EXECUTIVE SUMMARY

OF

SILICA SAND MINE

[First Time EC cum Expansion]

In

VILLAGE - KASARDE,

TALUKA- KANKAVALI, DISTRICT- SINDHUDURG,

STATE - MAHARASHTRA

[LEASE AREA - 63.26 HA]

Proposed Production- 6,00,000 MT/annum

LIFE OF MINE-20 YEARS

TOR No. J11015/85/2014-IA.II(M) dated 16.06.2014

Project Cost: 330.5 Lakhs

FOR

PUBLIC HEARING

STUDY PERIOD: December, 2014 – February, 2015

Being Developed by

M/s C. V. Mahadik

(Lease Holder- Smt. Kashmira C. Mahadik)

A/t Post- Kasarde, Opp. Petrol Pump, Tehsil- Kankavali,
District- Sindhudurg-416801
Mumbai (MH)

EXECUTIVE SUMMARY

1.0 INTRODUCTION: The project pertains to mining of Silica Sand which will be done by open cast mechanized method with drilling and blasting. The lease area is 63.26Ha and the lease holder is Smt. Kashmira C. Mahadik. The proposed production shall be 6Lac MTPA.

Need of the project: The contribution of Maharashtra state in the total production of silica sand is about 17%. However, good quality silica sand is always in demand. Proposed project is for a production of 6.0 Lakh MTPA. This will increase the share of State Maharashtra as well improve the Govt. Revenue. Local people will also get employment in this project directly. Beside above people of the area will positively affected by means of CSR activities, health checkup and jobs.

1.1 DETAILS OF THE PROJECT: Silica Sand Mine will have production capacity of 6.0Lakh MTPA. The lease is private non forest hilly land which has no economically significant vegetation. Mining lease was granted to lessee vide ML order No. MMN-1293/31523/(6351)IND-9 dated 12.06.1997. Lease deed was executed on 05.11.1997 for a period of 20 years from the date 16.11.1992. Mining is being carried out in the area since 1997. Environmental clearance was not applicable at that time. Renewal of lease is applied in due times on 02.11.11. Mining operation were continued on the clause of "Deemed to have been renewed" under clause 24A(6) of Mineral Concession Rules 1960. The highest production during 2007-2008 is about 48465 MT as against 50,000 MT/annum proposed in approved mine plan.

Environmental clearance for the project was applied earlier on 25.7.2011. But since the report of High Level Working Group (HLWG) for study of Biodiversity and Environmental integrity of Western Ghat was not received, the Expert Appraisal Committee did not take up the case. This was intimated to the project proponent through MoEF letter no J-11015/191/2011/-IA.II (M) Dated 20.04.2012. HLWG has excluded the village area of M/s C.V. Mahadik mine from the restricted list. Based on the information furnished and presentation made and discussions held on 29.04.2014 the Committee prescribed the TORs.

1.2 SALIENT FEATURES OF THE PROJECT:

S.no	Particulars	Details
A.	**Nature & Size of the project**	Silica Sand Mine will have production capacity of 6.0Lakh MTPA
B.	**Location Details**	
1.	Village	Gothan and Awaleshwar (Kasarde)

	Tehsil	Kankavali
	District	Sindhudurga
	State	Maharashtra
2.	Lat-Long	Latitude 16^0 26' 14" to 16^0 26' 45" and Longitude 73^0 40' 41" to 73^0 40' 41" in survey of India toposheet no. 47 H/11 (**Restricted Toposheet**)
C.	**Project Area**	
3	Area in ha	63.26 ha
D.	**Environmental Setting**	
4	Nearest National Highway	NH-17 (Mumbai-Goa highway) 2.5Km W
5	Nearest Railway Station	Kankwali railway station-20Km S
6	Nearest Airport	Kolhapur airport is about 48 Km NE
7	Nearest water body, PF/PF forest of Environmentally sensitive area etc.	Karli River 2 Km SE, Ghonsari Dam 11Km E, There are no PF/RF from the 15 Km radius of mine lease area"
8.	**Seismic Zone**	III
E.	**Project Details**	
9	Method of Mining	Mechanized Method of mining with drilling and blasting
10	Water Requirement	27KLD
11	Power Requirement	1400 HP (All the equipment's are diesel driven)
12	Diesel requirement	850 Lit (peak daily requirement)
13	Manpower Requirement	49
F.	**Cost Details**	
14.	Project Cost	330.5Lakhs
15.	EMP & CSR Cost	EMP capital cost is 10.6Lakh and recurring cost is 11.10Lakhs & CSR cost is 9.0 Lakh and recurring cost is 9.0 lakh/annum.

1.3 DESCRIPTION OF ENVIRONMENT:

AMBIENT AIR QUALITY

Samples collected from 6 Sampling Locations for PM_{10}, $PM_{2.5}$, SO_2, NOx. Results are summarized as below:

Location	Min.	Max.	98 Percentile	Mean	Min.	Max.	98 Percentile	Mean
	PM_{10} (Standard – 100 µg/m^3)				$PM_{2.5}$ (Standard – 60 µg/m^3)			
A1 (On Site W direction)	62.7	91.6	91.5	76.0	33.2	50.6	48.2	41.4
A2 (On Site E direction)	65.1	95.1	95.0	78.9	34.5	52.5	50.0	43.0
A3 (Uttargavthan 0.80 Km, SSW)	69.9	102.2	97.5	84.8	37.1	56.4	53.7	46.2
A4 (Jambhalnagar 0.95 Km, NE)	60.3	88.1	88.0	73.1	32.0	48.6	46.3	39.8
A5 (1.14 Km, SE)	68.1	99.5	99.4	82.6	36.1	55.0	52.3	45.0
A6 (Audumbanaga 1.97 Km, NW)	71.7	104.8	100.1	87.0	38.0	57.9	55.1	47.4

Location	Min.	Max.	98 Percentile	Mean	Min.	Max.	98 Percentile	Mean
	SO_2 (Standard – 80 µg/m^3)				NOx (Standard – 80 µg/m^3)			
A1 (On Site W direction)	4.2	7.3	6.3	5.4	14.5	23.0	20.4	18.2
A2 (On Site E direction)	4.3	7.6	6.6	5.7	15.1	26.9	21.2	18.9
A3 (Uttargavthan 0.80 Km, SSW)	4.6	8.2	7.1	6.1	16.2	25.6	22.8	20.3
A4 (Jambhalnagar 0.95 Km, NE)	4.0	7.1	6.1	5.2	14.0	22.1	19.6	17.5
A5 (1.14 Km, SE)	4.5	8.0	6.9	5.9	15.8	25.0	22.2	19.8
A6 (Audumbanaga 1.97 Km, NW)	4.8	8.4	7.2	6.2	16.4	26.3	23.4	20.8

Discussion:

- **Core zone**: The $PM_{2.5}$ PM_{10} SO_2 and NO_X are within the National ambient air quality standards.
- **Buffer zone**: The mean values of $PM_{2.5}$ $PM_{10,}$ SO_2 and NO_X are within the National ambient air quality standards, however maximum value of PM $_{10}$ at Uttargavthan (A3)& Audumbanagar (A6) are slightly higher than the National Ambient air quality standard limits.

