EXECUTIVE SUMMARY

1.1 INTRODUCTION

The applicant M/s. Aarti Sponge & Power Ltd, Raipur is seeking prior Environmental Clearance for Proposed Alnar Iron Ore Mine located in Alnar Village, Tehsil Kuwankonda of Dantewada District, Chhattisgarh State over an area of 31.55 Ha area for a maximum production of 1,50,000 TPA.

Chhattisgarh State Government vide their letter on 3-13/2010/12 dated 01/10/2013 has recommended the proposal to Secretary, Ministry of Mines, Government of India for grant of Mine Lease in favor of Project Proponent. Ministry of Mines, GOI have also issued a letter to Secretary, Govt, of Chhattisgarh, Mineral Resource Dept. vide letter no. 5/98/2010-M.IV dated 21.04.2011 for grant of mine lease over an area of 31.55 Ha in Village Alnar, District - Dantewada in favour of Aarti sponge and power Ltd. for a period of 30 years (now, 50years according to MMDR act, 2016). Chhattisgarh State Govt. has issued a letter of intent for preparation of mining plan vide letter No. F-3-13/2010/12, dtd. 01/10/2013 for Alnar iron ore deposit in village Alnar, Kuwankonda tehsil of Dantewada, District - over an area of 31.55 Ha in favor of M/s Aarti Sponge & Power Ltd, Raipur.

Regionally, the lease area is a part of northern most hilly terrain of Alnar. As per EIA Notification 2006 and subsequent amendments, the project falls in Schedule 1 (a) in Category 'B1' and needs Environmental Clearance from SEAC, Chhattisgarh. The application for prior Environmental Clearance (Form-1) for the Alnar Iron Ore Mine was considered by the Reconstituted Expert Appraisal Committee (Non-Coal Mining) in its 3rd meeting held during February 23-25, 2016 for prescribing Terms of Reference (ToR) to prepare Environmental Impact Assessment (EIA) report. The Terms of Reference (ToR's) has been issued by SEAC vide its letter No.2599/SEAC, Chhatrtisgarh/meeting/2015 dated 9th Septamber 2016.

1.1.1 Identification of Project

The Alnar Iron Ore Mine located in 31.55 Ha areas in revenue forest khasara no. 416, 417 & 418 of kuwankonda tehsil of Dantewada District of Chhattisgarh State has applied for Environmental Clearance. Application has been submitted to SEAC/PCCF forest wing registration File No. 14/2014 for Forest clearance. The Lessee proposed to produce a maximum of 1,50,000 Tons/annum of Ore from the Alnar mine.

The applicant is seeking prior Environmental Clearance for project as per EIA notification 2006 and its amendments. Since the applied mine lease area is lesser than 50 Ha (31.55 Ha), hence it falls under "Category B1" based on the Schedule Clause no 1(a) of EIA notification 2006 and subsequent amendments.

1.1.2 Location of the Project

The applied Mine lease area is located in revenue forest khasra No. 416, 417 & 418 in Alnar village, tehsil Kuwankonda, district – Dantewada Chhattisgarh, India over an area of 31.55 Ha.

The Mine lease area falls under Survey of India Toposheet no. 65 F/2 and lies between Latitudes 18°32′58.0680″ to 18°33'9.6788″N & Longitudes 81°14′36.1751″ to 81°13′55.0305″ E.

The details of salient features of project are given in **Table 1.1**

TABLE 1.1: SALIENT FEATURES OF THE PROJECT SITE

Particulars	Details
Project Location	Alnar Iron Ore Mine Revenue forest khasra No. 416, 417 & 418 Village – Alnar, Tehsil-Kuwankonda District – Dantewada, Chhattisgarh state
Site elevation above MSL	660 mRL to 640 mRL
Land use of project site	The land proposed to be utilized for mining activity is forest land. The land is part of Arnapur Reserve Forest in Dantewada Forest Range.
Site topography	Hilly Terrain
Nearest roadway	Kiranduk State Highway (SH-5) :18 Km E Raipur-Jagdalpur National Highway (NH 43) : 156.0 Km E
Nearest Railway Station	Tokapal Railway Station, 20 km, SE
Nearest village/major town	Village: Alnar Village – 1.6 km, NE Town: Dantewada : - 68 km, N
Hills/valleys	Lease area is hilly terrain surrounded by Hills
Ecologically sensitive zone	None within 10 km radius
Reserved/ Protected forests	Arnapur R.F.- Mine lease area does not falls in Reserved Forest.
Historical/tourist places	None within 10 km radius
Nearest Industries	None within 10 km radius
Nearest water bodies	Malenger river (1.53 km, ESE, near Alnar), Palldu Vegu (2.98 km), Korum nala (4.89 km, ESE), Koyar river (6.94 km, NE) and Vemal Gurun (8.54 km, SW, near Bainpali)
Seismic zone	Seismic Zone-II as per IS-1893 (Part-1)-2002. The site is located in a stable zone

