DRAFT ENVIRONMENT IMPACT ASSESSMENT REPORT

FOR

PROPOSED METALLURGICAL PROJECT OF "KAALENDI VENTURES L.L.P" MAUZA: - KHIRODHARPUR, TEHSIL: - FATUHA, DISTRICT: -PATNA, STATE: - BIHAR; BY M/S KAALENDI VENTURES L.L.P. (EXITING PRODUCTION CAPACITY MS PIPE (TUBE) – 60,000 TPA, SHUTTER PROFILE – 30,000 TPA, PROPOSED AFTER MODIFICATION / EXPANSION CAPACITY MS PIPE (TUBE)- 20,000 TPA, SHUTTER PROFILE- 2,000 TPA, TMT BAR – 68,000 TPA, MS BILLET- 90,000 TPA).

(Including TOR Compliance, Annexure)

TOR Letter No and Date	**F. No. SIA/3(a)/2048/2022 dated 23-01-2023**
Proposal No	**SIA/BR/IND/83083/2022**
Category of the Proposal	**B, 3(a) [Metallurgical Industries (ferrous & nonferrous)]**
Proposed production	**MS Pipe (Tube) - 20,000 TPA, Shutter Profile- 2,000 TPA, TMT BAR – 68,000 TPA, MS Billet- 90,000 TPA).**
Baseline Data Collection	Pre-Monsoon March 2022 – May 2022
Date of Public Hearing	To be conducted

M/S KAALENDI VENTURES L.L.P

KHIRODHARPUR, FATUHA, DISTRICT-PATNA, STATE- BIHAR

PROJECT PROPONENT **M/s Kaalendi Ventures L.L.P** **Khirodharpur, Fatuha, District-Patna, State-Bihar**	**ENVIRONMENTAL CONSULTANT** Rian Enviro Private Limited, H/O- 202 & 402, Mangal Market, Raza Bazar, Sheikhpura, Patna, Pincode: 800014 & 303, Nageshwar Tiwari Apartment, Near Shivam Appt., Bajpayee Path, Shukla Colony, Hinoo, Ranchi, Jharkhand- 834002 Ph- +91 -9716173106

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LIST OF ANNEXURES

Sl No.	Annexure I-	Copy of CTO
1	Annexure II	Copy of land document
2	Annexure III-	Copy of TOR
3	Annexure IV –	Factory license

COMPLIANCE OF TERMS OF REFERENCES (TOR)

M/s Kaalendi Ventures L.L.P. was granted the Terms of Reference (ToR) vide **letter no. F. No. SIA/3(a)/2048/2022 dated 23-01-2023** for proposed capacity of MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA) located **Kaalendi Ventures L.L.P.** The compliance of ToR (s) is given in Table below-

S.No.	ToR	Compliance
1.	**Executive Summary**	**Executive Summary of the project is attached. Separately after EIA report**
2.	**Introduction**	
i.	Details of EIA Consultant including NABET accreditation.	M/s Rian Enviro Pvt. Limited. Certificate no- NABET/EIA/2124/IA0079 dated 10-03-2024. Details are given in Chapter 12.
ii.	Information about the project Proponent.	M/s Kaalendi Ventures L.L.P **Project Proponent -** Mr. Binay Kumar Singh Director **M/s Kaalendi Ventures L.L.P**. Details of the project proponent is as above and mentioned in **Section 1.1.3, Chapter 1.**
iii.	Importance and Benefits of the Project.	• Growth of industries leads to increase in production of goods and services which are available to people at cheaper rates. • It reduces dependence on other countries and improves economy. • It results in rising the standard of living. • It creates new job opportunities helping in the removal of unemployment Detailed in, Chapter 8.
3	**Project Description**	
i.	Cost of Project and time of completion.	The estimated project cost for Plant is Proposed: 38.3 Cr. Detailed given in section 1.3, Table 1.1, Chapter-1.
ii	Products with capacities for the proposed project.	MS pipe (Tube)- 80,000 TPA, Shutter profile- 32,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA). Detailed given in Section 2.4, Table 2.2, Chapter-2.

