M/s RASHI STEEL AND POWER LTD. (RSPL)

EXECUTIVE SUMMARY

For Environmental Clearance of Existing Iron Ore Pellet Plant (0.4 MTPA) at Patwari Halka No. – 38, Village Paraghat, Tehsil – Masturi, District- Bilaspur, Chhattisgarh.




Prepared by:

ENVIRONMENT MANAGEMENT DIVISION

M/s INDIA GLYCOLS LIMITED
A-1, INDUSTRIAL AREA, KASHIPUR, DISTRICT-U.S. NAGAR, U.K .

EXECUTIVE SUMMARY

1.0 INTRODUCTION

Steel a basic commodity for all industrial activities, quantum of its consumption is considered an index of industrial prosperity. Since independence, there has been a substantial growth in the steel sector in India from 1.5 Million Tons in 1950-51 to about 31 Million Tons at present. Additional Steel making capacity of about 8 to 10 Million Tons near exists in the secondary steel sector. Further, with nearly 20% of the world population, India's contribution is only of the order of 3.4% of world steel production. Hence, short term and long term strategies are necessary in planning the development of the steel industry in the country to improve the level of per capita steel consumption. It is expected that with the measures taken by Govt. of India for promotion consumption of iron and steel and expected growth of Indian economy the requirement of steel will significantly increase and accordingly the domestic manufacturing capacity needs to be increase. Considering the potential of iron and steel in India and the experience gained by the group in this sector, M/s RASHI STEEL AND POWER LTD (RSPL) had decided to install pallet plant in the state of Chhatisgarh.

The management of the company believes that "Successful operation, performance and long term viability of any business depends on a continuous sequence of sound decision made individually or collectively by the management team. Every one of this decision ultimately causes for better or worse, an economic impact on the business. In essence, the process managing any enterprise amounts to making an on going series of economic choices, every time trading off costs or benefits."

M/s Rashi Steel and Power Limited (RSPL) have been incorporated on 28.08.2009 with Registrar of Company, New Delhi with a view to venture into Integrated Steel Plant. The Promoter of Companies is engaged in various activities such as- Steel Industry, Ferro alloys, Power Generation Unit, Real Estate & Hotel Business etc. The Group's annual turnover is about ₹ 500 crore.

Company has obtained Consent to Establish (CTE) on Dated 22.10.2010 from Chhattisgarh Environment Conservation Board Raipur. Consent to Operate was granted for the Period of three months on Dated 26.08.2014 & Commissioning of the 01 x 0.4 MTPA low grade iron ore pellet plant was attempted till 26.11.2014. Company had obtained Consent to Operate till Dated 31.10.2016 and further applied for its renewal to Chhattisgarh Environment Conservation Board Raipur. There is no National Park, Sanctuary or Forest Land in surrounding 10 Km radius. The project doesn't fall under CRZ boundaries.

The Iron ore fines are utilized in Pellet making. The Power required for the plant is made available from Chhattisgarh State Electricity Board (CSEB), Bilaspur District.

also. Environmental Clearance to set up the Integrated Steel Plant (0.4 MTPA) Project was already granted by the Ministry of Environment & Forests (IA Division), GOI vide Letter No. /File No. J-11011/466/2010-IA-II (I) Dated 12th August, 2016.

M/s India Glycols Limited, A – 1, Industrial Area, Bazpur Road, Kashipur, Distt. U.S. Nagar, Uttarakhand has been engaged as environmental consultants for preparation of EIA / EMP report. Baseline data generation was executed for pre monsoon season 2016 i.e. March – May 2016. The results, mitigation measures and conclusions are drawn into this EIA/EMP report.

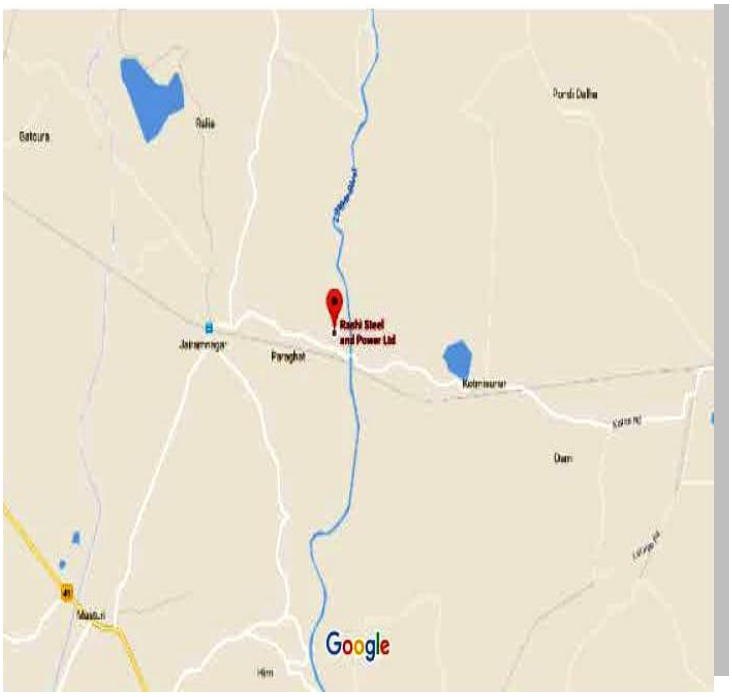
This report has been prepared in line with Terms of Reference (ToR) issued by MoEF & CC vide their Letter Number J-11011/237/2014-IA-II (I) dated 22nd January 2016 to obtain Environmental Clearance (EC) from MoEF & CC.