1.2 PROJECT DESCRIPTION

1.2.1 Method of Mining

It is proposed to carry out opencast mechanized mining for this plan period by creating systematic benching system having height of 5m and width of 5 to 6 m. It is proposed to deploy 63 mm dia

wagon drilling to drill blast holes having burden and spacing of 2 m x 2 m in stagger grid pattern. Muffle blasting will be adopted as precautionary measure.

Drilling and blasting will be conducted in the mine for extracting hard rock. The pattern of delay blasting will be done in conjunction with use of detonating fuse. Gelatin explosives will be used for blasting. Powder factor of over 7.25 tonnes / kg will be expected. Blasting will be done by contractual agency; hence, storage of explosive is not required.

1.2.2 Anticipated life of the mine

The mineable reserves of iron ore is 1.730836 million tonnes, considering the annual production rate of maximum 0.150 million tonnes, the life of the mine will be about 11.5 years. But, after completion of proposed boreholes, the reserves of iron ore will likely to increase and accordingly the life of the mine will get increased.

1.2.3 Conceptual Mine Plan

Total 5.943 ha will be mined out at the end of conceptual period. The infrastructure will be shifted to a safer place during the course of conceptual plan period. The overburden will be reclaimed by plantation. The voids left due to mining will be filled with rain water and used as water reservoir. The ultimate pit limit at the end of conceptual period is 638 msl.

TABLE 1.2: SALIENT FEATURES OF THE MINE

Particulars	Details
Method of mining	Mechanized Open Cast Mining
Area	31.55 ha
Proposed Production	1,50,000 TPA Iron Ore
Mineable Reserves	1.731 million tonnes
Life of the Mine	11.5 years (may be increased after future exploration)
Bench Height and Width	1.5 m Height & 5-6 m Width
Maximum Depth of Mining	upto 638 m msl
Topsoil thickness	Not available
Ultimate Pit Slope angle	45°
Elevation Range	660 to 640 m above msl
Water requirement	10 KLD
Source of Water	Water Tanker & mine pit water* (* if available)
Water table	5-10 m bgl from general ground level i.e. 600 msl
Number of working days	300 days

1.2.4 Waste Generation & Disposal

Waste generation in ML area will be mainly in the form of overburden (includes BHQ & ferruginous shaly BHQ rocks). Total 1,57,500 Cum of waste will be generated during mining plan period. Thereafter up to conceptual period, the generated waste will be about 31,500 Cum, The waste generated during mine life will be dumped on the north western side of the lease area with dump

height of 6 m and covered by fast growing grass and shrubs and protected by retaining wall & garland drain, if required.

1.2.5 Water Requirement & Source

Total water requirement for the project will be 10 KLD, which will be met from bore well and mine pit water (if available).

1.2.6 Manpower Requirement

Total manpower requirement for the project will be 171 persons.

