

1.0 EXECUTIVE SUMMARY

1.1 Introduction

Tata Steel Limited proposes to install 0.75 Million Tonnes Per Annum (MTPA) of Crude Steel Production through Electric Arc Furnace (EAF) at Industrial Plot A-1, Kadiana Khurd village, adjacent to Hi-Tech cycle valley, Ludhiana (East) Tehsil, Ludhiana district of Punjab on land measuring about 46.5 ha (115 acres). The estimated project cost of proposed steel plant and rebar mill is about Rs. 2590 crores.

1.2 Identification of the Project and Project Proponent

1.2.1 Project Proponent

Tata Steel group is among the top global steel companies with an annual crude steel capacity of 34 million tonnes per annum. It is one of the world's most geographically diversified steel producers, with operations and commercial presence across the world. The group recorded a consolidated turnover of US \$32.83 billion in the financial year ending March 31, 2022.

1.2.2 Identification of Project

Tata Steel Limited proposes to install 0.75 Million Tonnes Per Annum (MTPA) of Crude Steel Production through Electric Arc Furnace (EAF) based Steel Melting Shop (SMS) and Rebar Mill. The proposed plant is based on advanced process technology and equipped with the most efficient auxiliary sub-systems, material handling facilities along with pollution control equipment.

1.3 Environmental Setting

The environmental setting of the proposed project site is given in **Table- 1.1**.

TABLE – 1.1
DETAILS OF ENVIRONMENTAL SETTING

Sr. No.	Particulars	Details																					
1	Location	Industrial Plot A-1, Kadiana Khurd Village (Adjacent to Hi-Tech valley), Ludhiana (East) Tehsil, Ludhiana District, Punjab																					
2	Elevation above MSL	250 m above MSL																					
3	Topo Sheet	H43D16, H43E4, H43J13. H43K1 <table border="1" data-bbox="767 1753 1358 1984"> <thead> <tr> <th>Sr.No</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>30°56'50.91"N</td> <td>75°59'16.38"E</td> </tr> <tr> <td>2</td> <td>30°56'49.41"N</td> <td>75°58'48.88"E</td> </tr> <tr> <td>3</td> <td>30°56'42.66"N</td> <td>75°58'39.07"E</td> </tr> <tr> <td>4</td> <td>30°56'32.18"N</td> <td>75°58'33.29"E</td> </tr> <tr> <td>5</td> <td>30°56'19.03"N</td> <td>75°58'23.51"E</td> </tr> <tr> <td>6</td> <td>30°56'16.23"N</td> <td>75°58'29.69"E</td> </tr> </tbody> </table>	Sr.No	Latitude	Longitude	1	30°56'50.91"N	75°59'16.38"E	2	30°56'49.41"N	75°58'48.88"E	3	30°56'42.66"N	75°58'39.07"E	4	30°56'32.18"N	75°58'33.29"E	5	30°56'19.03"N	75°58'23.51"E	6	30°56'16.23"N	75°58'29.69"E
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Sr. No.	Particulars	Details			
		7	30°56'45.80"N	75°59'20.01"E	
4	Nearest highway	NH-44 (9.3 Km, SW) NH-5 (6.6 Km, S) SH-54 (4.0 km, NW)			
5	Nearest IMD	Ludhiana (12.2 km, WSW)			
6	Nearest railway station	Ludhiana railway Station (12.2 km, WSW) Dhandari R.S (9.3 km, SW)			
7	Nearest airport	Ludhiana (9.3 km, S)			
8	Nearest villages	Kharina Khurd (0.2 km, N)			
9	Nearest town/City	Ludhiana (5.8 km, SW)			
10	Archaeologically important places	Nil within 10 km of the study area			
11	National parks / Wildlife sanctuaries	Nil within 10 km of the study area			
12	Defence Installations	Nil			
13	Reserved/ Protected forests	Mattiwara R.F (2.6 km, N) Haidarnagar PF (5.4 km, NE) PF near Bora (4.9 km, NE) Chaunta Mand P.F (8.1 km, NE) PF near Jiwanpur (13.9 km, E) Ludhiana RF (14.3 km, W).			
14	Water bodies	Satluj River (6.0 km, N) Buddha Nala (0.7 km, S) Sirhind canal (14.9 km, SE) Sirhind Canal (Sidhwan Branch)(13.5 km, SW)			
15	Nearest seaport	1042 km, SW			
16	List of industries	Budhewal Cool Sugar Mills Ltd (4.8 km, SSE) Mukesh Udyog Ltd (Spinning Mills) (5.6 km, SSE) Allied Recycling Ltd (6.0 km, SSE) Venkys India pvt. Ltd (7.0 km, NW) Youngman Woolen (6.9 km, W)			
17	Seismicity	Zone-IV			