M/s Rashi Steel And Power Ltd (RSPL) has its corporate office at A – 184, 1st Floor, Meera Bagh, New Delhi - 110087 & Works is at Village Paraghat, Tehsil – Masturi, District- Bilaspur, Chhattisgarh.

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The existing Iron Ore Pellet Plant (0.4 MTPA) is situated at Khasra No. 99/1 to 105/5, 113/1 to 115/6 Village Paraghat, Tehsil – Masturi, District- Bilaspur, of Chhattisgarh State. The nearest National Highway NH-200 is 08 km away from the site. The nearest Railway station Jai Ram Nagar is about 2.5 km away from the site. Nearest town is Masturi which is around 10 kms from the project site. Nearest Railway station is Bilaspur which is around 22 kms from the project site. Commercial Airport is Raipur and nearest port is Vishakapattanam.



Coordinates: : N 22^0 01' 54.3'' E 82^0 19' 23.6'' to N 22^0 02' 09.2'' E 82^0 19' 42.

The Company has chosen this site mainly due to the rail and road transport facilities which is readily available at the site. River *Lilagar*, which is a perennial river, flows by the side of the site. Adequate surface water and ground water is available in the area.

The site was selected based on the following factors:

- Nearness to source of main raw materials
- Location of consumer centre
- Availability of sufficient stretch of land
- Convenient Rail & Road links (Plant located near SH/Railway JN)
- Perennial & adequate sources of water supply
- Availability & closeness to source of adequate power supply

2.2 PROMOTERS OF THE COMPANY

The Promoters of the Company are given below:

Sr. No.	Name	Designation
1.	Shri Ashok Agrawal	Director
2.	Shri Rakesh Jindal	Director
3.	Shri Amar Agrawal	Director
4.	Shri Mahesh Gupta	Director
5.	Shri Ashok Agrawal	Director

2.3 PRESENT LAND USE OF THE SITE

Proponent has acquired Land about 34.12 Acres at Village Paraghat, Tehsil – Masturi, District- Bilaspur, Chhattisgarh for Installation of Pellet Pant. Company has installed 0.4 MTPA Iron Ore Pellet Plant at the same location.

The present land use of the site is low productive agriculture land & used for Industrial development; therefore, no change in Land use is envisaged. The land use breakup is as follows:

S. No.	Construction	Area (Acres)
1.	**Built up area for Plant & Facilities**	**07.00**
2.	**Roads and Drains**	**05.00**
3.	**Greenbelt**	**11.25**
4.	**Parking**	**01.87**
5.	**Temporary Dump Yard**	**05.00**
6.	**Open Area**	**04.00**
Total Land		**34.12**

2.4 EXISTING PRODUCTION CAPACITY (MTPA)

M/s Rashi Steel & Power Limited has set up a 0.4 million TPA Iron Ore Pelletization Plant at Patwari Halka No. – 38, Village Paraghat, Tehsil – Masturi, District- Bilaspur, Chhattisgarh after obtaining the Necessary Consent to Establishment Dated 22.10.2010 from Chhattisgarh Environment Conservation Board Raipur. The commercial production was started after obtaining Consent to Operate from CECB, Raipur.

PRODUCTION CAPACITY

Sl.	Plant Facility	Product	Capacity	Remarks
1.	**Pellet Plant**	**Iron ore Pellet**	**0.4 MTPA**	**Commissioning on 26-11-2014**

2.4.1 RAW MATERIALS

The following are the major raw material required for the manufacturing of Iron Ore Pellets.

1) Raw Material- Hematite Iron Ore fines
2) Binding Material - Bentonite
3) Coal

Iron Ore fines:

Fe (T)	:	64 ± 1%
$Si0_2$	:	0.85 Max.
Al_2O_3	:	1.80 Max.
S	:	0.01 Max.
P	:	0.05 Max.
Size	:	200 mesh

Bentonite:

SiO_2	:	66.70%
Al_2O_3	:	28.30 %
CaO	:	1.50%
MgO	:	3.50 %
H_2O	:	5.00 %

Coal:

Fixed Carbon	:	45% plus.
Volatile Matter	:	35% plus.

Ash	:	35 to 45%.
Sulphur	:	0.1 max.
G.C.V	:	3500 (k.cal/kg)/min
Ash Fusion Temperature	:	2000 ℃/1600 ℃ (min)
Size	:	0 to 300 mm/200mm.
Moisture	:	10 to 15 % max.

2.4.2 RAW MATERIAL REQUIREMENTS

Unit	Raw Material	Raw Material Required Per Day (T)	Raw Material Required Per Month (T)	Raw Material Required Per Annum 330 Days (T)
Pelletization Plant (1200 TPD)	Iron Ore Fines	1320	36300	435600
	Bentonite	18	495	5940
	Coal	34	935	11220

2.4.3 MATERIAL BALANCE (IRON ORE PELLETIZATION PLANT)

Input		Output	
Iron Ore Fines	1.1000 Tons	B.F. Sinter	1.0 Tons
Coal	0.02883 Tons	Input Return Fine Dust	0.143 Tons
Bentonite	0.0150 Tons		
Total Input	**1.143 Tons**	**Total Output**	**1.143 Tons**

2.5 COST OF PROJECT

The total estimated cost of the project was approximately ₹ 150.00 Crores.