HYDROGEOLOGY

Dharwarian metasediments (Archean), Kaladgi formation (Precambrian), Deccan Trap lava flows (Upper Cretaceous to Lower Eocene age), Laterite (Pleistocene) and Alluvial deposits (Recent to Sub-Recent) are the water bearing formations observed in area. However Kaladgi formation occurs in patches and does not form potential aquifer in the district. The Alluviums also has limited areal extent found mainly along the coast.

The Kaladgi rocks are mainly represented by orthoquartzite, sandstone and shales. They are jointed in diverse directions and this along with weathered portion controls the water bearing properties. The unconfined aquifer is developed down to depth of 10-12 m bgl and the yield of the wells tapping such aquifer varies form 2 to 5 m3/day. Borewells generally tap deeper aquifer down to the depth of 60 m bgl and their yield varies between 500 and 9315 litres/hr.

The primary porosity is negligent in the Deccan trap basalts. The secondary porosity imparted due to jointing, fracturing plays an important role in ground water circulation. In the basaltic terrain ground water occurs under unconfined conditions in the phreatic zone up to a depth of 15 meters in the weathered zone, fractures and joints in the massive unit and weathered/fractured vesicular units. The basalts occupying higher elevations do not form good aquifers however the basalts occupying lower elevations give rise to good aquifers. The unconfined aquifer is developed due to the weathering and jointing of upper flow in Basalt down to depth of 15-20 m bgl and the yield of the wells tapping such aquifer varies form 0.50 to 4.00 m3/day. Bore-wells are not common in the area and they tap deeper aquifer in generally down to the depth of 90 m bgl their yield varies between 500 and 770 litres/hr.

The Alluvial deposits are found along the coastal areas in few isolated patches having limited areal extent and limited thickness as Beach Sand. The ground water occurs in inter-granular pore spaces of sands, gravels and silts. The ground water occurs under phreatic/unconfined aquifer at relatively shallow depths of 2-10 m bgl and their yield ranges from about 2 to 5 m3/day.

Depth of Water Level: AS per CGWB report, the pre monsoon depth to water level was observed to vary between 2 to 5 mbgl.

WATER QUALITY:

There were 11 **Ground Water** and 1 Surface water sample collected.

Ground Water Quality results of Core & Buffer Zone

S.No	Parameter	Unit	IS: 10500 Drinking Water Standards	Core Zone W1 Onsite (Well-water)	Buffer Zone W2 Uttargavthan (Well water)	Buffer Zone W3 Jambhalnagar (Well water)	Buffer Zone W4 Kasarde (Well water)	Buffer Zone W5 Audumbarnagar (Well water)	Buffer Zone W6 Anandnagar (Well water)	W7 Nagsawantwadi (Hand Pump)
1	Colour	Hazen	**5**	< 1	<1	<1	< 1	< 1	< 1	< 1
2	Odour	--	**Agreeable**	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Turbidity	NTU	**1**	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
4	pH Value	--	**6.5-8.5**	5.1	6.9	6.6	6.8	6.4	6.8	6.5
5	Temperature	°C	**-**	23.4	23.6	22.8	23.6	23.7	23.5	23.4
6	Conductivity	µmhos /cm	**-**	61.0	80.0	119	86.0	60.9	310	60.0
7	Total Dissolved Solids	mg/l	**500**	30.0	42.1	63	49.0	30.8	152	32.1
8	Chloride (as Cl)	mg/l	**250**	2.4	7.0	4.0	1.6	0.8	27.0	3.2
9	Fluoride (as F)	mg/l	**1.0**	2.9	2.0	3.0	2.0	2.5	2.8	2.2
10	Total Hardness	mg/l	**200**	8.4	11.5	15.5	8.4	6.7	50.1	4.0
11	Calcium (as Ca)	mg/l	**75**	3.2	4.2	5.2	3.2	2.5	16.0	1.3
12	Magnesium (as Mg)	mg/l	**30**	0.1	0.3	0.6	0.1	0.1	2.5	0.2
13	Iron (as Fe)	mg/l	**0.3**	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
14	Sulphate (SO_4)	mg/l	**200**	6.1	10.9	9.2	1.8	0.7	0.07	1.8
15	Nitrate Nitrogen	mg/l	**45**	0.2	0.1	0.2	0.09	0.3	0.1	0.3
16	Boron	mg/l	**0.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Alkalinity	mg/l	**200**	14.0	3.0	6.3	17.0	14.0	50	9.0
18	Sodium (Na)	mg/l	**-**	4.0	5.4	1.1	1.5	1.1	3.3	3.0
19	Potassium(as K)	mg/l	**-**	0.06	0.5	0.3	1.03	0.03	5.1	0.5
20	Nickel (as Ni)	mg/l	**0.02**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
21	Manganese (Mn)	mg/l	**0.1**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

22	Copper (Cu)	mg/l	**0.05**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
23	Cadmium (as Cd)	mg/l	**0.003**	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
24	Lead (as Pb)	mg/l	**0.01**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	**5**	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
26	Total Cr	mg/l	**0.05**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Lithium	mg/l	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Phosphate	mg/l	--	1.7	<0.02	<0.02	<0.02	<0.02	<0.02	1.1
29	Aluminum	mg/l	**0.03**	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

Ground water quality results (Source of standards: IS: 10500, Laboratory:M/sPerfact Researchers Pvt. Ltd (NABL Accredited)

Ground Water Quality results of Buffer Zone

S.No.	Parameter	Unit	IS: 10500 Drinking Water Standards	W8 Tarele (Well water)	W9 Dabgaon (Well water)	W10 Satamwadi (Well water)	W11 Tembewadi (Hand pump)
1	Colour	Hazen	**5**	<1	< 1	< 1	< 1
2	Odour	--	**Agreeable**	Agreeable	Agreeable	Agreeable	Agreeable
3	Turbidity	NTU	**1**	< 0.5	< 0.5	< 0.5	< 0.5
4	pH Value	--	**6.5-8.5**	6.3	6.2	6.3	6.3
5	Temperature	^oC	-	23.5	22.9	23.5	23.1
6	Conductivity	µmhos/cm	-	71.1	103	42.6	386.4
7	Total Dissolved Solids	mg/l	**500**	35.9	56.0	34.0	270
8	Chloride (as Cl)	mg/l	**250**	1.2	13.1	2.8	56.0
9	Fluoride (as F)	mg/l	**1.0**	2.7	2.9	3.0	2.6
10	Total Hardness	mg/l	**200**	9.9	8.9	12.4	148.7
11	Calcium (as Ca)	mg/l	**75**	3.8	3.4	4.8	44.2
12	Magnesium (as Mg)	mg/l	**30**	0.1	0.1	0.1	9.3
13	Iron (as Fe)	mg/l	**0.3**	<0.04	<0.04	<0.04	<0.04
14	Sulphate (as SO_4)	mg/l	**200**	6.0	0.3	1.05	9.8
15	Nitrate Nitrogen	mg/l	**45**	0.2	0.1	0.05	0.02
16	Boron	mg/l	**0.5**	<0.5	<0.5	<0.5	<0.5
17	Alkalinity	mg/l	**200**	10.0	8.6	22.0	139
18	Sodium (as Na)	mg/l	-	1.2	6.9	1.4	10.9
19	Potassium (as K)	mg/l	-	0.8	0.2	1.5	0.6
20	Nickel (as Ni)	mg/l	**0.02**	<0.02	<0.02	<0.02	<0.02
21	Manganese (as Mn)	mg/l	**0.1**	<0.01	<0.01	<0.01	<0.01