*Aerial distances are taken into consideration

1.4 Resource Requirement

1.4.1 Land Requirement

The Total land requirement for the proposed steel plant is 46.53 ha (115 acres). The proposed built-up area of Plant is envisaged on 14.93 ha (36.9 acres) and the remaining 31.6 ha (78.1 acres) will be utilized for greenbelt development 15.36 ha (37.95 acres), water reservoir 0.25 ha (0.63 acres) and Infrastructure 15.99 ha (39.52 acres). The total land i.e 46.53 ha has been allotted by Punjab Small Industries & Export Corporation to TSL.

1.4.2 Water Requirement

The estimated water requirement for the proposed project during operation phase is 6,000 KLD and during construction phase is 600 KLD. The source of water is from dedicated reservoirs in the Industrial Area of Punjab Small Industries & Export Corporation limited (PSIECL) that is fed from nearby canals set up by the Irrigation Department.

1.4.3 Power Requirement

The total power requirement of the proposed project is about 90.1 MW. It will be sourced from nearest grid sub-station of Hi-Tech Valley Park for supplying power to the 220/33 kV main receiving sub-station (MRSS) to be installed in plant premises.

1.4.4 Man Power Requirement

The proposed project will be operating with skilled and semi-skilled personnel. The total number of employment during construction phase is 2500 (Permanent employment - 40 Contractual employment - 2,460) and during operation phase the total employment would be 450 (Permanent employment - 300; Contractual employment- 150).

1.4.5 Raw material Requirement

The details of raw material requirement, source and mode of transportation are given in **Table - 1.2**.

TABLE - 1.2
DETAILS OF RAW MATERIAL AND SOURCES

Sr.No	Material Handling	TPA	Source	Mode of Transport	Distance from Source
1	Scarp	840000	SRB Rohtak, Haryana, Local market Imported (if required)/Open Market	Road	
2	Lime	25000	Import/ Multiple domestic Source/Open Market	Road	1000
3	Dolomite	11000	Import/ Multiple domestic Source/Open Market	Road	500
4	Coke	8500	Import/ Multiple domestic Source/Open Market	Road	3000
5	CaF ₂	1000	Import/ Multiple domestic Source/Open Market	Road	800
6	FE-Alloy	16000	Import/ Multiple domestic Source/Open Market	Road	5200

Source: Project Report TSL

1.5 **Process Description**

Electric Arc Furnace: Scrap will be pre-heated to 500-600°C and melted through electrical heating using Carbon Electrodes. Oxygen is blown into the scrap, combusting or cutting the steel, and extra chemical heat is provided by wall-mounted oxygen-fuel burners. The scrap-charging and meltdown process will be repeated as many times as necessary to reach the required heat weight. Once the temperature and chemistry are correct, the steel is tapped out into a preheated ladle by tilting the furnace. After tapping of Steel, Slag will be tapped in opposite side to furnace. Slag can be tapped directly on floor and dispatched to dedicated slag processing area.

Ladle Furnace: The ladle furnace (LF) makes it possible to divide the steel melting operations, carried out in EAF, from those of treatment and refining. The liquid steel produced by the EAF is poured into the ladle, which serves as a reactor for metallurgical operations at the treatment stations. The ladle is transported under the LF hood, where alloying and reheating operations are performed to target values for the next process station.

Continuous Caster: Once the steel chemistry and temperature are achieved at LF station, the Ladle with liquid steel will be placed on Turret arm of Continuous Billet Casting machine via EOT crane. Casting process starts once liquid steel reaches to the Mould.