1.3 EXISTING ENVIRONMENTAL SCENARIO

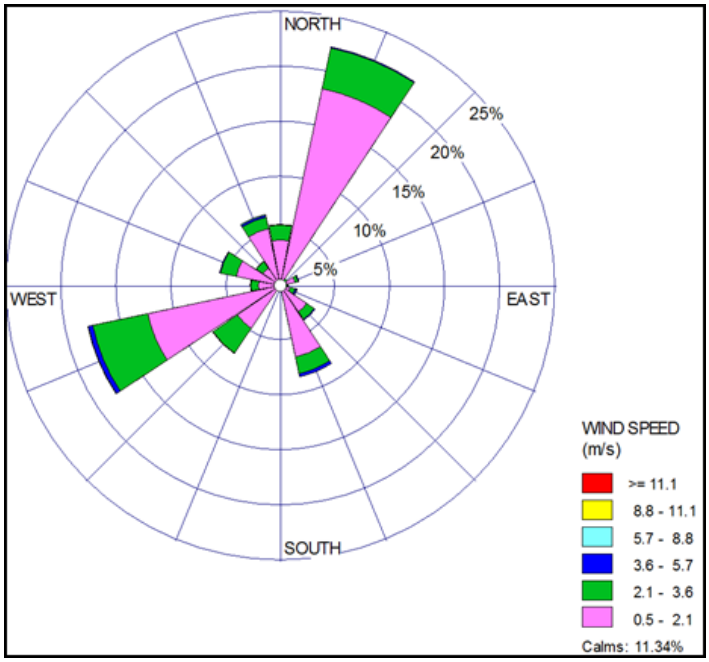
1.3.1 Baseline Environmental Studies

Baseline environmental studies were carried out within 10 km radius of the Alnar Iron Ore Mine area to assess the existing environmental scenario in the area. For the purpose of EIA studies, Mine lease area of Alnar Iron Ore Mine was considered as the core zone and area outside the mine upto 10 km radius was considered as buffer zone. The baseline environmental monitoring for various components of environment, viz. Air, Noise, Water, Land was carried out during summer season i.e. March to May 2016 in the study area covering 10 km radial Distance from the mine lease area.

1.3.2 Meteorology & Ambient Air Quality

Summary of Meteorological data generated at site (March to May 2016)

Temperature (°C)	20°C to 40°C
Relative Humidity (%)	10% to 95%
Wind Direction	NNE (17.9%)
Calm wind %	11.34%



Ambient Air Quality Status

The status of ambient air quality within the study area was monitored for summer season during March - May 2016 at 10 locations including the Mining area and in nearby villages. Total locations were selected based on the meteorological conditions considering upwind and downwind directions. The levels of Respirable Particulate Matter (PM_{10}), Fine Particulates ($PM_{2.5}$), Sulphur Dioxide (SO_2,), and Oxides of Nitrogen (NO_X) were monitored. The minimum and maximum values of monitoring results are summarized in **Table 1.3**.

TABLE 1.3 SUMMARY OF AMBIENT AIR QUALITY MONITORING RESULTS

Station code	Location	Description	PM10, ($\mu g/m^3$)	PM2.5, ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	CO (mg/m^3)	O3 ($\mu g/m^3$)	NH3 ($\mu g/m^3$)
AAQ1	Project Site	Minimum	37	16	5	6	0.212	9.8	12
		Maximum	44	22	8	12	0.272	16.8	23
AAQ2	Alnar	Minimum	32	10	5	5	0.202	7.8	12
		Maximum	42	21	6	8	0.243	15.6	21
AAQ 3	Gumiyapal	Minimum	37	16	5	5	0.248	10.7	10
		Maximum	43	19	7	9	0.286	18.9	32
AAQ 4	Bengpal	Minimum	40	18	5	12	0.248	10.1	12
		Maximum	56	32	8	28	0.355	18.2	29
AAQ 5	Bodepali	Minimum	42	18	5	11	0.242	11.6	12
		Maximum	62	28	9	26	0.328	19.4	28
AAQ 6	Madakmaras	Minimum	34	13	5	7	0.165	6.7	5
		Maximum	44	19	7	13	0.22	13.8	13
AAQ 7	Taneli	Minimum	40	18	5	12	0.248	10.1	12
		Maximum	56	32	8	28	0.355	18.2	29
AAQ 8	Kanhalguda	Minimum	48	16	5	12	0.215	10.4	12
		Maximum	68	38	9	28	0.358	18.2	32
AAQ 9	Perpa	Minimum	49	21	5	11	0.242	10.8	12
		Maximum	64	34	8	26	0.362	19.2	29
AAQ 10	Kirandul	Minimum	51	21	5	12	0.217	11.4	12
		Maximum	66	32	7	24	0.341	19.2	28
CPCB Standard			**100 (24 hrs)**	**60 (24 hrs)**	**80 (24 hrs)**	**80 (24 hrs)**	**2 (8 hrs)**	**180 (1 hrs)**	**400 (24 hrs)**

From the above results, it is observed that the ambient air quality with respect to PM_{10}, $PM_{2.5}$, SO_2, and NOx at all the monitoring locations was within the permissible limits specified by CPCB.