Initiated Project cost was estimated as under:

	Particulars	Amount in Lacs
(i)	Land & site Development and infrastructure	550.00
(ii)	Factory Building & Civil Works etc.	3800.00
(iii)	Plant & Machinery	7750.00
(iv)	Pollution Control Devices	1100.00
(v)	Electrical Installation	580.00

(vi)	Misc. Fixed Assets	120.00
(vii)	Preliminary and Preoperative Expenses	030.00
(viii	Deposits	070.00
Sub-Total		14000.00
Margin Money for Working Capital		1000.00
Grand -Total		**15000.00**

2.5.1 PROVISION FOR ENVIRONMENTAL ASPECTS

The total cost of the project is approximately ₹ 150.00 Crores. Approximate Capital cost on Environmental issue will be ₹ 3.30 Crores and Recurring expanses ₹ 61.5 Lac/ Annum.

2.6 POWER

Chhattisgarh State Electricity Board (CSEB), Bilaspur District is major source to electricity (4.0 MW) and Coal is being sourced from various Coal mines located in Chhattisgarh also from local Coal traders.

Two Nos. of green insulated DG Sets (500 KVA) are proposed for alternate source of power for essential services. HSD (80 lit/day approx.) shall be used as a fuel for the proposed facility. However, there is a D.G set, which get automatically started within15 seconds of power failure.

2.7 EMPLOYMENT GENERATION (DIRECT AND INDIRECT)

Total Manpower engaged during operation of the 0.4 MTPA Pellet Plant is 90. Apart from this, 450-500 persons are indirectly benefited by this project during the operation phase for logistic.

EMPLOYMENT STATUS

Sl.	Category	No. of Employees
1.	Managerial Staff	06
2.	Technical Staff	6
3.	Highly Skilled Staff	8
4.	Skilled Staff	1
5.	Semi-Skilled Staff	1
6.	Unskilled Staff	4
7.	Clerical Staff	5

	Total	**90**

2.8 WATER CONSUMPTION & EFFLUENT GENERATION

2.8.1 WATER REQUIREMENT & SOURCE

Initial Water requirement for the Pellet project is 670.00 KLD for and out of which 270.00 KLD is being recycled after adequate treatment therefore net water requirement is 400.00 KLD during the operation phase, which is being sourced from Surface water (*Lilagar* River) as well as Ground water i.e. Bore wells.

The Company has obtained permission from Govt. of Chhattisgarh to draw water. A reservoir is constructed inside plant. Estimated make up water requirement to replenish the process and treatment losses for the facilities are as follows:

Total Plant Raw Water Requirement (KLD)

Items	**Total make - up water requirement**
Pelletization Process	380
Domestic use & Misc.	20
Total	**400**

2.8.2 EFFLUENT GENERATION & MODE OF TREATMENT

The domestic effluent within the plant premises is being treated in Septic tank /Soak pits. STP of 15 KLD capacity (MBBR Technology) is proposed to treat the waste water from Canteen & Toilets. Treated effluents are being used in green belt. The existing plant has achieved a zero discharge norms with reuse /recycling of treated water from different treatment plants. Run off from various area such as ash disposal area, solid waste dumping area and coal stock pile area will be passed through settling tanks before discharging to outside.

In the iron ore pellet plant; there is no effluent generation from the process. Water is used to maintain moisture in pellets. Further water is used for equipment cooling which is completely recycled with make-up water. Scrubbing effluent is treated in settling tank and will be recycled in scrubbing with make -up water in a closed circuit.

2.8.3 WATER BALANCE

Initial water requirement: 670.00 KLD

REQUIREMENT	INPUT	LOSSES	RECYCLED	OUTPUT
PELLETIZATION PROCESS (GRINDING SYSTEM, BALLING DISC., COOLING, ETC.)	650.00	370.00	270.0	*10.0
DOMESTIC (M^3)	4.5	0.9	0.0	*3.6
MISCELLANEOUS I.E. FIRE WATER, DUST SUPPRESSION ETC. (M^3)	3.5	3.5	0.0	Nil
GREEN BELT (M^3)	12.0	12.0	0.0	Nil
TOTAL OUTPUT TO E.T.P.				**NIL**

Note:

- Zero discharge is being achieved.
- Waste water generated from Pelletization Process (Grinding System, Balling, Disc., Cooling, etc.) is being treated in the existing ETP & treated water is being reused into the Process.
- Effluent from raw water treatment facilities are treated in settling pond and taken to common basin.
- DM plant regeneration are neutralized and taken to common basin for reuse.
- CT blow down is taken to common basin and reuse in ash handling and dust suppression.
- Cooling water in Pellet plant is completely recycled in closed loop.
- Domestic effluent is subjected to Septic tank/soak pit. However STP of 15 KLD capacity is proposed also.

2.9 MANUFACTURING PROCESS & TECHNOLOGICAL EQUIPMENT

The grinding process is adopted to improve granularity constitution of concentrated iron ore and make material fully blended and grinded so that it can be suitable for palletizing. The sophisticated disc palletizer is adopted to reduce circulating load and improve utilization efficiency. The characteristic of grate-annular cooler production process is as follows:

1. Drying and preheating roasting and cooling proceed in grate kiln and annular cooler respectively so its equipment is sample and reliable and product quality is even.

2. The equipment of roasting system with high adaptability to raw material can be individually controlled and flexibly regulated.
3. The consumption of fuel is low and power low as well.