22	Copper (as Cu)	mg/l	**0.05**	<0.02	<0.02	<0.02	<0.02
23	Cadmium (as Cd)	mg/l	**0.003**	<0.007	<0.007	<0.007	<0.007
24	Lead (as Pb)	mg/l	**0.01**	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	**5**	<0.006	<0.006	<0.006	<0.006
26	Total Chromium	mg/l	**0.05**	<0.01	<0.01	<0.01	<0.01
27	Lithium	mg/l	--	<0.05	<0.05	<0.05	<0.05
28	Phosphate	mg/l	--	<0.02	<0.02	<0.02	<0.02
29	Aluminium	mg/l	**0.03**	<0.003	<0.003	<0.003	<0.003

Discussion

- **Core Zone Ground water quality:** As per the results shown above, the Ground water shows that the pH is 6.4. Other parameters like Alkalinity (14.0 mg/l) and Hardness (8.4 mg/l), T.D.S (30 mg/l), Sulphate (6.1 mg/l), Chloride (2.4 mg/l), Calcium (3.2 mg/l) and Magnesium (0.1 mg/l) are within the drinking water standards

- **Buffer zone Ground water quality:** water collected from ground shows that the pH ranges from 6.5 – 6.9. Other parameters like Alkalinity, Hardness, T.D.S ,Calcium , Magnesium& Chloride of Jambhalnagar, Kasarde, Audumbarnagar, Nagsawantwadi, Anandnagar, Tarele, Dabgaon, Satamwadi and Tembewadiare within the drinking water standards while Fluoride of all the locations is slightly higher than the drinking water standards.

Surface water quality: The detail is given below:

S.No.	Parameters	Unit	Buffer Zone SW1 Bhoglay Minor	IS: 10500:2012 (Drinking Water Standard)	CPCB Surface water quality criteria				
					Class 'A'	Class 'B'	Class 'C'	Class 'D'	Class 'E'
1	Colour	Hazen	< 1	5	-	-	-	-	-
2	Odour	--	Agreeable	Agreeable	-	-	-	-	-
3	Turbidity	NTU	< 0.5	1	-	-	-	-	-
4	pH Value	--	5.9	6.5-6.8	6.5-6.8	6.5-8.5	6-9	6.5-8.5	6-8.5
5	Temperature	^{o}C	23.1	-	-	-	-	-	-
6	Conductivity	µmhos/cm	32.8	-	-	-	-	-	2250
7	Total Dissolved Solids	mg/l	21.0	500	-	-	-	-	-

8	Chloride (as Cl)	mg/l	0.4	250	-	-	-	-	-
9	Fluoride (as F)	mg/l	2.8	1.0	-	-	-	-	-
10	Total Hardness	mg/l	6.4	200	-	-	-	-	-
11	Calcium (as Ca)	mg/l	2.4	75	-	-	-	-	-
12	Magnesium (as Mg)	mg/l	0.1	30	-	-	-	-	-
13	Iron (as Fe)	mg/l	<0.04	0.3	-	-	-	-	-
14	Sulphate (as SO4)	mg/l	3.0	200	-	-	-	-	-
15	Nitrate Nitrogen	mg/l	0.3	45	-	-	-	-	-
16	Nitrite Nitrogen	mg/l	<0.005	-	-	-	-	-	-
17	Alkalinity	mg/l	13.0	200	-	-	-	-	-
18	Aluminium (as Al)	mg/l	<0.003	0.03	-	-	-	-	-
19	Boron	mg/l	<0.5	0.5	-	-	-	-	2
20	Phosphate	mg/l	<0.01	-	-	-	-	-	-
21	Sodium (as Na)	mg/l	1.2	-	-	-	-	-	-
22	Potassium (as K)	mg/l	0.9	-	-	-	-	-	-
23	Nickel (as Ni)	mg/l	<0.02	0.02	-	-	-	-	-
24	Manganese (as Mn)	mg/l	<0.01	0.1	-	-	-	-	-
25	Copper (as Cu)	mg/l	<0.02	0.05	-	-	-	-	-
26	Cadmium (as Cd)	mg/l	<0.007	0.003	-	-	-	-	-
27	Lead (as Pb)	mg/l	<0.01	0.01	-	-	-	-	-
28	Zinc (as Zn)	mg/l	<0.006	5	-	-	-	-	-
29	BOD	mg/l	1.8	-	≤2	≤3	≤3		
30	COD	mg/l	4.0	-	-	-	-	-	-
31	DO	mg/l	7.4	-	≥6	≥5	≥4	-	-
32	Ammonical Nitrogen	mg/l	<1.0	-	-	-	-	-	-
33	Total Suspended Solids	mg/l	18.0	-	-	-	-	-	-
34	Total Coliform	MPN/100ml	Absent	-	≤50	≤500	≤5000	-	-
35	Fecal Coliform	MPN/100ml	Absent	-	-	-	-	-	-

36	Chromium	mg/l	<0.01	0.05	-	-	-	-	-
37	Surfactant	mg/l	<0.02	-	-	-	-	-	-
38	Phenols	mg/l	<0.001	0.001	-	-	-	-	-
39	Arsenic	mg/l	<0.01	0.01	-	-	-	-	-
40	Cyanide	mg/l	<0.05	0.05	-	-	-	-	-
41	Selenium	mg/l	<0.01	0.01	-	-	-	-	-
42	Mercury	mg/l	<0.001	0.001	-	-	-	-	-
43	PAH	mg/l	<0.0001	0.0001	-	-	-	-	-
44	PCB	mg/l	<0.0005	0.0005	-	-	-	-	-

Discussion: Buffer Zone Surface Water Quality: Surface water sample collected, results shows Bhoglay Minor all values of all parameters analyzed falls within the Drinking water standards and Surface water quality criteria as per CPCB (Class of water 'A', 'B', 'C' , 'D'& 'E')except fluoride which is slightly higher than the drinking water standards.