1.3.3 Ambient Noise Levels

Ambient noise level monitoring was carried out at the 10 monitoring locations; those were selected for ambient air quality monitoring. The monitoring results are summarized in **Table 1.4.**

TABLE 1.4: SUMMARY OF AMBIENT NOISE LEVEL MONITORING RESULTS

Time	Core Zone	Alnar	Gumiyapal	Bengpal	Bodepali	Madakparas	Taneli	Kanhalguda	Perpa	Kirandul
Min	**30**	**31**	**41**	**42**	**42**	**43**	**43**	**41**	**41**	**41**
Max	**48**	**47**	**57**	**61**	**56**	**54**	**57**	**54**	**60**	**56**
Ld	**45**	**45**	**51**	**55**	**53**	**49**	**53**	**50**	**54**	**52**
Ln	**34**	**35**	**44**	**45**	**45**	**44**	**46**	**42**	**45**	**44**

1.3.4 Surface and Ground Water Resources & Quality

There is no seasonal stream or nallah flowing through the mining area. However there is a some water bodies viz. Malenger river (1.53 km, ESE, near Alnar), Palldu Vegu (2.98 km), Korum nala (4.89 km, ESE), Koyar river (6.94 km, NE) and Vemal Gurun (8.54 km, SW, near Bainpali) are flowing within the study area.

The pre monsoon water level in the area is observed at 5-10 m bgl while post monsoon water level in the area is observed from 3-6m bgl from a general elevation of 26m amsl. The general elevation within the study area is from 640 m to 660m. The entire Dantewara has 25.17% ground water development status. Thus it falls in safe category (CGWB, 2008).

Water Quality

The existing status of groundwater and surface water quality was assessed by identifying 8 ground water (Bore wells/dug wells) samples in different villages and 4 surface water samples.

A. Groundwater Quality

The pH of the water samples collected ranged from 6.50 to 7.54 and within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in the range of 170 - 446 mg/l in all samples. The total hardness varied between 158.2 - 348.48 mg/l for all samples collected at 6 locations. In all samples, iron content varied in between 0.16 - 0.94 mg/l, Nitrate in between 4.28 - 18.85 mg/l, fluoride varied between 0.14 - 0.28 mg/l, chloride 18.15 - 58.98 mg/l, Sulphate 5.08 - 26.12 mg/l, alkalinity 80.5 - 358.8 mg/l, calcium 34.35 - 77.61 mg/l and magnesium in between 17.60 - 37.60 mg/l. The overall ground water quality was found to be good.

B. Surface Water Quality

The pH of the surface water samples collected was 7.33 to 7.67 and within the acceptable limit of 6.5-8.5. The total dissolved solids were found to be 128 - 334 mg/l. Total hardness was observed between 126.56 - 266.68 mg/l. Iron content in all samples was found in the range of 0.62 - 2.90 mg/l, concentration of nitrate was 1.4 - 4.99 mg/l. The fluoride concentration was found to be <0.01 to 0.26 mg/l and chloride concentration was varied between 12.70 - 78.04 mg/l. The sulphate content in all samples was in the range of 12.03 - 26.46 mg/l. The variation in alkalinity recorded was in the range of 55.2 - 165.6 mg/l, magnesium was found to be in the range of 14.65 to 23.87 mg/l in all samples. It

was observed from the analysis that, the physico-chemical characteristics of the surface water samples are within the permissible limits of drinking water standards except iron content, which is observed to exceed the permissible limits of 0.3 mg/l.

C. Bacteriological Characteristics

In groundwater samples, total coliform & faecal coliform were absent in all the samples. Whereas surface water was found to be contaminated by coliform bacteria. From the results, it was observed that, groundwater is suitable for drinking and domestic uses in absence of alternate drinking water source whereas surface water was not suitable for drinking uses without treatment.