The advanced air flow system is adopted, which fully reclaim-and utilize sensible heat of high-heat flue gas from annular cooler reduce heat rate of pellet with maximum utilization of heat energy. The main production process is controlled by PLC with high automatically. Exhaust gas with dust is purified and discharged by static de-duster to protect environment. Returned material and dust arrested are sent to stock yard and damp mill so as to resources can be fully re-utilized.

A stockyard has storage capacity sufficient amount of concentrated iron ore. Concentrate iron ore piled open in the stock yard and is delivered to a receiving bin by the help of shovel cars. The pressure filters separate iron ore as cake termed as filter cake, with about 10–11% moisture from the slurry and the filtrate is sent to the thickener for treatment and reuse. The filter cake is then conveyed to mixer where additives like limestone / dolomite, bentonite and coke breeze are added and mixed thoroughly.

The mixed material is conveyed to the bins mounted above the individual balling discs. The mixed materials are fed into balling discs to get uniform sized balls of 9–16 mm. These green balls/pellets are screened for size in a double deck roller screen. The right sized green balls are fed into the travelling grate of the indurating machine where these green balls are heat hardened. The dried pellets are preheated to a progressively higher temperature to initiate magnetite oxidation and sulphur burning due to coke breeze present in the mixture. The pellets are then fired at 1300°C to provide the recrystallization and slag bonding which imparts adequate strength to the pellets. Cooling of indurated pellets is accomplished by up-draughting ambient air through the pellet bed supplied by a cooling air fan.

The cooled pellets leave the indurating machine at a temperature of 100°C or less. The cooled pellets as a product are stored at stockpile.

2.9.1 POLLUTION CONTROL EQUIPMENT

One process ESP and dedusting bag filters are in operation, to control the dust emission level less than 50 mg/Nm^3 in the stack. All process dust & broken pellets generated is consumed within the pellet plant and are converted in the form of slurry and used as a raw material to the plant. Bag Filters are provided for material handling, coal grinding, flux grinding sections. ESP has been installed to mitigate the emissions from rotary kiln. Dust suppression system shall be installed at all requisite points in the plant. The chimney of suitable height (55 meters) has been provided with personal access for monitoring of stack emissions.

Waste water generated from Pelletization Process (Grinding System, Balling, Disc., Cooling, etc.) is being treated in the existing ETP & treated water is being reused into the Process. Effluent from raw water treatment facilities are treated in settling pond and taken to common basin. DM plant regeneration & CT blow down are neutralized and taken to common basin for reuse in ash handling and dust suppression. Cooling water in Pellet plant is completely recycled in closed loop.

The pellet plant is operating on zero discharge philosophy with respect to solid and liquid wastes.

3.0 DESCRIPTION OF ENVIRONMENT

The present report covers baseline environmental data generated within 10 km radius surrounding area from the project site which is the study area. The project site within 34.12 acres of land is termed as Core Zone and the surrounding area beyond Core Zone within study area is termed as Buffer Zone.

The baseline environmental data were generated during pre-monsoon season i.e., during March to May 2016 for meteorology, air quality, water quality, noise levels and soil characteristics, by setting up a number of monitoring stations. Further, existing ecological and socio-economic features were also studied. The collected data were analyzed for identifying, predicting and evaluating environmental impacts. The maximum anticipated impacts were assessed and based on which an environmental management plan has been drawn.

3.1 METEOROLOGY

The micro-meteorological data were collected regularly in the meteorological station, installed in the plant site. Meteorological parameters such as temperature, relative humidity, wind direction, wind speed are recorded continuously. The predominant wind directions observed during the month of March 2016 to May 2016 are W (14.5%), S (8.1%) followed by SW (8.0%). The prevailing calm condition has been observed 19.9%.

Table V: Summarized Meteorological Data for the Monitoring Period (Period: March – 2016 to May – 2016)

Month	Temperature (^{0}C)			Relative Humidity (%)			Visibility (km)			Rainfall (mm)
	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	
March 2016	39.0	20.0	29.3	86.0	6.0	36.0	4.0	3.5	4.0	4.4
April 2016	47.0	22.0	34.1	72.0	7.0	26.3	4.0	4.0	4.0	2.0
May 2016	44.0	23.0	34.4	75.0	8.0	32.9	4.0	4.0	4.0	14.2
Range	**20.0 to 47.0**			**6.0 to 86.0**			**3.5 to 4.0**			**2.0 to 14.2**

3.2 AMBIENT AIR

Eight (08) AAQ monitoring stations were established covering the predominant and downwind directions of the operating plant in the study area of 10 km radius. It is evident from the monitored results that maximum values for PM_{10}, $PM_{2.5}$, SO_2, NOx, CO & HC are in conformity with the norms of MoEF & CC.

AAQ results for pre monsoon season 2016 are observed as 42.96 – 84.54 µg/m^3 for PM_{10}, 16.02 – 37.45 µg/m^3 for $PM_{2.5}$, 4.27 – 14.18 µg/m^3 for SO_2, 9.43 – 27.56 µg/m^3 for NOx, and BDL for CO & HC. However an average value of PM_{10} was observed as 63.33 µg/m^3, $PM_{2.5}$ µg/m^3 as 25.25 µg/m^3, SO_2 as 8.17 µg/m^3 and NO_2 as 14.58 µg/m^3.

The AAQ result confirms that the background values are well within the norms. The pellet plant is in operation. Hence, it can be considered that the recorded values are inclusive effects of pellet plant and other industrial sources of such emissions in the study area.