NOISE LEVELS

Total 8 samples were collected, results are as follows,

S. No.	**Locations**	**Project area/Study Area**	**L_{eq} Day noise level dB(A)**	**L_{eq}Night noise level dB(A)**	**Day time (6.00 A.M to 10.00P.M)**	**Night time (10.00 P.M to 6.00A.M)**
					Standard (L_{eq} in dB(A)	**Standard (L_{eq} in dB(A)**
N1	On Site	Industrial area	55.0	45.2	75.0	70.0
N2	On Site	Industrial area	54.1	44.1	75.0	70.0
N3	Uttargavthan	Residential area	56.5	43.8	55.0	45.0
N4	Jambhalnagar	Residential area	55.8	44.0	55.0	45.0
N5	Kasarde	Residential area	57.3	43.6	55.0	45.0
N6	Audumbanagar	Residential area	54.6	42.2	55.0	45.0
N7	Approach Road	Commercial Area	58.2	52.4	65.0	55.0
N8	NH - 17	Commercial Area	61.2	58.3	65.0	55.0

Discussion:

- **Core Zone: The** ambient noise level at the project site was 54.1 dB (A) – 55.0dB (A) which is within the standard of Industrial area are ~ 75 dB (A). During night onsite noise level was observed to be 44.1 dB (A) – 45.2dB (A) which is within the standard of Residential area are 70.0 dB (A).

- **Buffer Zone:** The ambient noise level was 54.6 dB (A) to 57.3 dB (A) which are slightly higher than the stand ard of Residential area i.e 55 dB (A)due to local village activities. During night buffer zone noise level was 42.2 dB (A) to 44.0 dB (A) which is within the night-time noise standards of Residential area 45.0 dB (A).

SOIL QUALITY

12 Samples collected. Results are as follows:

S. No.	Parameter	S1 Onsite	S2 Onsite	S3 Uttaragavthan	S4 Jambhalnagar	S5 Kasarde	S6 Audumbnagar	S7 Anandnagar	S8 Nagsawantwadi	S9 Tarele	S10 Dabgaon	S11 Satamwadi	S12 Tembewadi	Minimum Detection Limit
Physical Properties of Soil														
1	Colour	Reddish Brown	Reddish Brown	Reddish Brown	Reddish Brown	Brown	Brown	Reddish Brown	Brown	Reddish Brown	Brown	Brown	Reddish Brown	1-10 Munsell Chart
2	Composition (%)	Sand :30.2 Silt:25.7 Clay:44.0	Sand :31.4 Silt:29.6 Clay:37.8	Sand :37.9 Silt: 27.2 Clay:33.7	Sand :23.1 Silt:56.2 Clay:20.5	Sand :20.6 Silt: 41.6 Clay:36.8	Sand :29.3 Silt:34.1 Clay:36.4	Sand :24.2 Silt: 34.7 Clay:40.0	Sand :37.5 Silt: 48.4 Clay:12.7	Sand :25.6 Silt:48.4 Clay:24.7	Sand :30.0 Silt: 43.3 Clay:25.9	Sand :20.1 Silt:53.7 Clay:25.0	Sand :25.4 Silt: 27.9 Clay:46.0	Sand : 0-100% Silt: 0-100% Clay: 0-100%
3	Moisture Content (%)	1.1	1.9	1.0	1.0	1.2	0.9	0.3	0.9	0.4	1.8	1.2	1.7	0.1
4	Conductivity (µ s/cm)	51.4	37.0	35.0	24.7	65.1	72.2	114.9	79.6	51.6	21.7	41.4	25.5	1
Chemical Properties of Soil														
1	Texture	**Clay**	**Clay Loam**	**Clay Loam**	**Silt Loam**	**ClayLoam**	**Clay Loam**	**Clay Loam**	**Silt Loam**	**Loam**	**Loam**	**Silt Loam**	**Clay**	--
2	pH	5.8	5.3	5.9	5.7	6.8	5.5	5.8	5.9	5.8	5.6	5.7	5.8	--
3	Available Nitrogen (mg/kg)	78.4	67.2	75.6	64.4	67.2	61.6	81.2	56.0	70.0	81.2	72.8	86.8	1
4	Available P (mg/kg)	6.4	4.0	1.6	3.2	2.0	1.2	4.0	0.8	2.4	3.2	7.6	1.2	5
5	K (mg/kg)	0.4	1.2	1.4	0.6	0.8	0.8	0.8	0.9	0.7	0.5	0.3	0.5	5
6	Ca (mg/kg)	20.0	32.0	24.0	36.0	44.0	24.0	36.0	32.0	28.0	28.0	20.0	28.0	5
7	Mg (mg/kg)	16.0	20.0	20.0	16.0	32.0	20.0	20.0	16.0	16.0	8.0	16.0	8.0	5
8	Organic matter (%)	0.8	0.3	0.6	1.4	1.34	1.2	1.63	1.3	1.24	1.8	1.9	1.5	10
9	Nitrate Nitrogen (mg/kg)	193.9	218.5	179.9	147.8	149.2	274.3	216.6	184.1	176.9	150.2	164.8	182.5	0.1

10	Chloride(mg/kg)	17.5	52.5	61.3	35.0	78.8	26.3	26.3	52.5	43.8	17.5	26.3	17.5	5
11	Available Sulphur(mg/kg)	2.0	3.1	5.4	9.3	2.7	1.4	6.3	9.6	4.6	1.7	1.9	0.7	5
12	Sodium (mg/kg)	2.4	1.8	2.2	1.7	1.3	2.6	1.6	1.7	1.5	2.6	0.6	0.1	10
13	Cation Exchange Capacity(meq/100gm)	62.6	55.2	36.8	37.7	46.9	23.9	49.6	45.1	34.9	69.0	73.6	44.2	5
14	Bi carbonate(mg/kg)	24.4	12.2	24.4	12.2	36.6	24.4	48.8	61.0	73.2	24.4	12.2	48.8	5
15	Orthophosphate(mg/kg)	<0.02	<0.02	<0.01	<0.01	<0.01	0.2	<0.01	<0.01	<0.01	0.3	<0.01	<0.01	2