Rebar Mill: The proposed scheme is to position and install the Rebar Rolling Mill at downstream of the continuous casting equipment in alignment with the casting line to directly roll output casted bloom from the one-line/single strand high-speed caster. In the proposed concept, the rolling mill will receive the bloom at the plastic deformation temperature at a uniform rate to perform the rolling / deformation of the stock for the required sizes where, asking rate of the mill has been matched by output of the caster. An active furnace equipment will be installed in between the continuous casting line end and mill entry for heating, equalizing and holding said bloom to a predetermined rolling temperature which will be controlled and ensured by the caster process control. Two-strand rebar mill has been proposed, after slitting where the output products range is TMT retail and TMT products.

1.6 Baseline Environmental Status

1.6.1 Land Use

As per satellite imagery, the study area of 10 km radius comprises the built-up land of about 18.7 %, forest land (Scrub Forest land) occupies 4.9 %, agricultural land about 61.2 %, water body is 8.7 % and remaining land is waste land is 6.5 %.

1.6.2 Soil Characteristics

The total 11 nos of soil samples are collected during the study period and physical and chemical characteristics are analyzed. The textural classes of the soil samples are clay, silty clay loam to silty clay. The bulk density of the soil samples range between 1.1 to 1.23.

The Electrical Conductivity (EC) of soil samples range between 101.9 to 205 $\mu\text{s}/\text{cm}$. The available nitrogen content in samples as per analysis range between 151.9 to 229.5 kg/ha. The phosphorus content of soil samples range between 58.7 to 97.7 kg/ha. The Potassium content of soil samples range between 366.9 to 816 kg/ha.

1.6.3 Meteorology

During the study period the temperature in the study area ranges from 5°C to 34°C. Relative Humidity ranges from 51% to 89%. The predominant winds are mostly from NW (23.6%) followed by NE (4.1%) & SW (2.9%).

1.6.4 Ambient Air Quality

Ambient Air Quality (AAQM) was carried out at 11 locations with a frequency of two days per week for three months during post monsoon (October to December 2022) as per CPCB standards.

The minimum and maximum concentrations for PM₁₀ were recorded as 52.9 µg/m³ and 74.1 µg/m³. The minimum and maximum concentrations for PM_{2.5} were recorded as 31.4 µg/m³ and 45.3 µg/m³.

The minimum and maximum SO₂ concentrations were recorded as 8.1 µg/m³ and 15.0 µg/m³. The minimum and maximum NO₂ concentrations were recorded as 13.9 µg/m³ and 23.8 µg/m³. The minimum and maximum CO concentrations were recorded as 303 µg/m³ and 508 µg/m³.

The concentrations of PM_{2.5}, PM₁₀, SO₂, NO₂, O₃, CO, NH₃, Pb, BaP, As, Ni and C₆H₆ are observed to be well within the NAAQ standards prescribed by Central Pollution Control Board (CPCB) for industrial and rural /residential zone.

1.6.5 Water Quality

Nine water samples consisting of bore wells and dug wells (ground water sources) and four surface water sources covering 10 km radial distance from the proposed plant boundary were examined for physico-chemical, heavy metals and bacteriological parameters in order to assess the effect of operations from plant and other activities on surface and ground water quality.

Surface Water:

The analysis results of water samples indicate that the pH value was observed to be 7.37 – 8.31. Electrical conductivity of water samples was observed to be 289 - 1062 µS/cm. The total dissolved solids were observed to be 179 - 1062 mg/l. Total hardness was observed in the range of 105.3 to 265 mg/l. Sulphates were found to be in the range of 21.2 to 132.7 mg/l and Nitrates were found to be in the range of 2.9 – 9.8 mg/l. Fluoride concentration was found to be 0.25 – 0.43 mg/l.

Ground Water:

The analysis results of ground water samples showed the pH in range of 7.2 – 8.44. Turbidity of the samples ranged from 2 - 5 NTU whereas the prescribed limit is 1 to 5 NTU.

Electrical conductivity of the samples ranged from 487 - 3220 µS/cm. The total dissolved solids of the samples ranged from 305 - 2053 mg/l. Calcium concentrations ranged from 42.5-166.3 mg/l. Magnesium concentrations ranged from 12.1 to 52.3 mg/l. The total hardness of the samples ranged from 156-549 mg/l. Chlorides concentrations at all the locations ranges 64.5 – 687.5 mg/l.

1.6.6 Noise Quality

The noise monitoring has been conducted for determination of noise levels at twelve locations in the study area. The noise levels at each of the locations were recorded for 24 hours for October 2022.

