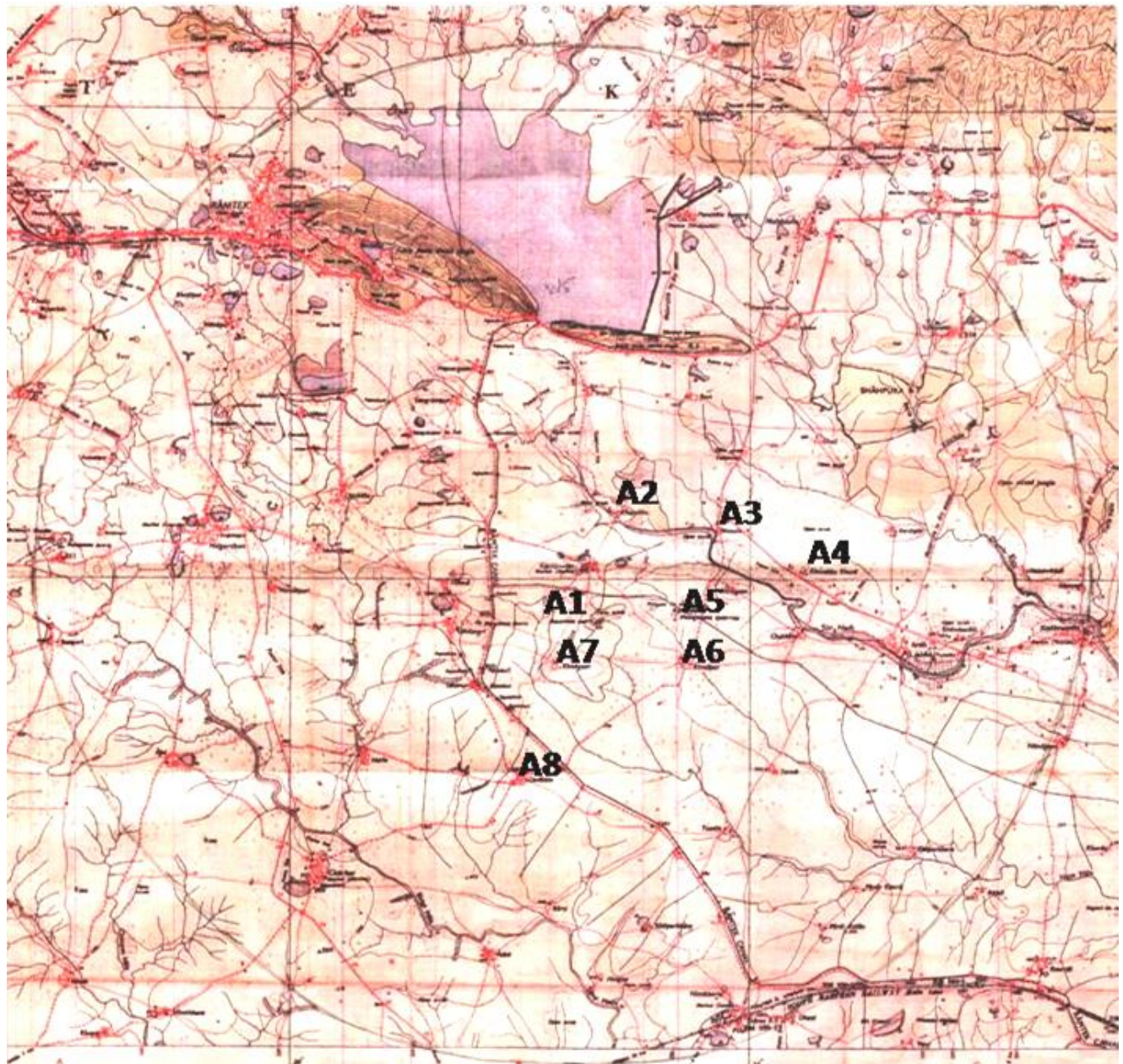
Micrometeorology:

Annual average of wind speed is 5-6 Km / hr. Average annual relative humidity is 60 per cent. Average annual rainfall during past 20 years is 1083.9 mm /year.

Wind rose for monitoring period is given in **Figure 5** and ambient air quality monitoring stations are depicted in **Figure 6**.