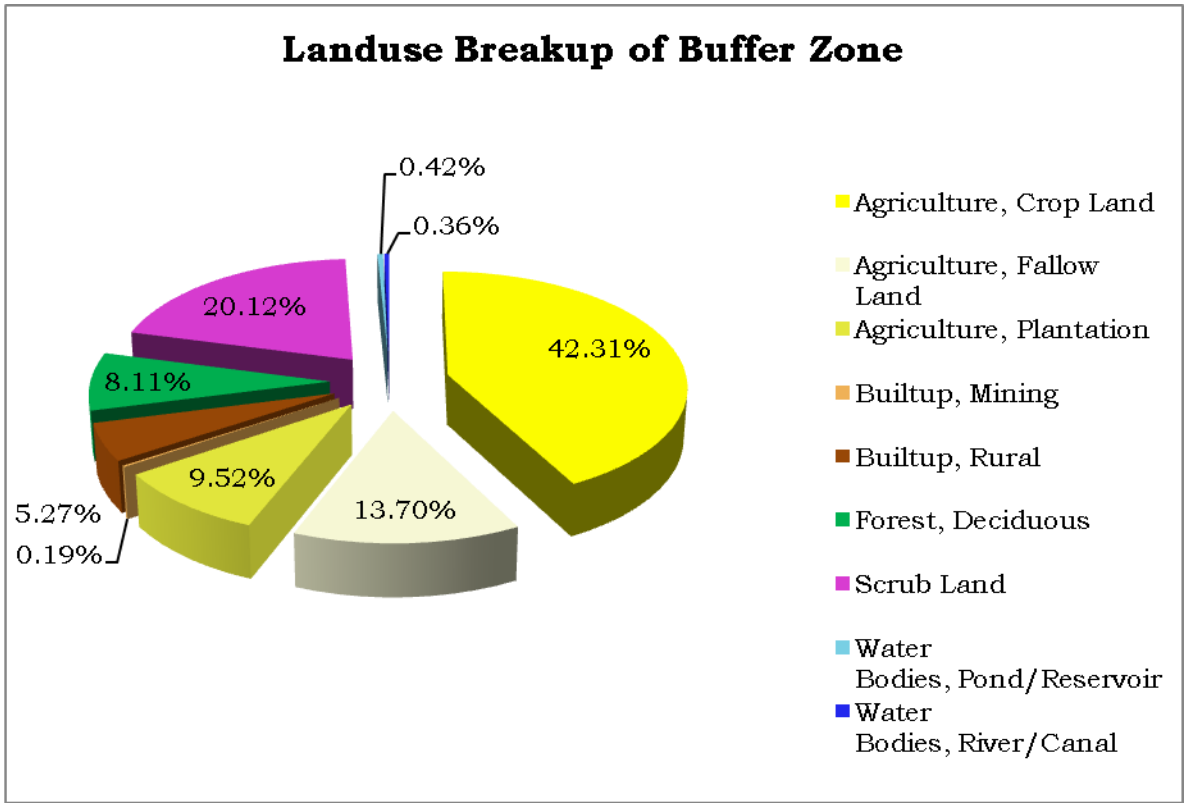
Discussion:

- **Core Zone:** the result shows that Colour was Reddish Brown, pH is 5.3 to 5.8. Amount of primary nutrients like Organic matter 0.3% to 0.8 %, the available nitrogen67.2 mg/kg to 78.4 mg/kg, the available Phosphorus 4.0 mg/kg to 6.0 mg/kg is medium in range while available Potassium 0.4 mg/kg to 1.2 mg/kg is Lower in range, Primary nutrient profile shows that soil is low in fertility due to the availability of low amount of nitrogen,

- **Buffer Zone:** The result shows that Colour was light Brown to Reddish brown, pH 5.5 – 6.8. Amount of primary nutrients like Organic matter 0.6 % - 1.9 %, the available nitrogen 56.0 – 86.8 mg/kg, the available Phosphorus 0.8 – 7.6 mg/kg & available Potassium 0.3 – 1.63 mg/kg is lower in range, Primary nutrient profile shows that soil is low in fertility due to the availability of low amount of nitrogen, Potassium. Adding bio fertilizer enrich in nitrogen will enhance the fertility of soil.

LAND USE

Study area has agriculture land 23413.93Ha i.e. 65.53%, Forest land 2897.72Ha i.e. 8.11%, Built up was in 1949.34 Ha i.e. 5.46%, Barren Land i.e. 7188.31ha i.e.2012% & water body in 278.68ha i.e. 0.78% of the total study area Ha. Land use breakup of Buffer Zone (10km Radius) of the lease area is given below:



ECOLOGY AND BIODIVERSITY

The tables are shown below for Flora and Fauna of Core and Buffer Zone.

Herbs and Shrubs of the Core zone

S.No.	Botanical name	
	SHRUBS	***HERBS***
1	*Calotrophis giagantea*	*Achyranthes aspera*
2	*Cassia tora*	*Boerhavia diffusa*
3	*Microcos paniculata*	*Eclipta alba*
4	*Pothos scandens*	*Brachiara mutica*
5	*Vitex negundo*	*Centella asiatica*
6	*Zizhphus oenoplia*	*Cynodon dactylon*
7	*Strobilanthes callosus*	*Lucas aspera*
8	*Cipadessa baccifera*	*Hemidesmun indicus*
9	*Maesa indica*	*Mentha arvensis*
10	*Leea indica*	*Smilax zeylanica*
11	*Cledodendrum serratum*	*Lucas aspera*
12	*Bridelia stipularis*	*Phyllanthus niruri*
13	*Adatodha vesica*	*Hemidesmun indicus*
14	*Zizhuphusrugosa*	*Mentha arvensis*
15	*Brachiaramutica*	*Smilax zeylanica*
16	*Lantana camara*	

Source: Field survey done by Ecology and Biodiversity Team of M/s Perfact Enviro Solutions Pvt. Ltd.

Trees of the Core Zone

S.No.	Botanical name	Common Name
1	*Thespesia populanea*	Portia
2	*Acacia catechu*	Catechu
3	*Acacia jennerae*	Murray's wattle
4	*Bauhinia racemosa*	Katmauli

Source: Field survey done by Ecology and Biodiversity Team of M/s Perfact Enviro Solutions Pvt. Ltd

Buffer Zone:

In the buffer zone of 10 Km there is no Reserve forest. The dominant species are *Aegle marmelos* (Bel), *Zizyphus jujuba* (Ber), Acacia catechu (Khair) etc. Only on the basis of Primary survey and secondary information from forest department, flora of Buffer zone is given below:

Flora of Buffer Zone

S.No	***Botanical Name***	**Local Vernacular Name**
1	*Acacia catechu*	Khair
2	*Actinodaphne hookeri*	Pisa
3	*Adina cordifolia*	Hed
4	*Aegle marmelos*	Bel
5	*Alstonia scholaris*	Satwin
6	*Albizzia lebbek*	Shiras
7	*Anacardium occidentale*	Cashewnut
8	*Anthocephalus cadamba*	Kadam
9	*Artocarpus integra*	Phanas
10	*Arythrina indica*	Pangara
11	*Barringtonia acuitangula*	Samudra
12	*Bauhinia racemosa*	Apta
13	*Buchania latifolia*	Char
14	*Butea monosperma*	Palas
15	*Calophyllum inophyllum*	Undi
16	*Carallia brachiata*	Phanshi
17	*Cassia fistula*	Bhava
18	*Cinnamomum tarnala*	Tamal patra
19	*Cocos nucifera*	Coconut
20	*Cureya arborea*	Kumbhi
21	*Dalbergia latifolia*	Shissam

22	*Diospyros assimilis*	Malila
23	*Dolichandiona falcate*	Medshing
24	*Emblica officinalis*	Awala
25	*Eugenia zeylanica*	Pitkuli
26	*Ficus gibbosa*	Datir
27	*Ficus bengalensis*	Wad
28	*Ficus religiosa*	Pimpal
29	*Ficus tsjekela*	Kel
30	*Gardenia lucida*	Dikamali
31	*Garcinia indica*	Kokum
32	*Grewia tiliaefolia*	Dhaman
33	*Glochidion velutinum*	Salai
34	*Gmelina arborea*	Shivam
35	*Heterphragma quadriloculare*	Waras
36	*Hydnocarpus launifolia*	Kawti
37	*Lagerstroemia lanceolata*	Nana
38	*Lannea grandis*	Moi, Shemat
39	*Mangifera indica*	Aam
40	*Mallotus philippinensis*	Shendri
41	*Moringa oleifera*	Shevga
42	*Mitragyna parviflora*	Kalamb
43	*Myristica malabarica*	Ranjaiphal
44	*Ochrocarpus longifolia*	Surangi
45	*Oroxylum indicum*	Tetu
46	*Psidium guajava*	Guava
47	*Randia spinosa*	Gela