The day time noise levels at all the locations were observed in between 71.2 to 46.5 dB(A). The night time noise levels were observed in between 69.3 dB (A) to 38.4 dB (A).

1.6.7 Flora and Fauna

There are no eco sensitive areas like National Park, Wild Life Sanctuary, Elephant/ Tiger Reserves or Wild Life Corridors and/or breeding or nesting grounds and/or Eco-sensitive Zones or Biosphere Reserves or Ramsar Wetlands either within the Core Zone (project site) or within the zone of influence (ZoI) say Buffer Zone i.e. within 10 km radius (aerial distance) of the project boundaries. During the site visit 11 no's of plant species, 1no's of mammal, 1 no's of amphibia & 20 no's of birds are observed.

1.6.8 Socio-Economic Status

As per 2011 census records, the study area consists 87 habitations (86 rural and 1 urban) having population of 1,58,646 persons. The configuration of male is about 53.31% and female is about 46.69% of the total population. The study area has total households of 31,529 with an average household size of 5 persons. The study area child sex ratio (0-6 age group) is 865 female children per 1000 male children. The overall literacy rate is 76.06% as per 2011 census records which is lower than the district literacy rate that is 82.20% but slightly higher than the state literacy rate that is 75.84%. Total work participation in the study area is only 37.03% and the non-workers constitute 62.97% of total population.

1.6.9 Traffic study

Traffic survey is essential for appreciating the traffic characteristics in term of volume, hourly variation, traffic composition, peak hour share and direction slit. The survey was conducted on major roads around project site. A total of five location are selected for conducting traffic survey. The Passenger Car Unit (PCU) recorded at the selected traffic locations to is about 15786 PCU/24 Hours (To & From). The minimum PCU is 191 PCU/24 Hours at Plant site road and maximum 8318 PCU/24 Hours recorded at Ludhiana-Chandigarh State Highway.

1.7 Anticipated Environmental Impacts and Mitigation Measures

The proposed plant comprises of various activities each of which may have an impact on some or other environmental parameters. Various impacts on the environment parameters have been studied to estimate the impact on the environment and are discussed briefly below and elaborated in the subsequent sections.

1.7.1 Impact on Land Use and Soil Quality

The total plant area is 115 acres (46.5 ha), consisting of 100% Government land and project area consists of 90% agriculture rain fed single crop and 10% fallow land. Proposed site does not involve any forest area. Clearing of trees/shrubs at some locations is required during construction phase. The proposed plant built-up is envisaged on 14.93 ha (36.9 acres) and the remaining 31.6ha (78.1 acres) will be utilized for green belt development, water reservoir, and other future use. The present land use will be converted into industrial land use. This will be an irreversible change.

Mitigation Measures:

- After completion of the construction phase, the surplus earth will be utilized to fill up the low-lying areas, the rubble will be cleared and all un-built surfaces will be reinstated;
- The top soil from the excavated areas will be preserved in separate stacks for re-use during the plantation;
- Green belt development and related activities will be taken up so that plantation will grow to adequate height by the time of plant commissioning. Thus, green belt will be effective in containing the fugitive emissions during operation, if any;
- Species selected in this plantation will be native, fast growing with rich canopy and they will be easily adaptable to local conditions. Their ability to combat localized pollution is the prime factor for their selection and placement in the planting grid/pattern. Most of the varieties will be eco-friendly i.e. generate lot of oxygen while helping reduce/absorb gases and dust;
- Entire plant will be aesthetically landscaped and natural gradient will be maintained to the extent feasible;
- There will be minimum concreting of the top surfaces so that there is a scope for maximum ground water recharge due to rainfall; and
- Plantation outside the plant premises, in the nearby villages will be encouraged by supplying free saplings to the villagers.

1.7.2 Impact on Air Quality

During construction phase, particulate matter will be the main pollutant, which would be generated from the site development activities and vehicular movement on the road. Further, concentration of NO_x and CO will also increase due to increased vehicular traffic movement. However, the increase in ambient concentrations of air quality will be negligible. As most of the construction equipment will be mobile, the emissions are likely to be fugitive and well dispersed. The dust generated will also be fugitive in nature, which can be controlled by sprinkling of water.