1.3.5 Land use Land Cover classification

The Land Cover classes were extracted following a visual interpretation method or on screen digitization of the Resource Sat-1 Imagery, sensor LISS-3 having 23.5 m spatial resolution image. These were later verified by using SOI toposheet and Google Earth imagery. Polygon layers for each class were digitized and the respective areas were calculated. The land cover classes and their coverage are summarized in **Table 1.5.**

TABLE1.5: LU/LC CLASSES AND THEIR COVERAGE WITHIN 10 KM RADIUS

LU/LC classes and their coverage in Sq. Km			
Sr. No.	**LU/LC Class**	**Area (Sq.Km²)**	**Percentage (%)**
1	Built up Land Rural/Urban)		
	Settlement	19.72	6.28
	Road Infrastructure	2.36	0.75
	Railway	0.05	0.02
2	Agriculture Land		
	Cropland	40.32	12.84
3	Water bodies		
	River/Nala/Stream	2.97	0.95
4	Scrub/Waste Land		
	Land with scrub/Open Scrub	33.61	10.70
5	Forest		
	Dense Forest	206.12	65.64
6	mining AREA	8.85	2.82
	Total	314.00	100.00

1.3.6 Soil Quality

For studying soil profile of the region, sampling locations were selected to assess the existing soil conditions in and around the proposed project site representing various land use conditions. The physical, chemical properties and heavy metals concentrations were determined. The samples were collected by ramming a core-cutter into the soil up to a depth of 15-20 cm. Total 8 samples within the study area were collected and analyzed.

From the analysis results of the soil samples, it was observed that the soil was low to medium fertile and having low productivity. The soil in the study area needs additional fertilizers for improving the

fertility status and increase in crop productivity. The concentration of heavy metals in the water extract of soil was found to be low with a negligible concentration level of cadmium, chromium, lead, cobalt and selenium. This also indicates the poor level of micro-nutrient. The organic matter and organic carbon was found in the range of 0.89 to 1.14 % and 0.52 to 0.66 % respectively indicating moderate organic content in the soil.

1.3.7 Biological Environment

The vegetation was found in mixed category forest which have association of Sal (Shorea robusta), Dhawa (*Anogeissus latifolia*), Mahua (*Madhuca latifolia*), Ber (*Zizyphus* sp.), Makor (Zizyphus *oenophlolia*), Saja(*Terminalia tomentosa*), Jamun (*Sygigum cumini*), Gular (*Ficus glomerata*), lendia(*Lagerstromia perviflora*), Asta (*Bahunia purpuria*), Mundi(*Mitrigyna pervifolia*), Ghont (*Zizyphus xylocarpus*), Kari (*Milliusa tomentosa*) Gilchi (*Casseria graviolens*), Kasai (*Bridelia retusa*), Salai (*Boswelia serrata*), Semal (*Bombax ceiba*), Pakur (*Ficus infectoria*), Keolar (*Bauhinia* sp.), Karra (*Cleistanthus collinus*), Tinsa (*Ougenia oogensis*), Gunja (*Leena coromendelica*) etc. The landscape is hilly terrain have altitude varies from 700-600m msl. Forest floor is generally covered with dry litters and carbon rich humus in most of the area which shows the functioning characteristics of the biological systems. The soil is basically silty clay to clay loam textured lateritic soil which has medium fertility that is not suitable for the all types of agriculture species only suitable for rice, maize, ramtil and other minor millets.

Flora in the core & Buffer Zone

Study Area is known for its dense & extensive forests. As per Champion & Seth, 1968 vegetation types of the area can be grouped as Northern Tropical Dry Mixed Deciduous Forests 5B/C2 (vii) and Tropical Dry Deciduous Scrub Forests 5B/DSI (ii). The average annual rainfall of the region is 1427 mm. Soil of the area is black fertile soil derived from basaltic lava. Winter is moderately cold and the summer is very hot. The local people carry on their livelihood on the forest products like Bamboo, Sabai grass, Tasser, silk cocoon, lac, Semal cotton & Tendu (Bidi) leaves. Mango, were observed in most of the villages of the study area. Other fruit yielding varieties observed in the villages in the study area were Papaya, Guava, Vilayti imali, Imli, Sitafal and Ber.

Only 163 plant species were enlisted within the study site. The comparative accounts of habit wise species diversity in different zone of study site are given in **Table 1.6**.