iii	If expansion project details of existing products with capacities and whether adequate land is available for expansion reference of earlier EC if any.	Exiting Production Capacity MS PIPE (TUBE) – 60,000 TPA, Shutter Profile – 30,000 TPA. Proposed plan will be done on the an area of 3.721 ha (9.196 Acres) which is owned by the project proponent.
iv	List of raw materials required and their source along with mode of transportation.	Billets (Total Production: 90,000 TPA) Sponge Iron, Pig iron/MS scrap, Ingot/billet, Ferro Alloys (Si/Mn/Fe/Si), Metal scrap from in house metal extraction. Rolling Mill- TMT Bars/Rods (Total Production: 68000 TPA) along with MS Pipe (Tube) ~80,000 TPA & Shutter Profile ~32,200 TPA, Slag crusher 10 TPH Hot Billets/M.S. Billets Furnace Oil/PNG for re-heating furnace will be used as basic raw material to manufacture ingots. Raw material requirement (externally sourced/indigenous) Source – Nearby industries of Patna. Detailed given in Chapter-2.
v	Other chemicals and materials required with quantities and storage capacities.	No other chemicals are required. Quantity of Materials required detailed given in and Chapter-2.
vi	Details of Emission, effluents, hazardous waste generation and their management.	The main source of emissions will be from **Induction Furnace** and from the work zone which will be controlled by the Air Pollution Control System. **Slag** will be generated as solid waste which will be used for filling of low-lying areas. **APCD dust will be sent for reuse like fly ash brick manufacturing and Waste oil/lubricant** will be sent as hazardous waste for proper disposal. Source of the emissions & mitigation measures given in, Chapter 4.
vii	Requirement of water, power with source of supply status of approval water balance diagram manpower requirement. (Regular and contract)	**Water requirement** - Approx ~45m3/day of water is required to meet process cooling and for domestic requirement ~6.5m3/day is required. **Power requirement** - ~12.4 MVA of electricity will be required to run the plant & machinery. The source of power will be SBPDCL. One DG set of 250 kVA already installed (as power back-up) and DG of 500 KVA is proposed. **Manpower requirement** - Around 60 persons would be hired for construction and during operational phase 100 persons will be required. Water balance and other details given in Chapter-**2.**

viii	Process description along with major equipment and machineries, process flow sheet (quantative) from raw material to products to be provided.	Process flow sheet along with raw material requirements mentioned in **Chapter 2.**
ix	Production of a report certificate from concerned authority enforcing Factory Act regarding suitability of existing unit/plant for proposed expansion mentioning whether existing plant is a satisfactory compliant of factory Act.	Copy of Factory license is attached as Annexure – IV.
x	The proposal of the expansion of capacity to include through renovation/up gradation of all existing infrastructure of the unit consisting development/ construction of first aid/dispensary room for workers, development of facilitates) toilets/urinals/washing rooms, canteen etc.)	Thorough renovation of all existing infrastructure including First aid room for workers, sanitation facilities will be done. Details given in chapter 10
xi	Hazard identification and details of proposed safety systems	Occupational hazard and safety system is provided in the premises for the workers. Details given in **Chapter 7.**
xii	Submit a copy of application submitted to competent authority/ agency with regards to supply of PNG gas pipe line.	Will be done as per the provision of PNG gas pipe line when available in project area.
xiii	Expansion/modernization proposals: a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A Certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May. 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing / existing operation of the project from SPCB shall be attached with the EIA-EMP report. b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification. 2006 shall be provided.	Not applicable

	Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006. CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.	
4	**Site Details**	
i.	Location of the projects it covering village, taluka /tehsil, district and state, justification for selecting the site, whether other sites were considered	Project is located at Khirodharpur, Fatuha, District-Patna, State-Bihar The project will be carried out within the existing premises as well as addition of adjacent land only so no alternative site study is being done for the project. **Location of the projects it covering and justification for selecting the site selection is discussed in section 1.3.1 of chapter 1.**
ii.	A Toposheet of the study area of radius of 10 km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet, (including all eco-sensitive areas and environmentally sensitive places).	A Topo sheet no- G45N6 covering study area of 10 km radius and site location is shown in **chapter 3.**
iii.	Details w.r.t. option analysis for selection of site	No Alternate Site has been examined, as the proposed project will be carried out within existing premises of M/s Kaalendi ventures LLP. The plant has already obtained CTO from BSPCB Emission Consent Order vide letter ref no 3277 dated 22-10-2022 and Discharge Consent Order vide letter ref No. 3278 dated 22-10-2022 for production of MS PIPE (TUBE) – 60,000 TPA, Shutter Profile – 30,000 TPA, Copy of CTO is Attached as Annexure I.
iv.	Co-ordinates (lat-long) of all four corners of the site.	Map showing pillar co-ordinates of the plant mentioned in **Chapter 2.**
v.	Google map-Earth downloaded of the project site.	Google map-Earth downloaded for the project in**, Chapter 2** of EIA report.
vi.	Layout maps indicating existing units as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an industrial area/Estate/Complex, layout of the industrial Area indicating location unit within the industrial area Estate.	Plant is located on the private land. Converted to industrial land. Lay out map indicating existing unit as well as proposed, indicating storage area, plant area, greenbelt area, utilities etc. **attached in Chapter 2** of EIA report.

<table>
<tr><td>vii.</td><td>Photographs of the proposed and existing (If applicable) plant site. If existing, show photographs of plantation green belt in particular.</td><td>Photographs of the existing plant site areas shown Figure 2.3, chapter 2.</td></tr>
<tr><td>viii.</td><td>Land use break-up of total land of the project (identified and acquired), government/private–agricultural, forest, waste land, water bodies, settlements etc. Shall be included. (Not required for industrial area)</td><td>The proposed plant is located Khirodharpur, Fatuha, District-Patna, State- Bihar, Land-Use Map attached in Section 3.10, Chapter-3 of EIA report.</td></tr>
<tr><td>ix.</td><td>A list of major industries with name and type within study area (10 km radius) shall be incorporated. Land use details of the study area.</td><td>A list of major industries with name and type within study area incorporated below:
<table>
<tr><th>S.No.</th><th>Name of Industries</th><th>Distance & Direction</th><th>Type</th></tr>
<tr><td>01.</td><td>Patwari Steels Pvt Ltd. Fathua Patna</td><td>0.26 km in South</td><td>Metallurgy Industry</td></tr>
<tr><td>02.</td><td>Krishh Rice Mill, fathua, Patna</td><td>0.11 km in West</td><td>Rice Mill</td></tr>
<tr><td>03.</td><td>Crestia Polytech Pvt Ltd, Fathua</td><td>1.1 km in West</td><td>PVC Industry</td></tr>
<tr><td>04.</td><td>BPC Fatuha LPG Bottling Plant Patna, Bihar 803201</td><td>1.2 km in WSW</td><td>LPG Bottling Plant</td></tr>
<tr><td>05.</td><td>Topline Industries, Fathua</td><td>Adjacent to the project site</td><td>Ware House</td></tr>
<tr><td>06.</td><td>Maa Durgeshwari Metal Products Pvt Ltd, Fathua</td><td>0.80 km in WNW</td><td>Metallurgy Industry</td></tr>
</table></td></tr>
<tr><td>x.</td><td>Geological features and Geo-hydrological status of the study area shall be included.</td><td>Geo-Hydrological status of the area incorporated in, Chapter 3.</td></tr>
<tr><td>xi.</td><td>Details of drainage of the project up to 5 km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood level of the project site and maximum flood level of the river shall be provided. (Mega greenfield projects)</td><td>5 km Drainage map of this study area is shown in Fig 3-13 of Chapter -3.</td></tr>
<tr><td>xii.</td><td>Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.</td><td>The Project is located at Khirodharpur, Fatuha, Patna - 803201 and the same is used for this project.</td></tr>
</table>