The impact on air quality is assessed based on emissions of the Proposed 0.75 MTPA of Crude Steel Production through EAF project. Particulate matter (PM₁₀ & PM_{2.5}) sulphur dioxide (SO₂), Nitrogen Oxide (NO₂) are the important pollutants

emitting from the proposed project. For prediction of maximum Ground Level Concentrations (GLC's), the air dispersion modeling software (AERMOD) was used. The modelling has been executed in two following scenarios.

Scenario-I: Proposed 0.75 MTPA Crude steel Production through EAF Ludhiana

The maximum predicted incremental Ground Level Concentration (GLC's) for PM₁₀ due to the proposed plant is observed to be 10.46 µg/m³ occurring at a distance of 1.48 km towards SE direction, whereas for PM_{2.5} the maximum incremental GLC's is around 2.12 µg/m³ and for NO_x and SO₂ the predicted incremental GLC's are found to be 1.65 µg/m³ & 0.05 µg/m³ respectively.

The incremental concentrations (Maximum GLC) when superimposed over the existing baseline concentrations, the resultant concentrations are observed to be well within the permissible levels for residential/rural conditions.

Scenario-II: Cumulative Impact Assessment considering the proposed project with existing/proposed Industries within 10 km radius.

Based on the observations the predicted cumulative GLC's of PM₁₀ and PM_{2.5} are respectively 22.0 µg/m³ and 8.81 µg/m³ occurring at 2.17 km in SE direction due to the activity of proposed Crude steel plant of TSL and Grasim Paint Industry. Whereas, for NO₂ the maximum predicted cumulative GLC of 27.50 µg/m³ occurs at 3.49 km towards ESE due to the activity of proposed Grasim Paint Industry and SO₂ the maximum predicted cumulative GLC's of 17.90 occurs at 5.55 km in SSW direction due to the activity of Allied Recycling Ltd.

Mitigation Measures:

- Raw material handling areas are major source for fugitive emissions. Most of the time, sources of fugitive emissions will be the transfer and junction points, product hopper area and loading points. Bag filter will be provided with appropriate suction devices to control the fugitive emissions.
- In areas where provision of bag filter and other control device is not feasible, water-spraying arrangements will be made.
- Adopting good housekeeping practice will also help in control of fugitive emission. Maintaining shop floor and roads in good condition minimizes the chance of fugitive emission.
- The trucks and other vehicles will be maintained and serviced regularly to reduce air emissions.
- Usage of respiratory protective equipment by all employees to be ensured.

1.7.3 Impact on Water Quality

The estimated water requirement for the proposed project during operation phase is 6,000 KLD and during construction phase is 600 KLD.

The source of water is from dedicated reservoirs in the Industrial Area of Punjab Small Industries & Export Corporation limited (PSIECL) that is fed from nearby canals set up by the Irrigation Department.

Impact on Surface Water Resources

Water used from the various process of the plant is mainly from indirect cooling circuits which are not normally contaminated with any pollutants. Wastewater generated from process is treated in proposed CETP and reused for plant process. Hence, the impact on the surface water quality is not envisaged.

Impact on Ground Water Resources

No ground water is abstracted as the required water will be met from PSIECL dedicated reservoirs in the Industrial area. Hence, no impact on ground water is envisaged.

1.7.4 Impact on Noise Environment

The main noise generating sources from the proposed crude steel plants are Electric Arc Furnace and DG sets. The noise levels at the sources for these units are in the range of 75-125 dB(A). For an approximate estimation of dispersion of noise in the ambient from the source point, a standard mathematical model for sound wave propagation is used. It was observed from the modeling results that high noise levels ranging between 25.6-73.2 dB(A) are limited to work zone only. At the corners of the plant boundary, noise levels will be 18.3 dB(A). As per model results the resultant noise levels due to the proposed plant will be <55 dB (A) at the plant boundaries in all the directions. Day and night sound pressure levels L_{dn} is often used to describe the community noise exposure, which includes 10 dB (A) night time penalty. The predicted noise levels at a distance of 0.5 km and above would be less than <50.0 dB (A).