**Figure 5 : Wind rose – monitoring period**



**FIGURE 6 : AIR QUALITY MONITORING STATIONS**

Station code & name	
A1 Kachurwahi	A5 Wadegaon
A2 Khandala	A6 Kirnapur
A3 Masala	A7 Khadgaon
A4 Khandalakhurd	A8 Dudhala



## Ambient air quality

<b>A1 : Kachurwahi lease area</b>	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )
Minimum	40.6	7.8	6.0	6.8
Maximum	52.6	13.2	6.9	10.2
Average	47.2	9.9	6.4	8.3
98 percentile	52.6	12.8	6.9	10.0
<b>A2 : Khandala</b>				
Minimum	36.4	7.2	6.2	6.8
Maximum	55.1	12.4	9.6	9.8
Average	46.0	9.1	7.8	8.2
98 percentile	54.2	12.0	9.5	9.7
<b>A3 –Masala</b>				
Minimum	32.4	6.6	5.2	7.6
Maximum	48.4	9.8	6.9	10.4
Average	40.2	8.0	6.2	8.7
98 percentile	47.9	9.7	6.8	10.3
<b>A4- Khandalakhurd</b>				
Minimum	38.3	7.6	6.5	6.8
Maximum	55.6	12.3	8.4	9.6
Average	46.7	9.4	7.4	8.5
98 percentile	55.2	12.0	8.4	9.6
<b>A5 –Wadegaon</b>	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )
Minimum	31.7	6.2	6.0	6.8
Maximum	51.2	10.6	6.4	10.4
Average	41.6	8.3	6.1	8.5
98 percentile	50.5	10.1	6.4	10.4
<b>A6–Kirnapur</b>				
Minimum	35.6	7.3	5.6	6.8
Maximum	52.6	11.4	6.3	8.7
Average	43.8	8.7	6.0	7.8
98 percentile	52.0	11.1	6.3	8.7

<b>A7- Khodgaon</b>				
Minimum	41.4	8.6	6.0	7.1
Maximum	54.6	12.6	6.6	10.6
Average	49.4	10.1	6.2	8.5
98 percentile	54.2	12.5	6.6	10.5
<b>A8- Dudhhala</b>				
Minimum	38.2	5.2	6.0	7.3
Maximum	53.8	11.6	6.8	10.8
Average	46.1	9.3	6.4	8.7
98 percentile	53.6	11.4	6.8	10.5

### **Observations on air quality:**

There are no industrial sources within 10 km radius of the site. Emissions are only due to domestic and agriculture activities. Only light vehicular movement was observed. All air quality criteria pollutants were within permissible limits. There are no sensitive receptors like hospitals, schools or any ecosystems within the buffer zone.

### **6.2 Noise environment:**

#### **Noise Levels, dB(A)**

Range	31.2-47.6	37.6-55.8	32.4-47.6	32.0-55.6
Ld	44.0	50.6	43.3	50.1
Ln	35.5	43.2	38.7	40.4
Ldn	44.6	51.8	46.2	50.2

### **6.3 Aquatic environment**

Ground water table as seen from dug wells is beyond 7 m b.g.l. Annual average rainfall is between 800 & 1000 mm/year.

Surface water:

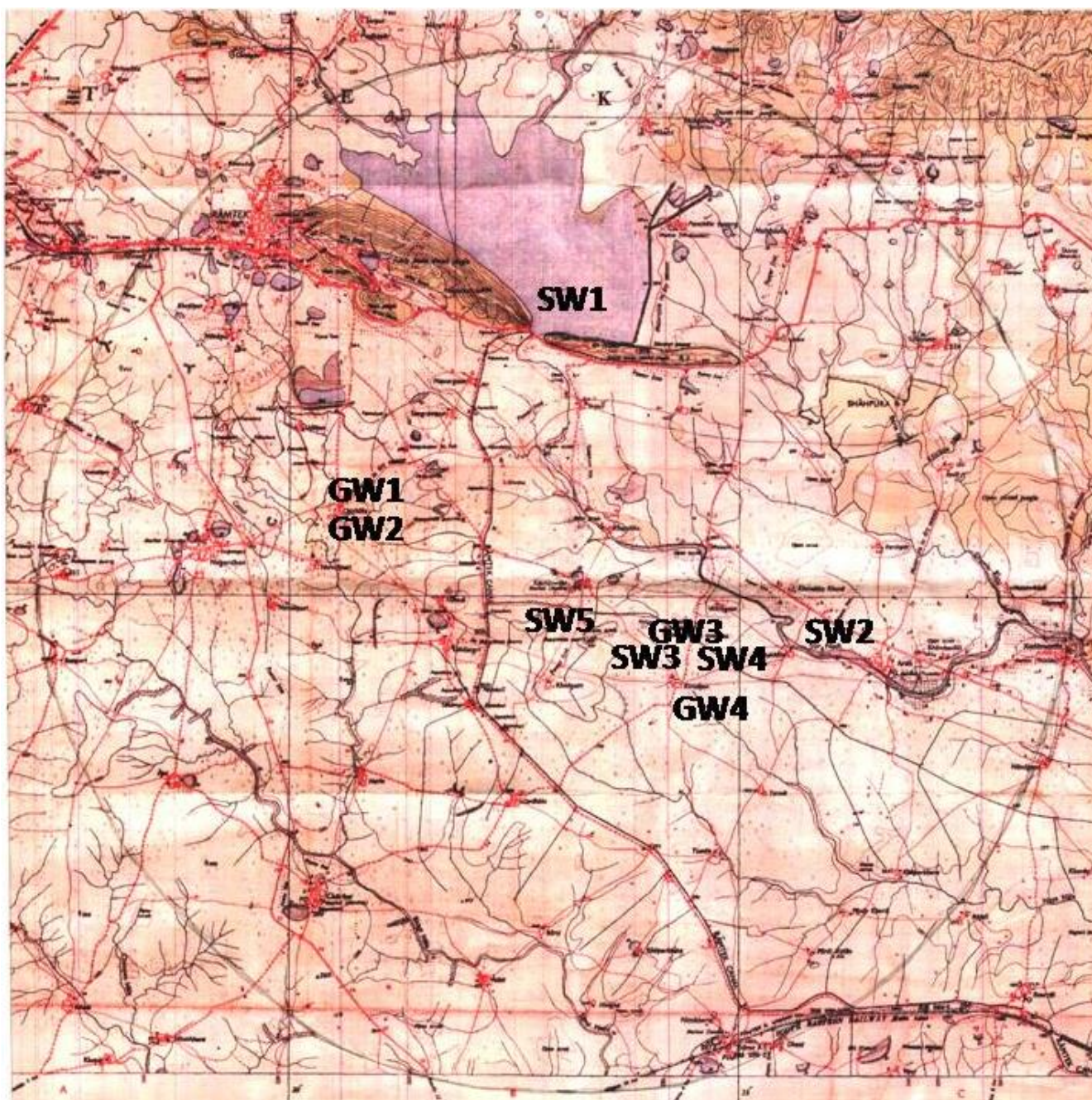
Surface water sources in buffer zone are Khindsi lake to the west of Kachurwahi-Wadegaon at about 9 km and the Sur River which is about 2.5 km flowing from NW to E-SE. There are three old and abandoned mine pits. Photographs of River Sur and canal is given below. There was no flow in the river. Water quality of these sources and the standards are given in table below and sampling stations are depicted in **Figure 7**.



**Plate 1 : Irrigation canal in buffer zone**



**Plate 2 : View of Sur river during monitoring**



Station code & name	
SW 1 Khindsi lake	GW 1 Chichala well water
SW 2 Sur river	GW2 Chichala gram panchayat well water
SW 3 Mine pit Wadegaon, 2.49 ha	GW3 Wadegaon hand pump water
SW 4 Mine pit Wadegaon, 3.97 ha	GW4 Kirnapur hand pump water
SW 5 Mine pit Kachurwahi	