xiii.	R&R details in respect of land in line with state Government policy.	Not applicable
5.	**Environmental Status**	
i.	Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	Site-specific micro-meteorological data using temp, relative humidity, wind speed, direction & rainfall has been incorporated in report. Details mentioned in Chapter-**3.**
ii.	Surface water quality of nearby River (100 m upstream and downstream) and other surface drain sat 8 locations as per CPCB/MoEF&CC guidelines.	Surface Water Quality monitoring is carried out in the study area of 10 km based on the land use pattern and ground truth of nearby villages. Surface water samples were collected from 8 locations during the study period of March 2022 to May 2022 and analyzed for a number of physico-chemical parameters. As the project will works on ZLD principal therefore there will be no discharge point in any stream. **Details are given in Chapter-3.**
iii.	Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF & CC guidelines, if yes give details.	No such river in the study area
iv.	Ground water monitoring at minimum at 8 locations shall be included.	Ground Water Quality monitoring is carried out in the study area of 10 km based on the land use pattern and ground truth of nearby villages. Ground water samples were collected from 8 locations during the study period of March 2022 to May 2022 and analyzed for a number of physico-chemical parameters. As the project will be works on ZLD therefore there will be no discharge point in any stream.
v.	Noise location monitoring at 8 locations within the study area.	Details are given in section 3.13.3 of Chapter-3 of EIA Report.
vi.	Soil characteristic as per CPCB guidelines	Details are given in section 3.14 of Chapter-3 of EIA Report.
vii.	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangements etc.	Details of Traffic Analysis Transportation Route is discussed in section 4.4 of chapter 4 of EIA report.
viii.	A detailed report shall be submitted using suitable model used to predict increase in air pollutant due ti increased traffic load due to the proposed peoject.	Details are given in chapter 4.
ix.	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If	Details are given section 3.15 of Chapter-3 of EIA report.

	Schedule-I fauna are found within the study area, a wild life conservation plan shall be prepared and furnished.	
x.	Socio economic status of the study area	Details are given section 3.16 of Chapter-3 of EIA report.
6.	**Impact and Environment management Plan**	
i.	Assessment of ground level concentration of pollutants from the stack emission based on the site – specific meteorological features. In case the project is located on a hilly terrain, the AQIP modeling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emission (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modeling shall also pe provided. The air quality control shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors if any.	Air quality modeling has been done to predict the impact of industrial units on the ambient air quality so as to quantitatively predict the impact on the ground level concentration of pollutants. The modeling has been done for M/s Kaalendi Ventures LLP which plans to capacity enhancement of integrating melting and rolling facility at Khirodharpur, Fatuha, Patna - 803201. Prediction of impacts on air environment has been carried out employing mathematical model based on a steady state. **Details are given in Chapter-4.**
ii.	Water quality modeling – in case of discharge in water body.	Not applicable, the proposed plant will be ZLD
iii.	Ground water classification as per Central Ground Water Authority and NOC from CGWB	The project falls under Safe zone zone as per central Ground water Authority.
iv.	Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for the transport of raw materials and finished products and waste (large quantities) by rail or rail -cum road transport or conveyer -cum-rail transport shall be examined.	Details are given in C**hapter-4.**
v.	A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standard of discharge under E (P) rules.	Details are given in C**hapter-4**

vi.	Details of the stack emission and action plan for control of emission to meet standard.	Details are given in C**hapter-4**
vii.	Measures for fugitive emission control	Details are given in C**hapter-4**
viii.	Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation	The hazardous waste generation and their storage, utilization and management will be done as per the Hazardous and other Wastes (Management &Trans boundary Movement) Rules, 2016. Details are given in Chapter -4.
ix.	Proper utilization of fly ash, shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	Fly ash will be given to the fly ash brick manufacturing
x.	Submit an action plan for the three tier planation to develop a green belt development plan in 33 % area ie. Land with not less than 1500 trees per hectare. Giving details of specifies, width of planation, planning schedule etc. shall be included. The green belt shall be around the project boundary and scheme for greening of the roads used for the project shall also be incorporated.	Yes, the land is available for green belt development. ~ 12,280.9 sqm land is available for green belt development plan.
xi.	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	Depending upon the available contours at detailed engineering stage, the number of drainage outfall and extent of open drains etc. will be designed so as to discharge the water to the rainwater harvesting pond for reuse in dust suppression & greenbelt development. A rainwater harvesting pond of capacity 3000 m^3 will be made to collect rainwater.
xii.	Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.	Total Cost of the Project- Rs. 38.3 Crs. Capital Cost towards Environment Protection Measures- Rs 1.06Cr. Recurring Cost / Annum towards Environment Protection Measures- Rs 0.185 Cr.
xiii.	Action plan for post-project environmental monitoring shall be submitted.	Details are given in C**hapter-6**