Mitigation Measures:

In the process, various equipment's like EAF, compressors, DG sets etc generate the noise. The recommendations to mitigate higher noise levels are:

- All the design/installation precautions as specified by the manufacturers with respect to noise control will be strictly adhered to.
- High noise generating sources will be insulated adequately by providing suitable enclosures, acoustic louvers, slots, etc.,
- Air compressors, DG sets, transformer etc., will be provided with acoustic enclosure.
- Furnace operators will be protected by enclosing the source of noise with sound-deadening material or by providing sound-proofed shelters.
- Provision of adequate thick greenbelt to attenuate the noise levels; and
- Provision of earplugs to the workers working in high noise level area.

1.7.5 Impact on Traffic

The incoming of raw materials and finished product dispatch will be completely through Road. The proposed traffic route will initiate from the Plant site and connect to Ludhiana-Chandigarh Highway via Dhanansu village. The same road will be utilized for both incoming of raw materials and dispatch of finished product. The observation from predictions reveals that the maximum NO_x, CO, PM₁₀, PM_{2.5} and HC concentration are respectively 12.50 µg/m³, 5.38 µg/m³, 0.69 µg/m³, 0.41 µg/m³ and 3.45 µg/m³ likely to occur at a distance of 22m from the road centerline. The CO and NO₂ concentrations are likely to be very low when compared with NAAQS 2009 limits.

Level of service (LOS) is a qualitative measure used to relate the quality of vehicle traffic service. LOS is used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measure like vehicle speed, density, congestion, etc.

Qualitative measure considering the operational conditions within the traffic stream in defined study area has been estimated by using Level of Service (LOS). LOS calculated for no of vehicles per hour for 0.75 MTPA finished product and incoming of raw materials which will be transported by road to the end destination points. The total PCU of existing traffic as per study observations are found maximum at T5- 8318 PCU at Ludhiana-Chandigarh state highway which is less than 30,000 PCU as per IRC standards. And V/C ratio at all the transportation route range between 0.07 to 0.34 and category B to A which is found to be very good to excellent.

1.7.6 Biological Environment

The impact on terrestrial ecology may occur due to emission of gaseous pollutants like SO₂, PM and NO₂. However, at higher doses, they can be injurious to both vegetation as well as animals.

Effective utilization of pollution reducing technologies, such as air and noise pollution reduction equipment during the operation phase will be of immense help and will aid in reducing the pollution during operation phase of the plant and also appropriate plantation activity plant and using treated sewage water for the purpose of the greenbelt development and gardening activities which are earmarked in the area.

Identified impacts	Proposed mitigation measures
Uncontrolled disposal of construction waste like soil, brick bits and also demolition wastes may cause unacceptable leachates thereby causing harm to biota	Construction and demolition wastes are to be utilized in levelling of land and road making.
There is a possibility of oil spillages and fires from the storages, which are likely to harm biota.	Disaster management plan developed after suitable risk assessment will be made functional appropriately.

Dust and noise emanation due to vehicle/ machinery operations	Water sprinklers will be deployed along the transport routes both fixed and mobile. Dust suppression in open areas to be controlled through water trucks fitted with sprinklers. Dust suppression system installed in all drill machines in the form of water jets will be installed. Transportation of materials only through covered trucks will be made mandatory. Acoustic enclosures as well as greenbelt plantations will considerably reduce the nuisance caused by noise.
Emission of pollutant gases as exhaust gas from vehicles/ machineries	Setting up of pollution control devices along with the machineries will lead to low emissions of NOx. Due to this, the proposed project activities will have insignificant impact on ambient air quality and the NOx concentration will be within NAAQ standards. Extensive plantation comprising of pollutant resistant species as suitable to the locality will be carried out within the project area as proposed.
Removal of vegetation/ fauna displacement and ecosystem disturbances	A well-maintained greenbelt should be developed that may contribute to 33% of the total project area. The extensive greenbelt plantation as per CPCB guidelines and plant species as suitable to the local agroclimatic zone will serve not only as pollution sink but also as a noise barrier.

It is expected that, with the adoption of the above-mentioned mitigation measures, the impact due to the proposed project activity over flora & fauna of the study area will be minimal on the ecosystems. Progressive plantation with over a period of time will create conditions favourable for fauna also.

1.7.7 Solid Waste Management

20-30% of the metallics in the slag would be recovered and reused in EAF. Balance would be utilized as railway ballast, concrete, road making etc. after proper weathering. EAF & LF slag produced will be sold after iron recovery. Industrial sludge will be sold to authorised TSDF. Generated domestic sludge will be used as manure.