**FIGURE 7 : WATER QUALITY SAMPLING STATIONS**

### Water quality in surface sources

Parameter	Unit	Khindsi Lake SW1	Sur river SW2	Wadegaon 2.49 SW3	Wadegaon 3.97 SW4	Kachurwahi  SW5
Ambient temp.	°C	27	28	31	31	30
Color	Hazen	CL	muddy	CL	CL	CL
Odour		UO	earthy musty	UO	UO	UO
Turbidity	NTU	<2	39	<2	<2	<2
pH		9.1	7.6	8.5	8.7	8.7
DO	mg/L	4.5	3.2	4.3	4.1	4.2
DO	% saturation	57	41	55	55	56
E. Conductance	µS	320	806	467	508	449
TDS	mg/L	197	608	247	283	278
TSS	mg/L	<10	25	<10	<10	<10
T. Alkalinity as CaCO <sub>3</sub> ,	mg/L	100	282	149	132	160
P. Alkalinity as CaCO <sub>3</sub> ,	mg/L	4	0	10	14	2
MO Alkalinity as CaCO <sub>3</sub>	mg/L	96	282	139	118	158
T hardness as CaCO <sub>3</sub>	mg/L	60	208	120	150	120
Ca Hardness as CaCO <sub>3</sub>	mg/L	50	150	80	110	74
Mg Hardness as CaCO <sub>3</sub>	mg/L	10	58	40	40	46
Calcium as Ca <sup>++</sup>	mg/L	20	60	32	44	30
Magnesium as Mg <sup>++</sup>	mg/L	2	14	9.6	10	7
Chloride as Cl,	mg/L	11	59	14	17	17
Sulphate as SO <sub>4</sub>	mg/L	8	18	7	35	7
Iron as Fe	mg/L	0.03	0.014	Nil	Nil	Nil
Manganese as Mn	mg/L	Nil	Nil	Nil	Nil	NIL
Coliforms	MPN/100ml	>1100	>1100	>1100	>1100	>1100

**Table 12 : Ground water analysis**

Parameter	Unit	Chichala well water GW1	Chichala gram panchayat well water GW2	Wadegaon Hand pump water. GW3	Kirnapur hand pump water. GW4
Ambient temp.	°C	29	28	30	29
Color	Hazen	Colourless	Colourless	Colourless	Colourless
Odour		UO	UO	UO	UO
Turbidity	NTU	<2	<2	<2	<2
pH		7.3	7.5	7.5	7.8
DO	mg/L	1.9	3.2	4.3	2.3
DO	% saturation	25	41	57	30
E. Conductance	µS	1690	1291	1161	908
TDS	mg/L	1430	1120	1006	699
TSS	mg/L	<2	<2	<2	<2
T. Alkalinity as CaCO <sub>3</sub> ,	mg/L	480	350	342	484
P. Alkalinity as CaCO <sub>3</sub> ,	mg/L	0	0	0	0
MO Alkalinity as CaCO <sub>3</sub>	mg/L	480	350	342	484
T hardness as CaCO <sub>3</sub>	mg/L	560	432	460	196
Ca Hardness as CaCO <sub>3</sub>	mg/L	368	368	344	110
Mg Hardness as CaCO <sub>3</sub>	mg/L	192	64	116	86
Calcium as Ca <sup>++</sup>	mg/L	147	147	138	44
Magnesium as Mg <sup>++</sup>	mg/L	46	15	28	21
Chloride as Cl,	mg/L	212	188	138	20
Sulphate as SO <sub>4</sub>	mg/L	102	67	67	19
Iron as Fe	mg/L	NIL	NIL	0.43	NIL
Manganese as Mn	mg/L	NIL	NIL	NIL	NIL
Coliforms	MPN/100ml	140	>1100	NIL	NIL
Depth,	m	6.5	7	30	50
Below ground level	m	4.5	4.2	-	-

UO : Unobjectionable

### Water quality criteria - IS 10500 : 2012

Sr. No.	Parameters	Unit	Acceptable Limits IS 10500 : 2012	Permissible Limits in absence of alternate sources IS 10500 : 2012
1.	Colour	Hazen	5	15
2.	Odour		Agreeable	Agreeable
3.	Taste		Agreeable	Agreeable
4.	Turbidity	NTU	1	5
5.	pH		6.5-8.5	NR
6.	Total dissolved solids	mg/L	500	2000
7.	Total Alkalinity as CaCO <sub>3</sub>	mg/L	200	600
8.	Total Hardness as CaCO <sub>3</sub>	mg/L	200	600
9.	Calcium as Ca <sup>++</sup>	mg/L	75	200
10.	Magnesium as Mg <sup>++</sup>	mg/L	30	100
11.	Chlorides as Cl	mg/L	250	1000
12.	Sulphates as SO <sub>4</sub>	mg/L	200	400
13.	Sulphide	mg/L	0.05	NR
14.	Nitrate as NO <sub>3</sub>	mg/L	45	NR
15.	Fluoride as F	mg/L	1.0	1.5
16.	Iron as Fe	mg/L	0.3	NR
17.	Free residual chlorine	mg/L	0.2	1.0
18.	Manganese as Mn	mg/L	0.1	0.3
19.	Copper as Cu	mg/L	0.05	1.5
20.	Zinc as Zn	mg/L	5	15
21.	Aluminium as Al	mg/L	0.03	0.2
22.	Ammonia	mg/L	0.5	NR
23.	Barium as Ba	mg/L	0.7	NR
24.	Boron	mg/L	0.5	1.0
25.	Phenolic compound	mg/L	0.001	0.002
26.	Cyanide as Cn	mg/L	0.05	NR
27.	Cadmium as Cd	mg/L	0.003	NR