48	*Salmalia malabarica*	Sawar
49	*Sapindus emarginata*	Rita
50	*Schleichera oleosa*	Koshimb
51	*Semecarpus anacardium*	Biba
52	*Shorea robusta*	Sal
53	*Stereospermum chlonoides*	Padali
54	*Sterculia villosa*	Sarda
55	*Strychnos nux-vomica*	Kajra
56	*Syzygium cumuni*	Jambhul
57	*Tectona grandis*	Sag
58	*Terminalia arjuna*	Nat-ain-Arjun
59	*Terminalia chebula*	Hirda
60	*Terminalia tomentosa*	Ain
61	*Thespesia populnea*	Bhendi
62	*Vitex leucoxylon*	Songarbi
63	*Wrightia tinctoria*	Kuda
64	*Xylia xylocarpa*	Jambha
65	*Zanthoxylum rheisa*	Triphal

Source: Forest Department Kankavali

Herbs and Shrubs of the Buffer Zone:

S.No.	**Botanical name**	
	SHRUBS	***HERBS***
1	*Calotropis giagantea*	*Achyranthes aspera*
2	*Cassia tora*	*Boerhavia diffusa*
3	*Microcos paniculata*	*Eclipta alba*
4	*Pothos scandens*	*Brachiara mutica*
5	*Vitex negundo*	*Centella asiatica*
6	*Zizhphus oenoplia*	*Cynodon dactylon*
7	*Strobilanthes callosus*	*Lucas aspera*
8	*Cipadessa baccifera*	*Hemidesmun indicus*
9	*Maesa indica*	*Mentha arvensis*

10	*Leea indica*	*Smilax zeylanica*
11	*Cledodendrum serratum*	*Lucas aspera*
12	*Bridelia stipularis*	*Phyllanthus niruri*
13	*Adatodha vesica*	*Hemidesmun indicus*
14	*Zizhuphusrugosa*	*Mentha arvensis*
15	*Brachiaramutica*	*Smilax zeylanica*
16	*Lantana camara*	

Fruits and Ornamental plants of Surrounding Mine lease area

S.No	Scientific Name	Common Name
1	*Prunus avium*	Cherry
2	*Cocos nucifera*	Coconut
3	*Mangifera indica*	Mango
4	*Anacardium occidentale*	Cashewnut
5	*Garcinia indica*	Kokum
6	*Cucurbita pepo*	Pumpkin
7	*Ficus carica*	Anjeer
8	*Citrus limetta*	Mausami
9	*Citrus sinensis*	Orange
10	*Citrus limon*	Lemon
11	*Carica papaya*	Papaya
12	*Ziziphus mauritiana*	Ber
13	*Syzygium cumuni*	Jamun
14	*Manilkara zapota*	Chiku
15	*Psidium guajava*	Guava
16	*Phyllanthus emblica*	Amla
17	*Artocarpus integra*	Jackfruit
Ornamental Plants		
18	*Areca catechu*	Areca palm
19	*Hyophorbe lagenicaulis*	Bottle palm
20	*Phoenix dactylifera*	Date palm
21	*Ficus benjamina*	Ficus
22	*Platycladus orientalis*	Morpankhi
23	*Dracena reflexa*	Dracena

24	*Aurelia aurita*	Aurelia
25	*Araucaria columnaris*	Christmas tree
26	*Magnolia grandiflora*	Magnolia
27	*Rosa sinensis*	Rose
28	*Jasminum sambac*	Mogra

Agriculture- Agriculture is mainly rain fed. **Rice and nagali (a type of millet)** are the principal food crops of the sindhudurg district.

Pulses like tur, udid, Waal, pawta, kulith and Moong are also grown.

Main Oilseeds grown are Karala, Sesamum and Groundnut.

Cash crops- Mango, Coconut and Cashew.

Alphanso mango, known as the king of Mangoes hails from this district.

FAUNAL COMMUNITY: The faunal study was carried out for the core zone and buffer zone separately as given below;

Core Zone: Fauna based on the survey of core Zone is listed below:

S.No.	Zoological Name	Common Name	Schedule of Wildlife Protection Act'1972
Mammals			
1.	*Lepus ruficaudatus*	Hare	IV
2.	*Macaca radiate*	Monkey	II
3.	*Sus scrofa*	Wild Pig	III
4.	*Herpestes edwardsii*	Mongoose	II
Avifauna			
5.	*Passer domesticus*	House Sparrow	IV
6.	*Eudynamys scolopaceus*	Koel	IV
7.	*Acridotheres tristis*	Myna	IV
8.	*Columbia livia*	Blue Rock Pigeon	IV
9.	*Bubulcus ibis*	Cattle Egret	-
10.	*Corvusmacrorhynchos*	Jungle crow	IV
11.	*Corvussplendens*	House Crow	IV
12.	*Merops orientalis*	Little Green Bee-eater	-
13.	*Merops philippinus*	Blue-tailed Bee-eater	-
14.	*Perdicula asiatica*	Jungle Bush-Quail	IV

15.	*Pericrocotus cinnamomeus*	Small minivet	-
16.	*Pitta brachyura*	Indian Pitta	IV
17.	*Ploceus philippinus*	Indian Baya	IV
18.	*Streptopelia chinensis*	Spotted Dove	IV
19.	*Sturnus pagodarum*	Brahminy Myna	IV

Fauna of Buffer Zone

S.No	*Zoological Name*	Local Name	Schedule as per Wild life protection Act, 1972
Mammals			
1	*Rusa unicolor nigra*	Sambar	III
2	*Canis lupus pallipis*	Wolf	-
3	*Muntiacus vaginalis*	Bhekar	III
4	*Sus scrofa*	Ran dukkar	III
5	*Vulpes vulpes*	Kolha	II
6	*Herpestes edwardsii*	Mongoose	II
7	*Hystrix leucura*	Sayal	-
8	*Lepus ruficaudatus*	Hare	IV
9	*Viverria malaecansis*	Kalindri	-
10	*Macaca radiata*	Makad	II
11	*Semnopithecus entellus*	Wanar	II
12	*Panthera pardus*	Panther	I
13	*Panther tigris*	Tiger	I