Stack is also being monitored and Particulate Matter is reported to be within 32.80 mg/Nm^3 whereas the SOx and NOx are reported to be in the range of 80.00 and 24.00 mg/Nm^3 respectively.

3.3 WATER ENVIRONMENT

Eight (08) groundwater and four (04) Surface water samples were collected and tested as per IS 10500, IS 2296(Class C) and IS 1622 (Microbiological Testing) respectively. All the parameters are observed well within the prescribed norms.

Quality of ground water was compared with IS: 10500: 1991 (Reaffirmed 1993 With Amendment NO -3 July 2010) for drinking purposes. It was observed that all the physio chemical parameters and heavy metals from all the ground water samples are below stipulated drinking water standards. All the ground water samples analyzed can be considered fit for drinking purpose in the absence of alternate sources. It can be seen that water collected from pond at *Paraghat*, river *Lilaghar* and pond at project site can be compared with class B and can be used as drinking water source after conventional treatment and disinfection.

Bacteriological Examination of surface water indicates the presence of total coliform, which may be due to human activities observed during the study period.

3.4 SOIL

Soil samples were collected from eight (08) locations within the study area and analyzed. The soil samples show pH variation between 7.21 – 7.81. The observed values of exchangeable cations is good which favors the growth of plant species without amendment

of soil. The bulk density of the soil ranged between 1.28 – 1.58 g/cm^3, which indicate favorable physical condition for plant growth.

3.5 AMBIENT NOISE

Noise monitoring was carried out at eight (08) locations within the study area. Monitored noise levels meet the MoEF & CC norms specified for industrial, residential, and commercial areas barring a few values during night time.

The compiled noise levels during daytime and night time during the study period March-2016 to May-2016 is given in **Table – 03 – 21** in Chapter-3 of EIA Report. It can be seen that the night time Leq (Ln) varies from 36.66 to 44.50 dB (A) and the day time Leq (Ld) varies from 41.47 to 52.85 dB (A) within the study area. Low noise level is due to absence of any industrial activity in the area. The status of noise quality within the 10 km zone of the study area is, within the CPCB standards.

3.6 PHYSIOGRAPHY AND DRAINAGE

The drainage pattern of the site follows the general pattern of watershed i.e. dendritic. The surface run-off with respect to the site is in eastern direction. One sub-water shed is identified within the plant area. The operating plant site is located on an elevated mass at about 250 – 253 m above mean sea level indicates that flooding chance of site is negligible. The average annual rainfall in the region is 1351 mm. The estimated annual run-off volume from plant site is about 155507.84 m^3 per annum at present i.e., after construction of the pellet plant.

3.7 LAND USE / LAND COVER

Land use/Land cover pattern for pellet plant (10 km radius) was studied by utilizing three principal resources, namely, (i) Survey of India topo-sheet of 1:50,000 scale; (ii) Satellites imagery data without any cloud cover; and (iii) ground validation for the interpretation of the FCC imagery. **Table: VI** describes distribution of land area in hectares and percentage based on Census of India 2011 which has been illustrated in pie diagram in Figure 07 – 01 of EIA Report. The land use/land cover pattern can be more meaningful through a land-use map (Figure 07 – 02 in Chapter-7 of EIA Report).

The major share of the land in study area is under agriculture land and consists about 92.71 percent of the total study area. Water bodies i.e. Ponds is the second dominant land use type of the study area, and covers nearly 2.48 percent. Settlement covering in the study area is 2.08 percent. The open area in the study area is covering about 0.94 percent of the total study area. River i.e. *Lilagar* covers about 0.41 percent of the total area.

Table VI: Land use pattern in Study Area

Sr. No.	Description	Area (in Hectares)	Percentage share in
1.	Forest Land	449.85	1.38
2.	Agriculture Land	30305.73	92.71
3.	Settlement	681.44	2.08
4.	Water Bodies	810.78	2.48
5.	River	133.03	0.41
6.	Open Land	308.65	0.94
	Total	**32689.48**	**100.00**

3.8 ECOLOGICAL FEATURES

The Biological /Ecological study has been done within 10 km radius surrounding area from the proposed project site which is the study area. The proposed project site within 34.12 acres of land is termed as Core Zone and the surrounding area beyond Core Zone within study area is termed as Buffer Zone.

There is no major ecologically sensitive zone within the study area. Neither any corridor for the movement of wildlife, nor any other ecological sensitive areas located within the study area. However, a crocodile conservation site is present within the buffer zone of the project area known by the name Kotmisonar Crocodile Park which is about 4.5 km away from the proposed project site. This crocodile park is an artificially developed aquatic habitat for crocodile conservation. This is a manmade park created to avoid human-crocodile conflict. The crocodile park is on the other side of river as well as upstream of the river. Therefore no impacts on this park, due to the project are envisaged.

The nearest wildlife sanctuary, Achanakmar Wildlife Sanctuary is situated in Bilaspur district which is 55 km away from the proposed project site. One of the famous zoos named Kanan Pindari is situated 38 km away from the present project site.

The project site mostly contains plant area followed by plantation over the area.