TABLE 1.6: HABITATE WISE FLORISTIC COMPOSITION IN DEFERENT ZONE OF STUDY SITE.

Habit	Core	BF-I	BF-II
Climbers	7	20	20
Epiphytes	1	1	1
Grassess	7	17	18

Habit	Core	BF-I	BF-II
Herbs	6	9	10
Parasite	2	2	3
Shrubs	8	25	27
Trees	28	79	84
Total	**59**	**153**	**163**

Aquatic ecosystem Total 7 aquatic species have been identified and they can be described into following broad Categories (**3.6.7**)

Fauna in the core & Buffer zone

Total 90 faunal species was recorded through primary and secondary sources. Out of which 18 species belongs to class mammalian, 11 species belongs to class Reptilians and Amphibians, 43 species belongs to class Aves, 9 species belongs to class Insect (Butterflies) and 9 species belongs to class Pisces. During the field survey total 90 faunal species were found within the study site (**Table- 3.21**). Out of which 27 species were found from the core zone, 65 plants found from buffer-I zone(5 km radius from core) and 90 faunal species were recorded from the buffer-II (10 km radius from core except the buffer-I zone (**Table 3.22**). There is no sensitive floral / faunal species has been found in the study area.

1.3.8 Socio-economic Environment

Information on socio-demographic status and the trends of the communities in the 10 km radius was collected through primary social survey and secondary data from census 2011 & village directory 2001. Summary of the socio-economic status of the study area is given in **Table1.7.**

TABLE 1.7 SUMMARY OF SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES WITHIN 10 KM RADIUS AREA

No. of villages	23
Total households	2,222
Total population	10,707
Male Population	5,426
Female population	5,281
SC Population	845
ST Population	8,535
Total literates	4,153
Total workers	5,608
Total main workers	1,652
Total marginal workers	3,956
Total non-workers	5,099

1.4 Anticipated Environmental Impacts and Mitigation Measures

1.4.1 Impact on Topography, Drainage & Landuse

Regionally, the lease area is a part of northern most hilly terrain of Alnar. The entire applied lease area is hilly terrain; the highest contour level is 660 msl on the center and gradually reduced in all directions having lowest contour level of 640 msl, which will go upto 638 msl at Conceptual Stage.

The proposed mining operations will alter the existing topography of the mining lease area. Proposed mining will require hill cutting for excavation of iron ore, which will result in creation of mine pits in the lease area.

Mining lease area is devoid of any seasonal or perennial water body. Some seasonal nalas are present nearby mine lease area. The general ground level is about 600 msl near the village settlements. As observed from the nearby wells, the water table is about 10m below the general ground level. The UPL is 638 msl at conceptual stage of mining. Hence there is no intersection of ground water table has been anticipated from mining activity.

Proposed mining activities will change the land use pattern of the mining lease area. The present and proposed land use pattern of the mine lease area is given in**Table 1.8.**

TABLE 1.8 STAGE WISE LAND USE (HA)

Category	Present	Area in Hectare
Area Under Pits	0.0	5.943
Area for Dumping	0.0	1.294
Area for Approach Road	0.0	0.949
Plantation	0.0	0.225
Infrastructure	0.0	0.168
Undisturbed area	31.55	22.971
Total Area in Hectares	**31.55**	**31.55**

1.4.2 Ambient Air Quality

Impacts on Air Quality

To assess the impact of the Iron Ore mining and crushing operations from the Alnar Iron Ore Mine, air quality modeling was carried out for the mining operations and the mineral transportation activities. The modeling was carried out using MoEF/CPCB approved ISCST3 model.

The maximum predicted GLC of PM10 for iron ore mine activity like drilling/loading/unloading/transportation/crushing, blasting, was found to be 5.4 µg/m3, 4.4 µg/m3, in the SSW direction. From the observations of modeling results, it is observed that the cumulative concentrations of PM10 in the study area will remain within the permissible limits after commencement of the mining activities.