Sr. No.	Parameters	Unit	Acceptable Limits IS 10500 : 2012	Permissible Limits in absence of alternate sources IS 10500 : 2012
28.	Chromium as Cr	mg/L	0.05	NR
29.	Lead as Pb	mg/L	0.01	NR
30.	Nickel as Ni	mg/L	0.02	NR
31.	Selenium as Se	mg/L	0.01	NR
32.	Arsenic as Se	mg/L	0.01	0.05
33.	Mercury as Hg	mg/L	0.001	NR
34.	Pesticides	mg/L	ABSENT	0.001
35.	Polynuclear aromatic hydrocarbon as PAH	mg/L	0.0001	NR
36.	Polychlorinated biphenyls		0.0005	NR
37.	Anionic detergent	mg/L	0.2	1.0
38.	Mineral oil	mg/L	0.5	NR
39.	Chloramines as Cl <sub>2</sub>	mg/L	4.0	NR
40.	Silver as Ag	mg/L	0.1	NR
41.	Molybdenum as Mo	mg/L	0.07	NR

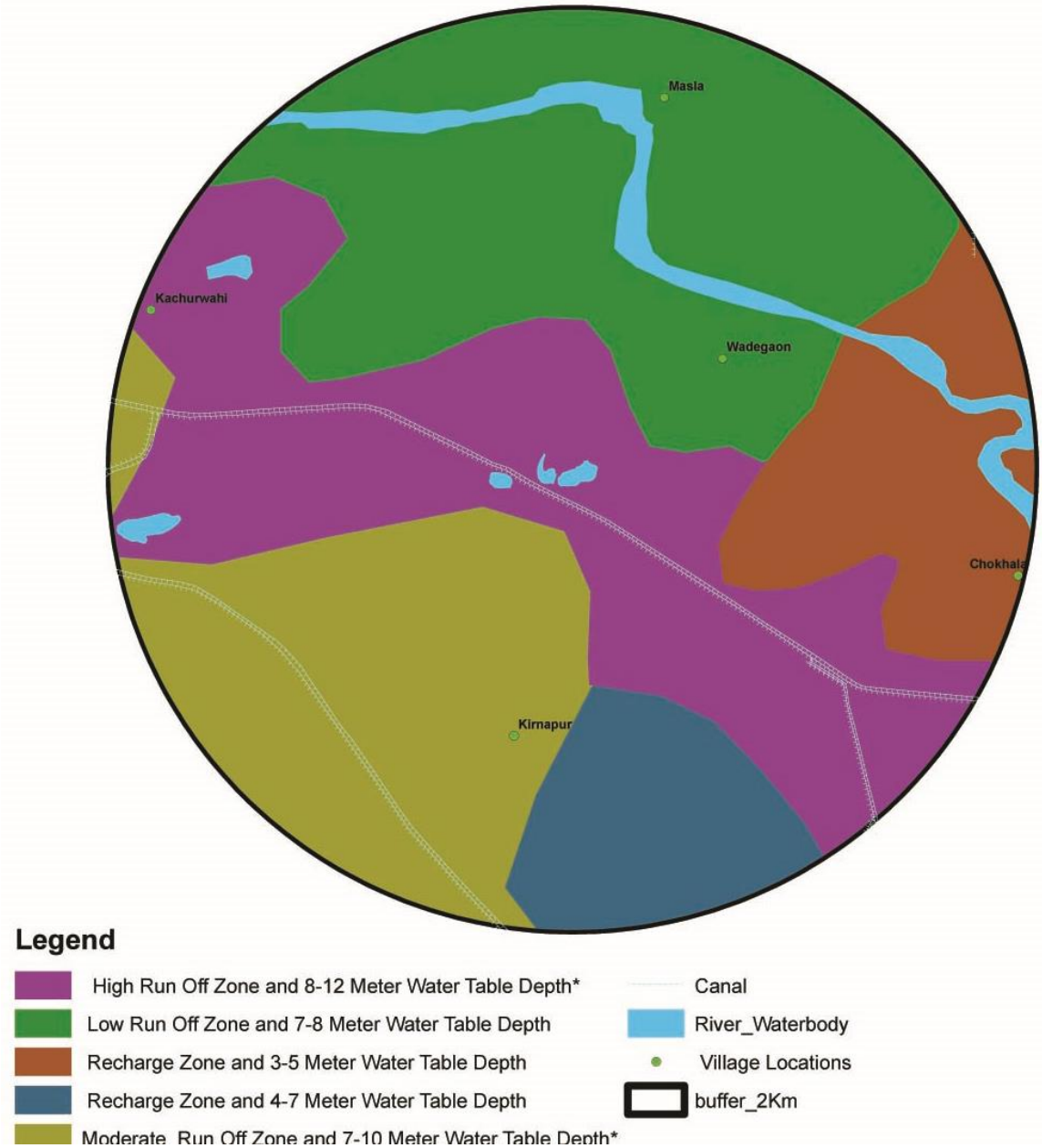
NR: no relaxation

### Remarks on water quality:

All samples require disinfection before consumption even if they meet drinking water quality criteria. Manganese was absent in all ground water samples. Low D.O. in ground water is expected. Main aquifer in Ramtek area is Basalt Gondwana, yield of a bore well in Gondwana as can be between 90 and 780 litres per day.

Run off, recharge zones within buffer zone of lease were marked with the help of land sat imagery of the area and is depicted in **Figure 8**. Lease lies in high run off zone and water table is between 8 and 12 meters below ground level in the lease.





**Figure 8 : Land sat imagery**

**6.4 Land/terrestrial environment:**

Lease is not a part of any forest. Present appearance of the lease over which there is an old pit as shown in **Plate 3**.



**Plate 3 : Old mine pit**

There are a few abandoned pits, one seasonal drain within the lease and a canal along the north flowing from NW-N-NE to east side of the lease. Land use in buffer zone as per satellite imagery is given below:

<b>SR. NO.</b>	<b>Use</b>	<b>Area (ha)</b>
1	Agricultural Land-Kharif Crop	19221.47
2	Agricultural Land-More than two crop	53.71
3	Agricultural Land-Rabi Crop	1721.82
4	Agricultural Land-Two crop area	1323.91