1.7.7 Impact on Socio-Economic

There will be number of positive changes on the socio-economic conditions of the project study area villages as well as the population. There will be a natural change, due to industrialization process, in the scenario leading into the socio-economic development of project core zone area and also the buffer zone.

The project is expected to provide impetus for economic development in the immediate surroundings and would also generate local employment. Furthermore, it will facilitate improved access to market centers, educational institutions, healthcare facilities, and offices located in the district. The cumulative likely positive impacts of the project will result in increased mobility, employment generation and

above all better economic integration of the area with the major market and trade centers within and outside the districts.

1.7.8 Green Belt Development Plan

Total land requirement for the proposed project is about 46.53 ha (115 acres). Greenbelt will be developed in an area of 15.36 ha (37.85 acres).

1.8 **Analysis of Alternative Technology and Site**

Melting of iron scrap in EAF was another technology available. However, TATA has adopted EAF/ Induction Furnace was most efficient and proven with added advantage of energy conservation and better environmental controls.

The alternative sites were considered for establishment of proposed project i.e, Site-1 Rohtak, Haryana Site-2 Rajpura, Punjab and Site -3 Ludhiana, Punjab. Due to the unavailable adequate land for future expansion/setting of downstream facilities first two sites are rejected. Site-3 Ludhiana was finalized for setting up of 0.75 MTPA crude steel production through Electrical Arc Furnace. The reasons for selecting the site are given below.

- a. Adequate land available for future expansion/setting of downstream facilities.
- b. Entire project land is government land
- c. Well-connected infrastructure.
- d. There will be no displacement of people.
- e. Thus, R & R issues are not applicable.

1.9 **Environmental Management Plan**

To ensure the effective implementation of the mitigation measures and environmental management plan during construction and operation phases of proposed project, it is essential that an effective Environmental Monitoring Plan be designed and followed during construction and operation phases. Suitable mitigation measures will be taken in case monitored parameters are exceeding the stipulated limits. Regular monitoring programs of the environmental parameters are essential to consider the changes in the environment. The objective of monitoring is:

- To verify the result of the impact assessment study in particular with regards to new developments;
- To follow the trend of parameters which have been identified as critical;
- To check or assess the efficiency of the controlling measures;
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new installations or through the modification in the operation of existing facilities.

The following routine monitoring programme as detailed in **Table-1.3** will be implemented at site. Besides this monitoring, the compliances to all environmental clearance conditions and regular permits from PPCB/MoEF&CC/CPCB will be monitored and reported periodically.

TABLE-1.3

ENVIRONMENTAL MONITORING DURING OPERATION PHASE

Sr. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
1	Air Emissions	Stack emissions from all major units and CPP boilers to be optimized and monitored	Gaseous emissions (PM, SO ₂ , CO, NO _x)	Continuous monitoring using on-line equipment during operation phase
		Stack emissions from DG set to be optimized and monitored	Gaseous emissions (SO ₂ , HC, CO, NO _x)	Periodic during operation phase
		Ambient air quality within the premises of the proposed unit and nearby habitations to be monitored. Exhaust from vehicles to be minimized by use of fuel-efficient vehicles and well maintained vehicles having PUC certificate.	PM, RPM, SO ₂ , NO _x , CO and HC. November 2009 notification Vehicle logs to be maintained	As per CPCB/PPCB requirement or on weekly basis whichever is earlier
		Measuring onsite data of meteorology	Wind speed, direction, temp., relative humidity and rainfall.	Continuous monitoring using on-line weather station during operation phase
		Vehicle trips to be minimized to the extent possible	Vehicle logs	Daily records
2	Noise	Noise generated from operation of power boilers/cooling towers to be optimized and monitored Noise generated from operation of DG set to be optimized and monitored DG sets to generate less than 75 dB(A) Leq at 1-m from the source DG sets are to be provided at basement with acoustic enclosures	Spot Noise Level recording; Leq (night), Leq (day), Leq (dn)	Periodic during operation phase
		Generation of vehicular noise	Maintain records of vehicles	Periodic during operation phase
		3	Wastewater discharge	No untreated discharge to be made to surface water, groundwater or soil.
Take care in disposal of wastewater generated such that soil and groundwater resources are protected	Discharge norms for effluents	Periodic during operation phase		
Compliance of wastewater discharge to standards	pH, TSS, TDS, BOD, COD & temperature	Once in a week during operation phase		
Compliance of treated sewage to standards	Comprehensive as per GSR 422(E)	Once in a season		
4	Drainage and effluent management	Ensure drainage system and specific design measures are working effectively.	Visual inspection of drainage and records thereof	Periodic during operation phase