Buffer zone of the study area comprises of fifty four tree species, twenty seven shrub species and forty nine herb/climber species. The dominant tree species in the buffer zone are Butea monosperma, Acacia nilotica, Terminalia tomentosa, Albizia lebbeck, Terminalia arjuna, Madhuca indica and Terminalia bellerica. Shrubs in the buffer zone comprised of mostly Lantana camara, Ziziphus mauritiana, Jatropha curcas, Calotropis procera, Ipomoea fistulosa, Nerium oleander and Argemone mexicana whereas the ground flora of buffer zone is dominated with Cynodon dactylon, Chenopodium album, Euphorbia hirta, Ocimum tenuiflorum, and Cissus repanda.

The major part of the study area lies under agriculture field and human settlements which restricted the wildlife habitat significantly. Most of the mammalian species reported in the study area are wild boars, squirrels and Indian hare and domesticated animals.

There are many small ponds present in the buffer zone of study area which are the major attraction sites for avifauna. Common Maina, Kingfisher, Spotted dove, Pintail and Pond Heron are some dominant bird species present in the study area. There is no migratory movement of birds in the study area. As far as the reptiles' community was concerned, rat snake, python, karait, and house lizard are reported from the study area.

3.9 SOCIO-ECONOMIC ENVIRONMENT

The study area within 10 km radius of the existing Pellet plant of M/s Rashi Steel & Power Ltd. is spread over in four districts of Chhattisgarh state. These districts are Bilaspur, Raipur, Durg and Jangir Champa. While the major portion of the study area falls in district Bilaspur a small portion each is stretch out in district Raipur, Durg and Jangir-Champa. The Sub-districts (Tehsils) falling in the study area are Masturi, Thakatpur, Lormi and Bilaspur in district Bilaspur, Bhatapara in district Raipur, Dhamdha in district Durg and Jangir in District Jangir-Champa.

The study area is dotted with 56 villages. Masturi and Akaltara are the nearest towns and fall outside the 10 km radius of the RSPL boundary while Bilaspur is the other nearest town.

The average distance between a village and the nearest town is approximately 18 Km. Masturi is the nearest town from village Paraghat located at a distance of 6.5 kilometers. Besides agricultural land and settlements other important landuse/ land cover patterns are open scrub land, river, barren wasteland, other natural vegetation, water bodies, wells etc, road, railway lines, National Highways, etc.

- The total population of the study area is 113889, of which 50.79 percent are male and the remaining 49.21 percent are female.
- Again, of the total population 31.80 percent are Scheduled caste and 11.41 percent are Scheduled Tribe. Gondas, Bhaina, Bhattara, Binjhwar, Karku, Khairwar, Mawasi, Nagesia, Pradhan, Pardhi, Parja, Saonta and Sonr, are the important tribes found in the area.
- The number of literate persons in the study area is 70158, which constitutes 61.60 percent of the total population. Of this male shares 36.29 percent and female 25.31 percent
- The total number of workers in the study area is 55897 of which 56.98 percent are male and the remaining 43.02 percent are female.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 IMPACT DURING CONSTRUCTION PHASE

The project site (34.12 acres) is under possession of M/s Rashi Steel and Power Limited and the plant is in operation. Approach road to site already exists. Internal access roads within the plant area have been laid. The direct and indirect impacts due to the above activities already occurred, and are discussed in the report. The impacts were restricted within the plant site for a short duration and no evidence of their occurrence is cited afterwards.

4.2 IMPACT DURING OPERATION PHASE

4.2.1 IMPACT ON AIR ENVIRONMENT

The principal impacts on ambient air quality due to operation of the existing units is due to emissions from the stacks of the Pellet unit and emissions of fugitive dust from the iron ore and coal handling areas. The pellet plant has three (03) stacks to meet the process requirement. ISCST model has been used to predict Ground Level Concentrations (GLC) of PM, SO_2 and NO_X. The impact has been predicted over a 10 km radius area with the location of the stack as the center. The predicted GLCs (Contribution by the Pellet plant units) of PM, SO_2 and NO_X occurred in the downwind distance are 3.619, 11.74 and 7.759 $\mu g/m^3$ respectively.

The monitored maximum background pollutant concentrations in the study area in ambient air for pre monsoon season are 84.10 $\mu g/m^3$ for PM, 12.77 $\mu g/m^3$ and 27.11 $\mu g/m^3$ for SO_2 and NO_X respectively. Generally, the predicted GLC values are added to the measured ambient background values to get the resultant GLC values for comparison. In this case, the plant is already in operation and the monitored background values are inclusive of the existing pellet plant emissions, which are well within the MoEF & CC norms for residential and rural areas.

AAQ results for pre monsoon season 2016 are observed as 42.96 – 84.54 $\mu g/m^3$ for PM_{10}, 16.02 – 37.45 $\mu g/m^3$ for $PM_{2.5}$, 4.27 – 14.18 $\mu g/m^3$ for SO_2, 9.43 – 27.56 $\mu g/m^3$ for NOx, and BDL for CO & HC.

4.2.2 CONTROL OF GASEOUS RELEASE

There are three number of stacks installed at plant. Out of Two, One is related to process. The dust generated from the feed end and discharge end are connected to scrubbers, and the scrubber water containing iron ore is reused as a raw material in the pellet plant. The process gas generated at induration due to burning of coal/furnace oil passes through ESP. The dust collected at ESP are converted into slurry and reused in the plant as raw material. Hence, air pollution from process is not expected.

4.2.3 MITIGATION MEASURES FOR FUGITIVE EMISSION

The process is mainly wet process and does not generate much dust emission. However, fugitive emissions due to transportation and material handling are unavoidable. The measures implemented at the plant site are as follows:

- The raw material handling and product handling areas are equipped with dust suppression systems like water sprinklers and high pressure water cannons.
- Low pressure water sprinklers at roads.
- Product and raw material trucks are covered with tarpaulins to avoid dust and spillage.
- The ESP dusts are collected in hopper and converted into slurry and reused in the system.