Birds of Buffer Zone

S.No	*Zoological Name*	Local Name
1	*Accipiter badius*	Shikra
2	*Acridotheres fuscus*	Jungle Myna
3	*Acrocephalus aedon*	Thick billed Warbler
4	*Acrocephalus agricola*	Paddyfield Warbler
5	*Anas crecca*	Common Teal
6	*Anas poecilorhyncha*	Spot-billed
7	*Aquila pomarina*	Lesser Spotted Eagle
8	*Ardea cinerea*	Grey Heron
9	*Ardeola grayii*	Indian Pond-Heron
10	*Butex furox*	Bazzards
11	*Bubulcus ibis*	Cattle Egret
12	*Cacomantis passerinus*	Grey-bellied Cuckoo
13	*Chalcophaps indica*	Emerald Dove
14	*Coicus marrurus*	Pale harrier
15	*Columba livia*	Rock Pigeon
16	*Copsychussaularis*	Magpie robin
17	*Corvusmacrorhynchos*	Jungle crow
18	*Corvussplendens*	House Crow

19	*Dendrocygnajavanica*	Lesser Whistling teal
20	*Dicrurusmacrocercus*	Black Drongo
21	*Dumetiahyperythra*	White throated Babbler
22	*Fulicaatra*	Common Coot
23	*Gallussonneratii*	Grey Junglefowl
24	*Iole indica*	Yellow-browed Bulbul
25	*Lonchura malacca*	Black headed Munia
26	*Lonchura striata*	White backed Munia
27	*Megalaima haemacephala*	Crimson breasted Barbet
28	*Megalaima viridis*	Small Green Barbet
29	*Merops leschenaulti*	Chestnut headed bee-eater
30	*Merops orientalis*	Little Green Bee-eater
31	*Merops philippinus*	Blue-tailed Bee-eater
32	*Mesophoyx intermedia*	Intermediate Egret
33	*Milvus migrans*	Black Kite
34	*Motacilla citreola*	Citrine Wagtail
35	*Motacilla madaraspatensis*	Large Pied wagtail
36	*Nectarinia asiatica*	Purple Sunbird
37	*Passer domesticus*	House Sparrow
38	*Pavo cristatus*	Indian Peafowl
39	*Pellorneum ruficeps*	Spotted Babbler
40	*Perdicula asiatica*	Jungle Bush-Quail
41	*Pericrocotus cinnamomeus*	Small minivet
42	*Pitta brachyura*	Indian Pitta
43	*Ploceus philippinus*	Indian Baya
44	*Streptopelia chinensis*	Spotted Dove
45	*Sturnus pagodarum*	Brahminy Myna
46	*Sturnus roseus*	Rosy Starling
47	*Tachybaptus ruficollis*	Little Grebe
48	*Tringa glareola*	Wood Sandpiper
49	*Tringa hypoleucos*	Common Sandpiper
50	*Turdoides striatus*	Jungle Babbler
51	*Vanellus indicus*	Red-wattled Lapwing
52	*Vanellus malabaricus*	Yellow-wattled Lapwing
53	*Perdicula asiatica*	Jungle Bush Quail
54	*Columba livia*	Blue Rock Pigeon

Insecta [Lepidoptera: Rhapalocera (Butterflies)]

S.No.	Family/Species	Relative abundance
PIERIDAE		
1.	Common Emigrant, *Catopsila crocale*	Common
2.	Common Grass Yellow, *Eurema hecabe*	Very Common

NYMPHALIDAE		
1.	Common Leopard, *Phalantha phalantha*	Fairly Common
2.	Lemon Pansy, *Precis lemonias*	Common
3.	Great Eggfly, *Hypolimnas bolina*	Common
4.	Common Castor, *Ariadne merione*	Uncommon
5.	Plain tiger, *Danaus chrysippus*	Common

Endangered and Threatened Species:

Endangered and threatened animals of India have been listed in the **Schedule I and Schedule II of the Wildlife (Protection) Act, 1972** (amended in 2002). In buffer zone Schedule **I species reported are*Pavo cristatus*** (Indian Peafowl), *Panthera pardus* (Leopard) and *Panthera tigris* (Tiger).

AQUATIC ECOLOGY

Baseline Data of Aquatic Fauna in the Impact Zone of the Study Area

S.No	Scientific Name	Vernacular Name	English Name
1	*Stolephorus indicus*	Kati	Indian anchovy
2	*Lates calcarifer*	Khajura	Bhetki
3	*Siluriformes*	Shingala	Catfish
4	*Brachyura*	Khekra	Crab
5	*Anguilliformes*	Vam, Beli	Eel
6	*Lutjanus campechanus*	Tambusa	Red snapper
7	*Trachipteridae*	Bala, Pitiwagti	Ribbon Fish
8	*Roho labeo*	Tambada massa	Rohu crap variety
9	*Eleutheronema tetradactylum*	Rawas	Indian Salmon
10	*Catla catla*	Tambra	Katla
11	*Rastrelliger kanagurta*	Bhangada	Indian mackerel
12	*Mango tilapia*	Dodywa, Rawas	Mango fish
13	*Parastromateus niger*	Halwa	Black pomfret
14	*Pampus argenteus*	Saranga	Silver promfret

Eco-sensitive Zone

There is no Wildlife Sanctuary, National Park or Biosphere Reserves in the Core as well as buffer zone.

SOCIO ECONOMIC ENVIRONMENT

The study based on secondary data and primary survey suggests following:

- **Population**: Total-45776,Male-22064 **,** Female-23712, **Percentage of Literacy rate: Total-73.07%** Male-52.5% ,Female- 47.5%
- **Total Workers** 18596 i.e. 40.6%**, Main Workers-62.8**%**, Marginal Worker-**37.2% of the total working population**,** working population is further categorized into **Cultivators-20.46%, Agricultural Labour-**7%**, Household Worker-**1%, **Other Worker-**12.33% of the total population.
- **Non-workers-** The total number of non-workers population is 27180 which 59.3% of the total population. **Basic amenities:** There are basic amenities such as drinking water, electricity, transportation, clinics etc. available in the area. However the project shall will initiate a positive impact by helping the local authorities in betterment of the locality.

TRAFFIC DENSITY

Total Traffic density at NH -17 (Mumbai to Goa) roads = existing traffic + Approach + proposed traffic at site =712 + 55 +4 = 771 PCU /hr. Hence it is concluded that since carrying capacity of NH -17 (Mumbai to Gova) roads is much higher than proposed traffic volume. Therefore the traffic to & fro of, "**SILICA SAND MINE**" will not create any traffic congestion.