5	Agricultural Land-Zaid Crop	2159.27
6	Agricultural Land-Current Fallow	38.94
7	Built Up-(Rural)	161.70
8	Forest-Deciduous –Dense	18.87
9	Forest-Deciduous –Open	69.02
10	Forest-Scrub Forest	2.85
11	Forest-Tree Clad Area- Dense	1705.51
12	Wastelands-Dense scrub	574.22
13	Wastelands-Open scrub	688.04
14	Water bodies-Canal	2893.60
15	Water bodies-Reservoir/Tanks	549.09
16	Water bodies-River/Stream	218.00
	<b>Total</b>	<b>31400.00</b>

## **6.5 Soil :**

Soils in the buffer zone are moderately drained and have slow permeability. Vegetation in the buffer zone is largely Mahua and Palas and crop is rice. Soils up to 15cm are dark brown, sandy clay loam, pH 6.5; 15-30 cm soil has pH of 7.1 and is also sandy loam. There are a number of pits due to old working. Presently, there is no infrastructure within the lease. Main crops in the area are paddy, wheat, jowar, gram, tur, cotton etc.

## **6.6 Socio economic status:**

Quality of life within buffer zone was studied with respect to housing, food, clothing, water supply and sanitation, health, energy availability, transportation, communication facilities, education, environmental quality, recreational facilities, social security etc . and was found to be satisfactory. Housing facility appears to be satisfactory. Occupancy is four-five persons per house. All other indicators of quality of life show satisfactory “quality of life” in the buffer zone.

## **7.0 Anticipated Environmental Impacts & Mitigation methods:**

Proposed mining method will be “other than fully mechanized (OFTM) “A”. Manual beneficiation at site is proposed. Initially float ore/dump will be worked in the first two years after E.C. Then underground mining is proposed. Intensity and method of mining can have impacts on i) air quality, ii) noise levels, iii) water regime in the area, iv) land use and v) socio economic/ quality of life. These have been described in the order.