Sr. No.	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
		Design to incorporate existing drainage pattern and avoid disturbing the same.		
5	Water quality and water levels	Monitoring used water quality, groundwater quality around ash pond and ground water levels	Comprehensive monitoring as per IS 10500 Groundwater level in meters bgl	Periodic during operation phase
		River water quality downstream to discharge	As per IS 10500	Once in a week
6	Work zone air contamination	Contaminants such as VOCs to be reduced by providing adequate ventilation	Monitoring of indoor air contaminants such as CO, CO ₂ and VOCs.	As per CPCB/PPCB requirement
7	Emergency preparedness, such as fire fighting	Fire protection and safety measures to take care of fire and explosion hazards, to be assessed and steps taken for their prevention.	Mock drill records, on site emergency plan, evacuation plan	Periodic during operation phase
8	Maintenance of flora and fauna	Vegetation, greenbelt / green cover development	Local/native species	Periodic during operation phase
9	Waste management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Records of solid waste generation, treatment and disposal	Periodic during operation phase
10	Soil quality	Maintenance of good soil quality	Physico-chemical parameters and metals.	Periodical monitoring at ash pond site
11	Health	Employees and migrant labour health check ups	All relevant parameters including HIV	Regular check ups

1.9.1 Environmental Management Cost

It is proposed to invest about Rs.133.55 Crores as capital cost and Rs. 3.27 Crores as recurring cost/ Annum. The capital and recurring expenses will be incurred phase-wise in proportion to the implementation of the project.

1.10 Risk Assessment and Disaster Management Plan

Risk assessment has been carried out to quantify the extent of damage and suggest recommendations for safety improvement for the proposed plant. Risk mitigation measures based on consequence analysis and engineering judgments are incorporated in order to improve overall system safety and mitigate the effects of major accidents.

An effective Disaster Management Plan (DMP) to mitigate the risks involved will be in place. This plan defines the responsibilities and resources available to respond to the different types of emergencies envisaged. Training exercises will be held to

ensure that all the personnel are familiar with their responsibilities and that communication links are functioning effectively.

1.11 Project Benefits

The proposed project will result in improvement of infrastructure as well as overall socio-economic development in the area. The people residing in the nearby areas will be benefited directly and indirectly due to the project. It is anticipated that the project will provide benefits to the locals in two phases i.e. during construction phase as well as during operational stage of the plant.

The proposed project will be operating with skilled and semi-skilled personnel. The total number of employment during construction phase is 2500 and during operation phase the total employment would be 450. Even more people will engage in trade, commerce, construction and transport and business opportunities in the area, which will positively impact the income generation activities for local people.

The Tata Steel Foundation (TSF) implements social impact programmes for Tata Steel, and has rich experience of designing and implementing change models through consistent and transparent dialogue, understanding of vulnerabilities, recognition of aspirations and appreciation of cultural nuances of the communities around. The same experience, approach and ability will enable our engagement with development challenges of proximate communities in the district of Ludhiana.

The TSF team has already commenced conversations with local communities to understand their challenges, potential solutions and strategic resources for impact in the region through a customized needs assessment. This is being complemented by early entry point activities which will feed into long term programmes. The thematic areas which will be covered under CSR activities are education, livelihood, health, sports and water. Budget allocated for CSR program for the years 2023-24 is about Rs. 355 lakhs, 2024-25 is about Rs.415 lakh and 2025-26 is about Rs. 450 Lakhs.

1.12 Conclusion

The development of this project has certain beneficial impact/effects in terms of providing the employment opportunities that the same will create during the course of its construction as well as during operational phase of the project. However, the proposed integrated plant will have certain level of adverse impacts on the local environment, which will be mitigated by effective implementation of EMP.

Thus, it can be concluded that with the judicious and proper implementation of the pollution control and mitigation measures, the project will be beneficial to the society and will help to reduce the demand – supply gap and will contribute to the economic development of the region in particular and country in general.