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES:

S. No.	Particular	Anticipated Impacts	Mitigation Measures
1.	**Water Environment**	• Possible impacts due to contamination on water quality due to runoff of storm water and mine seepage. • Water Consumption during project activity. • Impact on water table	• No toxic effluent discharge from mine, retaining wall shall be constructed to stop runoff during rainy season. • Water requirement for sprinkling and green belt shall be fulfilled by pit water. Only drinking water shall be sourced from nearby bore well. • Mining shall not intersect ground water table therefore no negative effect on ground water table is envisaged.
2.	**Air Environment**	There shall be generation of dust due to point and non-point	• No mining is proposed during windy days,

		sources. Ambient Air Quality parameters in the core zone are likely to increase due to: ➢ Drilling and Blasting ➢ Loading, Unloading, and Transportation & ➢ Running of Mining Equipment's etc.	• Regular water sprinkling is being done. • Plantation of trees shall be done every year • Vehicles shall have PUC certificate
3.	**Noise Environment**	Ambient noise level in the core zone is likely to increases. ➢ Drilling and Blasting ➢ Loading, Unloading & Transportation ➢ Running of Mining Equipment's etc. Noise causes ill effects on ambient environment & workers.	• Plantation shall be done along the periphery, • Regular maintenance shall be done to reduce noise pollution.
4	**Land Environment**	• Slope consideration in open cast mining • The land might lose productivity in the core zone. • Loss of top soil due to mining.	• During mining ultimate pit slope will be maintained 45 degree or less. • The land is already barren hillock and there is no significant vegetation. • Top soil shall be used for green belt development this will be done to enhance ambience and reduce environmental pollution due to mining operation. Moreover, mineral is inert and will not affect productivity of soil.
5.	**Biological Environment**	• Impact on existing native vegetation due to mining & loss of vegetation. • Effect on Scheduled species. • Impact on Forest • Displacement of fauna due to mining activity.	• Trees shall be planted@ 400trees per year in 5ha area as per conceptual plan • Mined out land reclamation shall be done by backfilling the old pit. • Conservation plan for Sc-I Species in buffer zone shall be prepared and duly approved from chief Wild life Warden. • No forest falls within mining lease area or in the surrounding 10km area therefore no displacement of fauna is envisaged.
6.	**Mine Safety and Socio-Economic Environment**	The mining activities have several health risks such as: • Accidental cuts and bruises due to Fly rock • Hearing impairment due to hearing prolonged or high decibel noises due to drilling blasting, engine running etc.	• Provision of distribution of personal protective gears such as dust masks, gloves, ear muffs and helmets to the mine workers. • Rotation of workers exposed to dusty and noisy areas. • Regular medical examinations of lungs, ears and eyes shall be done • Disaster and emergency planning shall be done beforehand. • There shall be employment generation due to project, apart from that with the help of local authorities contributions shall be made for providing better infrastructural facilities such as roads, provision of clean water, schools etc.

7.	**Mine Waste Management**	• Waste generation due to mine will be in the form of Mine OB, Hazardous waste from burnt of diesel, domestic waste.	• Mining shall not be done during rains and there shall be construction of retaining walls top prevent surface runoff. OB shall be back filled into existing pit. • Hazardous waste such as oil shall be stored properly and sold to registered re-processor. • Domestic wastes due to daily human activities which shall be properly disposed off into septic tanks followed by soak pits. Wrappers, foils, leftover food material etc shall be collected in separate bins.

1.5 ALTERNATIVE SITE AND TECHNOLOGY: The lease has already been executed on the basis of mineral availability and mining plan has been prepared and approved to excavate the mineral therefore any change in site or technology is not envisaged.

1.6 ENVIRONMENTAL MONITORING PROGRAMME: Post project monitoring shall be done and the recorded data will be submitted half yearly by project proponent to MoEF (Regional office) and State Pollution Control Board (SPCB). Following parameters shall be recorded.

- Ambient Air Quality Monitoring
- Noise Monitoring
- Monitoring of Water Quality
- Soil Quality Monitoring
- Plantation and Greenbelt Development Monitoring
- Occupational Health and Safety

Environmental Monitoring Schedule: Environmental monitoring within the ML area and in the study area of 10 km radius will be carried out on periodic basis. A comprehensive network for monitoring has been prepared. Sampling locations have been identified by considering the source of pollution due to mining operations, drainage pattern, topography of the area and biological environment. 1.5 Lakhs capital cost has been estimated and for that fund has been allocation towards environmental management and monitoring program of about 1.6 Lakhs as recurring cost.

1.7 ADDITIONAL STUDIES: The disaster management plan has been prepared and it shall be implemented during mining. The suggestions of the stake holders shall be duly complied with and biyearly report shall be furnished in the SPCB.

1.8 PROJECT BENEFITS AND COSTS EVALUATION: Mining activity and development go hand in hand. There are number of social and infrastructural development activities linked with mining.

- **Employment potential**: The project will generate direct employment for 49 people and indirect employment for many more. Preference shall be given to local people as per ability.
- **Improvements in the physical infrastructure:** Provision of better infrastructure, schools, roads, sanitary facilities etc. with the help of local authorities.
- **Awareness champagne and welfare programs:** Conduction of rehabilitation programmes, green belt development drive, awareness program for common diseases, personal hygiene and organization of health camps not only for the mine workers but also for the people living in nearby villages under CSR responsibilities.
- **Ancillary industries that may come up on account of the project**: Many ancillary activities bloom in the nearby areas such as opening of dhabas, tea stalls, and vehicle repair shops etc.
- **Tangible benefits like improved standard of living, health, education etc**: Under the corporate responsibility programme, lessee will help in improving the Human Development Index, which depends on the income, health and education indicators.
- **Cost estimates of the project and Budget for welfare activities**: The project cost is 330.5 Lakh and the EMP capital cost is 10.6Lakh and recurring cost is 11.10Lakhs & CSR cost is 9.0 lakh both capital and recurring.

1.9 ENVIRONMENTAL MANAGEMENT PLAN: Environment Management Plan, for the project has detailed as below:

Air Environment: During the course of mining no toxic substances are released into the atmosphere except for dust and smoke from the burning of diesel. Dust shall be stopped by sprinkling of water on stack and mining bench. There shall be regular maintenance of vehicle to control air pollution. Plantation will be carried out on approach roads & nearby area.

Water Management: Ground water table shall not be intersected during entire span of mining. No mining shall be done during rainy season. Retaining wall shall be constructed to avoid silt runoff.

Noise Environment: Mechanized mining shall be the main source of noise.

Proper maintenance of all machines is being carried out, which will help in reducing generation of noise during operations. Personal protective equipment's shall be provided to the workers.

Solid Waste Management: There shall be mining waste generation therefore backfilling is proposed in the existing pit. The area shall be planted as reclamation work. There will be solid waste generation due to workers daily need and it will be disposed of into septic tank followed by soak pit. Hazardous waste such as used oil generated from mining machinery will be sold to authorized dealer.

Biological Environment: The mining lease area is in non-forest land where presence of fauna is less no adverse impacts will be envisaged on the terrestrial flora and fauna.

Green Belt Development: About 5 ha area will be planted during mining. Plantation shall be done in mined out land upper benches and 7.5m statutory boundary. Considering 5m*5m for one tree there shall be a plantation @400 trees in 1.0 ha will be planted.

Socio – Economic Environment: The socio-economic impact of mining procedure will bring positive impact such as development of roads, plantation near the haul roads, organization of vocational training to the villagers, opening of schools and direct or ancillary employment benefits. There is provision of CSR of 9.0 lakh each (capital as well as recurring) to be allocated under corporate social responsibility for the workers. Apart from that there are provisions for:

- The locals shall be given employment opportunities.
- There shall be better infrastructure availability after commencement of project.
- Health camps, rehabilitation camps, availability of clean drinking water & provision schooling shall be the main focus of the company.

CONCLUSION

As discussed, it is safe to say that the project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area would also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released due to mine.