4.3 IMPACT ON WATER ENVIRONMENT

Initial Water requirement for the Pellet project is 670.00 KLD for and out of which 270.00 KLD is being recycled after adequate treatment therefore net water requirement is 400.00 KLD during the operation phase. The required water will be from surface water i.e. from ground water and *Lilagar* River also.

The company has obtained permission from Govt. of Chhattisgarh to draw water. A reservoir is constructed inside plant. Estimated make up water requirement to replenish the process and treatment losses for the facilities.

Total Plant Raw Water Requirement (KLD)

Items	Total water requirement
Pelletization process (make – up water)	380
Domestic use & Misc.	20
Total	**400**

M/s RSPL has adopted maximum recirculation/reuse of waste water in normal circumstances. However in case of abnormal condition occasionally small quantities of waste water have to be discharged to prevent build up of excess dissolved solids in circulating water.

During the monsoon, requirement of water for dust suppression and green belt irrigation will be significantly reduced. Hence excess water will have to be discharged. This waste water will mostly contain salts of Calcium and Magnesium and suspended solids already present in the raw water. All the blow down water is taken to the blow down tank and then used for irrigation, dust suppression etc.

Moreover, the waste water quality will be well within the stipulated norms.

4.4 IMPACT ON SOLID WASTE

The major solid wastes generated from the various facilities of Pellet plant are as below:

Sl. No	Process Unit	Solid waste	Quantity Ton / Annum	Mode of disposal
1.	Pellet Plant	Iron Ore Fine Dust:	171.5 TPD /56628 TPA	Reused in Pellet plant.

No solid waste is generated from the plant. Hence, no adverse impact on the land environment is anticipated.

4.5 IMPACTS ON NOISE LEVELS

Noise is generated due to continuous operation of the rotating machines like discs, grinding mil, machineries like blowers, fans, cooling tower fans and compressors.

The noise level within the plant is in the range of 42.60 – 53.80 dB (A). Acoustic enclosures, hoods, laggings, silencers and screens are provided for above equipment so that the sound pressure exposure in working areas is restricted below permissible limit of 90 dB(A). Suitable devices like ear muffs are provided to the personnel exposed to higher noise levels.

The noise levels in the public domain are not increased due to plant operations as a buffer of green belt is kept between the plant boundary and the public domain. Additional plantation is envisaged to increase the density will also have more green cover and expected to further attenuate the noise level.

5.0 RESOURCE

5.1 SURFACE WATER

The company has obtained permission from Govt. of Chhattisgarh to draw water from *Lilaghar* River. However there is no surface water used for the operation process of the pellet plant.

5.2 GROUND WATER

Utilization of groundwater for project process requirement is estimated as 400 m^3/day only. Company has obtained permission of ground water withdrawal for CGWA.

5.3 RUN-OFF ESTIMATION

To estimate the run-off, the IMD rainfall data of 1351 mm is considered. The annual average run-off volume increased from 93312.35 m^3 (pre-construction scenario) to 155507.84 m^3, showing an increase of nearly 60% in post construction scenario. The settling tanks with suitable size are contemplated on the plant sub-watershed to control the run-off during flood.

Substantial number of solar energy based illumination system will be installed at plant and approach roads.

5.4 RAINWATER HARVESTING

Considering water conservation as part of environmental study, it has been planned to harvest the rainwater to the maximum extent. About 353 m^3/yr is planned to be harvested.

5.5 PLANTATION PROGRAMME

The pellet plant has a lush green cover which is helpful in reducing the pollutants in the atmosphere and attenuating the noise and as well as enhancing the aesthetics and beauty of the site.

Considerable amount of fresh saplings have already been planted at the boundary of the plant site. All saplings are of mixed plantations of native species. No attributable environmental impact has been observed due to operation of pellet plant.

6.0 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

6.1 TECHNOLOGY

The major indurating processes developed for thermal treatment of green pellets are Shaft furnace process, Grate-rotary hearth-shaft furnace process, Annular furnace process, Circular indurating furnace process, Travelling grate process and Grate-kiln process.

Amongst the above pellet making processes, the travelling grate technology is most advanced one and suitable for low-grade iron ore pelletisation. Hence, the same technology was adopted and the plant is in successful operation.

6.2 SITE

The allotted area of 34.12 acres had several favorable criteria like readily available land, uninhabited, suitable topography and geology for plant construction, good accessibility through road and rail, availability of power & water sources at convenient distance, suitable seismic zone, and major steel plants are located within the vicinity of the plant. Further, in

the vicinity of 10 km radius of site neither archeologically important heritage monuments nor declared biodiversity parks/ sanctuaries are observed.

In view of the above, the site was accepted by M/s RSPL. Hence, consideration of any other alternate site has not been contemplated.

7.0 ENVIRONMENTAL MONITORING PROGRAM

All necessary steps are being taken to implement the measures suggested by Chhattisgarh Pollution Control Board & CPCB and the Charter on Corporate Responsibility for Environmental Protection (CREP) for Iron and Steel Industry.

The environmental cell of pellet plant regularly monitors meteorology, air quality, noise, water quality, emissions from stacks, effluents, as per the norms.