Air Pollution Control Measures

- No blasting under unfavorable wind and atmospheric conditions.
- Use of drilling machines equipped with dust collector arrangement.
- Blasting only in daytime and at a time when there will be no mining activity. No basting during unfavorable wind and atmospheric conditions.
- Blasting by using adequate booster/primer & by proper stemming of the blast hole.
- Minimum excavator bucket height during loading and unloading activity.
- Water sprinkling through mobile tanker at regular intervals on haul roads within the mine and surface transportation road.
- Regular maintenance of vehicles and machinery.
- Dust respirators to workmen.
- Development of green belt/plantation in the safety zone.
- Good housekeeping.
- Regular monitoring of pollutants to strengthen the control measures in case the concentration level exceeds the prescribed limits.

1.4.3 Ambient Noise Levels & Ground vibrations

From the modeling results, it was observed that the resultant noise levels at the mine lease boundary was about 50 dB (A), which will further reduce over short distance. The resultant noise levels due to mine operations at the nearest habitation i.e. Alnar village was about 40 dB (A). Thus, it could be seen that no significant impact will take place on the ambient noise levels due to the Alnar Iron Ore mine operations.

Ground vibrations

From the above table, it can be seen that the maximum charge per blast of 200 kg/day will not cause any significant ground vibrations in the area. The ground vibrations at Alnar village due to the blasting in Alnar Iron Ore mine is approximately zero. However, additional control measures needs to be adopted to avoid the impacts due to ground vibrations and fly rocks due to blasting.

Proposed Noise Control Measures

- Drilling will be carried out with sharp drill bits which help in reducing noise.
- Controlled blasting with proper spacing, burden, and optimum charge/delay will be maintained.
- Proper maintenance, of machines at regular intervals will be done to reduce generation of noise.
- Proper designing of crushing plant by providing inbuilt mechanism like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation.
- Green Belt/Plantation will be developed around the mining activity area and along haul roads.
- Ear muffs/ear plugs will be provided to persons working at high noise generating area
- Periodical monitoring of noise will be done.

Measures to Control Ground Vibration

Proper blast design will be made to control ground vibration and fly rocks.

- Adequate safe distance from blasting will be maintained.
- Charge per delay will be minimized and more number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity will be temporarily stopped;
- Drilling parameters will be properly designed to give proper blast.
- Muffle blasting using wire mesh and sand bags will be conducted at mine working near ML boundary towards habitation.
- Blasting will be carried out only to loosen the strata, thereby reducing the quantity of explosives.

1.4.4 Water environment

There will be no process waste water generation in the mine and allied activities. Only domestic effluent will be generated from the mine office and rest shelter. The domestic effluent is discharged in septic tank followed by soak pit. There is no discharge of effluent from the Iron Ore Mine. Rainwater accumulated in the mine pit, if any, will be collected in the mine sump and will be used for dust suppression and plantation in mine lease area. The ground water table in the nearby villages is observed at about 5-10 m bgl from normal surface level 600 msl. The mining is proposed upto 640 m msl during mining plan period and upto 638 m msl upto conceptual stage. From the occurrence of Water Table it has been observed that mining activity will be confined much above the water table and will not intersect the aquifers in the area.

Proposed Water Conservation & Water Pollution Control Measures

The daily water requirement for the proposed Iron Ore Mine is about 10 KLD which will be met from water tankers & mine pit water (when available). There is no water requirement for mineral processing in the mine. Also, there is no process effluent generation in the mine.

The following measures will be taken up to reduce this load:

- Garland drains around the mining pit so that surface water does not enter and is drained outside after treatment in settling tank.
- Retaining walls having water holes along the toe of the dumps to avoid the soil wash out.
- Stabilization of dump slopes by plantation to avoid soil erosion.
- Regular sampling and analysis of treated mine water for taking any corrective actions if required.

1.4.5 Biological Environment

Regionally, the lease area is a part of southernmost hilly terrain of Alnar Reserved Forest. There is no National Park, Wildlife Sanctuary and Biosphere Reserve within 10 km radius of the project site. No rare, endemic & endangered species are reported in the buffer zone. The core & buffer zone belongs

to mixed forest predominantly Sal & Dhawa species. Dust deposition on leaf lamina will takes place on nearby local plant species which may results in decline the rate of photosynthesis and retards the plant growth.