### **7.1 Air**

Float ore/ dump working up to 3-4 depth by creation of 6x6m benches will not need drilling and blasting. Major activities will be i) manual ore sorting, ii) operation of excavator and loading in to a dumper. Over burden handling will be about 82 m<sup>3</sup> /day. Ore handling from dump working will @ 35T/D during first three years after E.C. Maximum will be @ 167 tonnes per day when production reaches to 50,000 TPA. Dumper travel in a day would be 9.6 km (say 10km). Main emissions during these operations will be particulate matter (PM).

### **Control of emissions:**

- Water sprinkling over surface of dumps/float ore. Water from abandoned mine pits existing pits within lease will be used. Same water will be used during loading & unloading of ore.
- Road within lease will be macadamized during first two years.
- Plantation in safety zone and over vacant space is proposed.
- Ore transportation will be by covered vehicles.

### **7.2 Noise impact**

Adverse impact due to proposed mining is not anticipated as there is no habitation on the lease. There would not be blasting during dump and float ore working. One blast per day is expected during underground working which is not expected to alter noise levels. Vehicular noise levels would be up to 70-75 dB (A). There are no sensitive receptors. Workers/miners will use personal protection equipment like ear muffs. Only one blast per day during fixed time is proposed.

### **7.3 Impact on aquatic systems:**

The only aquatic system present over the lease is due to accumulated rain water in abandoned mine pits. Some water from these will be used for dust control. This water is unutilized and is lost by evaporation. Part of this water will be used for plantation. Its utilization for dust control would not cause any adverse impact. Proposed underground mining also will not require any tampering of surface water sources. Proper assessment of required dewatering will be carried out during the first two years after E.C. Water from the pit will be transmitted by a dedicated pipe line to the nearest pit. It will be allowed to settle and will be pumped back to the lease in a storage tank and used for dust control and

plantation by a properly designed distribution system. Treatment of water for dust control and plantation will not be necessary. Its use for agriculture is justified for its SAR is 0.5. Interested agriculturists from the area will be encouraged for its use.

#### **7.4 Impact on land use, fauna, flora etc:**

Tree felling will not be required. There are no trees in the lease even on the piece of land which is being broken. Sparsely located existing trees include Subabhool (*Acacia nilotica*), deobabhool (*Acacia horrida*), mango (*Mangifera indica*), shisam (*Dalbergia sissoo*), palas (*Butea monosperma*), neem (*Azadirachta indica*) etc. Besharam (*Ipomea*) was seen along the water bodies. Domestic animals were observed in the area. Cows, dogs, buffalos, langors, etc are readily seen. It is proposed to consult to local forest department and MOIL authorities who had carried out plantation in their mines for identification of locally available plants species which can be planted over the safety zone.

#### **Conclusion:**

Description of impacting activities in above paragraphs indicates that none of the tenets of environment including physical and social aspects will be adversely affected during manganese mining by proposed OFTM even at peak production of 167 TPD. Reasons for this safe and innocuous mining are i) occurrence of float/dump ore, ii) underground mining at 150 m b.g.l., iii) absence of sensitive receptors and iv) environmental setting in general .

Proposed mitigation measures have been summarized in following table

	Proposed control measures
Mining& land use	<ul style="list-style-type: none"> <li>-OFTM method &amp; dump &amp; float ore mining without blasting,</li> <li>-Only one blast /day during U.G. mining</li> <li>- Manual sorting &amp; grading</li> <li>- Use of water for control of fugitive dust</li> <li>-Transportation of ore in covered vehicle for only 0.6 km distance</li> <li>-Utilization of S.B. for back filling entry winzes</li> <li>-Restricting excavated areas to only 3.38 ha till the conceptual period enabling continuation of present activities.</li> </ul>
Fugitive emissions	<ul style="list-style-type: none"> <li>-Use of water for control of fugitive dust</li> <li>-Transportation of ore in covered vehicle over macadamized road</li> <li>-Plantation in safety barrier</li> <li>-PPE to miners</li> </ul>
Water	<ul style="list-style-type: none"> <li>-Storage of mine pit water in an existing abandoned pit</li> <li>- Use of this water for dust control &amp; plantation</li> <li>-Permit local agriculturists to use this water for agriculture over lease</li> </ul>
Social	Employment to local residents, encourage local to participate in plantation, transportation etc

Statutory requirements will be timely submission of returns/compliance in respect to implementation of EMP and EC.