7.1 MONITORING SYSTEM

A structured and certified Environment Monitoring System is suggested at the industry level for ensuring that all activities, products, and services conform to the environmental requirement. The Environment Management Cell will be responsible for managing following activities related to environment function of proposed Pilot Plant:

- Coordinate and manage the EMP implementation during operation phase
- Appoint dedicated environment staff to manage environmental monitoring responsibilities
- Manage and coordinate environmental monitoring and control
- Coordination with other sections of the plant and government agencies in relation to environmental management activities
- Implement and monitor greenbelt development and plantation activities
- Safety specialist will ensure safe working practices in all the sections of the plant

Cost: Existing Facilities for pollution control equipments & fire and explosion system, will be utilized. Other than the above the annual recurring cost for monitoring and green belt maintenance will be about Rs 15.0 lakhs excluding manpower.

8.0 ADDITIONAL STUDIES

Total 56 Nos. of villages have been identified within the study area. The total population within the study area of 10 km radius is about 113889 as per 2011 census. Medical experts for M/s RSPL employees under both contract and regular employment have carried out health survey study. From the survey, it is evident that people are generally affected by common communicable diseases like cough, coryza, and simple headache, which are not due to the impact of pellet plant.

Socio-economic study reveals that the economy of the study area is dominated by agriculture. However, the existing plant is not going to affect the prevailing rural agrarian economy of the study area.

The project has significant direct as well as indirect employment opportunities and associated allied activities.

9.0 RISK ANALYSIS

The risk assessment has been carried out to identify and assess the risks as a result of accidental release of chemical. The chemical inventory quantity does not exceed or equals the threshold values mentioned in MSIHC.

Hence, M/s RSPL pellet plant project does not fall under a Major Accident Hazardous (MAH) unit. Pool fire is considered for Furnace Oil.

Risks likely to pose a risk to man, environment or property associated with various activities are addressed in this report. Such activities include transport, storage; handling and usage of materials. Precautionary measures to be taken for preventing any hazards due to any materials are proposed in the report. During detailed engineering it will be ensured that the all materials are placed in such a way that its impact will not go beyond the plant boundary.

The following precautions will also be taken:

- Suitable fire protection system comprising hydrants and spray systems will be provided for fire protection. Fire extinguishers will be tested periodically and to always be kept in operational mode.
- Surrounding population (including all strata of society) will be made aware of safety precautions to be taken in case of any mishap in plant.
- On-site disaster management and off-site emergency plans, commands communication and controls will be established and maintained.
- Adequate provisions like emergency response, response organization, response plan, material safety data sheet, command & control, capabilities, transportation, medical facilities, mitigation measures, training, education, public awareness emergency plan review etc. to control any disaster situation will be made available.

10.0 PROJECT BENEFITS

For pellet plant, a preliminary roadmap for community development to the tune of ₹ 60.00 lakhs has been spent till date. Major amount has been spent for construction of additional classrooms and science laboratories in the neighboring schools, periphery development and road development, developing social forestry, training facility, supporting drinking water supply scheme to the nearby villages and other amenities.

M/s RSPL commits for social welfare activities as per CSR norms contributing in terms of financial resource and job opportunities.

11.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

The cost envisaged for pollution control measures like dust suppression, scrubbers, ESP, water treatment plant are already included in the capital cost. Cost towards environmental monitoring facilities is additionally included. In the analysis of capital cost, recurring cost is also included to understand the yearly expenditure.

The project has allocated sufficient funds towards pollution control measures, which is amounting to ₹ 3.30 crores. The recurring cost is to the tune of ₹ 0.615 crores/year.

12.0 ENVIRONMENTAL MANAGEMENT PLAN

An Environment Management Cell (EMC) is constituted for M/s RSPL to coordinate with the plant management. EMC is reviewing and monitoring the progress of Environment Management Plan implementation. M/s RSPL pellet plant in-charge is heading the cell and, if necessary, the cell may invite experts from within the plant or outside.

Considering the importance of the pollution control and environmental protection, a set of personnel is identified from Infrastructure, construction, technical, operations, maintenance, industrial safety, waste management, human resource and contract and material management wings of the project, who will also work for implementation of various components of EMP such as the maintenance and operation of pollution control systems, monitoring of pollutants and development of green cover.

12.1 GREEN BELT DEVELOPMENT

The existing complex of M/s RSPL has adequate green belt (11.25 Acres) of all along its perimeter. New trees are being planted to strengthen the existing green belt.

12.2 CSR ACTIVITY

M/s RSPL is already taking the responsibility for community development work at the village level so as to improve the quality of life. Development of infrastructure, educational and health facilities will be further strengthened as a part of existing CSR activities.

13.0 CONCLUSION

The state-of-art technology has been adopted in the plant design, so as to meet the air emission norms, zero discharge of liquid effluent and acceptable noise levels. Further, maximum re-use and re-utilization of effluent, in-built rainwater harvesting system to reduce freshwater consumption, wherever possible are also envisaged.

The EIA report has highlighted all the potential environmental impacts associated with the plant. Site specific and practically suitable mitigation measures are recommended to mitigate the impacts. Further, a suitably designed monitoring is already in place to monitor and control the effectiveness of mitigation measures implemented during the operation phase.

From the foregoing studies, it can be concluded that the operating pellet plant is benign to the environment. The plant is also important for our nation to convert iron ore fines to a value added product, there by extending the availability of iron ore for the future generations.

The plant is technically viable, environmentally friendly and highly beneficial to the nation.