Proposed Biological Environment Conservation Measures

- Periodic maintenance of mineral transport road from crusher to railway siding.
- Regular sprinkling of water through mobile tanker on mineral transport road up to railway siding.
- Covered Transport of stone from crusher to railway siding.
- Development of thick plantation will be done in and around mine lease area.
- Monitoring of dust fall at agriculture land located nearby the mining area.

1.4.6 Solid waste management

There is negligible soil cover in the top and less soil and other waste will be generated during mining process. Generated solid waste will be used for haul road and approach road maintenance and plantation work.

1.4.7 Socio-economic Environment

- There is no habitation or private land in the Alnar Iron Ore Mine. There is no rehabilitation and resettlement involved in the project.
- Total 171 nos. manpower will be employed directly during operation phase of Iron Ore Mine. Mostly local persons will be employed in the mine. Additional manpower requirement in the mine will be employed from the nearby villages. Thus, there will not be any population growth in the area due to the proposed mining project.
- Mine management will take efforts as a part of CSR for improvement in civic amenities like sanitation, drinking water facilities, transport road, etc in the nearby villages.

1.5 Environmental Monitoring Program

An Environmental Management Cell will be established for implementing the Environmental Management Plan and conducting periodic environmental monitoring of important and crucial environmental parameters to assess the status of environment regularly during mine operations. Environmental monitoring of Ambient Air Quality, Water table depth, Water quality, Ambient Noise Levels, Soil Quality, CSR activities etc will be carried out through MOEF accredited agencies regularly and reports will be submitted to CECB/MoEF. With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to operation of the mine and so that suitable additional mitigation steps could be taken in time to safeguard the environment.

1.6 Risk Assessment & Disaster Management Plan

The assessment of risk in the Alnar Iron Ore Mine has been estimated for Slope failure, Handling of explosives, Fly-rocks during blasting, Movement of HEMM, Inundation due to surface water, Dust hazards, Hazards associated with use of electricity/ Diesel Generator Sets and flooding of lower benches and corresponding mitigation measures are suggested in the Draft EIA/EMP report.

A detailed Disaster Management Plan for facing disasters due to natural effects and human reasons is prepared and incorporated in the draft EIA/EMP report for ensuring safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of Disaster Management Plan, it will be widely circulated and personnel training through rehearsals. Site facilities, procedures, Duties and responsibilities, Communications, etc is considered in detail in the Disaster Management Plan.

1.7 Project Benefits

The Alnar Iron Ore mine project at Alnar village would generate additional employment opportunities which would finally result in improvement in the quality of life of people of the nearby villages. In line with this CSR policy, M/s. Aarti sponge and Power Limited, Raipur will carry community welfare activities in the following areas:

- Education
- Community Health
- Livelihood & Employability
- Infrastructure Development
- Social Welfare

A budget of Rs. 12.00 Lakh per annum as recurring expenses has been proposed for implementation of Socio-economic welfare activities in the nearby villages.

1.8 Environmental Management Plan

The environmental management plan consists of following set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels.

- Overall conservation of environment.
- Minimization of natural resources and water.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and longtime impacts.

Judicious use of the present environmental management plan addressed the components of environment, which are likely to be affected by the different operations of mining activity.

The capital cost of the project is approx. Rs.6.00 Crore. It is proposed to provide an amount of Rs. 72.00 Lakh as capital cost and Rs. 20.65 Lakhs per annum as recurring expenses towards implementation of the environmental action plan.

1.9 Conclusion

The Alnar Iron Ore Mine is a project of M/s. M/s Aarti sponge and power Ltd, Raipur, will be beneficial for the development of the nearby villages. Some environmental aspects like dust emission, noise, siltation due to surface run-off, etc. will have to be controlled within the permissible norms to avoid impacts on the surrounding environment. Necessary pollution control equipment like water sprinkling, plantation, personal protective equipment's, etc., will form regular practice in the project. Additional pollution control measures and environmental conservation measures will be adopted to control/minimize impacts on the environment and socio-economic environment of the area. Measures like development of thick green belt and plantation within mine lease area and along transport road, adoption of rainwater harvesting in the mine and in nearby villages, etc. will be implemented. The CSR measures proposed to be adopted by the mine management will improve the social, economic status of the nearby villages.

The overall impacts of the Alnar Iron Ore Mine will be positive and will result in overall socio-economic growth of nearby villages.