xiv.	Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	Details are given in C**hapter-7**

7	**Occupational health**		
	i	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.	Details are given in C**hapter-7**
	ii	Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometer, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above-mentioned parameters as per age, sex, duration of exposure and department wise.	Details are given in C**hapter-7**
	iii	Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,	Details are given in C**hapter-7**
	iv	Annual report of health status of workers with special reference to	Details are given in C**hapter-7**

		Occupational Health and Safety	
	v	Making provision for all personal safety/ security related gears (shoes/hats/helmets/jacket/gloves, specks, ear plugs etc.) for all workers and enforcing use of the same	
8.	**Corporate Environment Policy**		
	i	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Details are given in C**hapter-8**
	ii.	The project proponent shall prepare report with the provision contained in Ministry of Environment, Forest & Climate Change OM Vide F. No. 22-65/2017-IA.III dated 1st May 2018 as applicable, regarding corporate Environment Responsibilities.	Details are provide 7.3.4 in chapter 7
	iii.	Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so. it may be detailed in the EIA.	Details are given in C**hapter-6.**
	iii	What is the hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	Details are given in C**hapter-9.**
	iv	Does the company have system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the	Details are given in C**hapter-6**

		company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.	
09	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.		Details are given in C**hapter-2**
10	**Enterprise Social Commitment (ESC)**		
	i	Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Consultation issues and item-wise details along with time bound action plan shall be included. Socioeconomic development activities need to be elaborated upon.	Enterprise Social Commitment based on Public Consultation issues will be detailed after public hearing.
11	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.		No
B	**SPECIFIC TERMS OF REFERENCE FOR EIA STUDIES FOR METALLURGICAL INDUSTRIES (FERROUS & NON-FERROUS)**		
1	Complete process flow diagram describing each unit, its processes and operations, along		Details are given in C**hapter-2**

	with material and energy inputs & outputs (material and energy balance).	
2	Details on blast furnace/ open hearth furnace/ basic oxygen furnace/ladle refining, casting and rolling plants etc.	Not applicable
3	Details on installation/activation of opacity meters with recording with proper calibration system.	Not applicable
4	Details on toxic metals including mercury, arsenic and fluoride emissions.	Not applicable
5	Details on stack height requirement for integrated steel.	Details are given in C**hapter-2**
6	Details on ash disposal and management -Non-ferrous metal.	Details are given in C**hapter-2**
7	Complete process flow diagram describing production of lead/zinc/copper/ aluminum, etc.	Not applicable
8	Raw materials substitution or elimination.	Not applicable
9	Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation.	Not applicable
10	Details on Holding and de-gassing of molten metal from primary and secondary aluminum, materials pre-treatment, and from melting and smelting of secondary aluminum.	Not applicable
11	Details on solvent recycling.	Not applicable
12	Details on precious metals recovery.	Not applicable
13	Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.	Need to be discussed
14	Details on toxic metal content in the waste material and its composition and end use (particularly of slag).	Not applicable
15	Trace metals Mercury, arsenic and fluoride emissions in the raw material.	Not applicable
16	Trace metals in waste material especially slag.	Not Applicable

17	Plan for trace metal recovery.	Not applicable
18	Trace metals in water.	Not applicable
19	A tabular chart with index for point wise compliance of above ToR	
C	**Additional Condition**	
1	Submit a copy of application submitted to competent authority/agency with regard to supply of piped natural Gas (PNG)	Will be done as per the provision of PNG gas pipe line when available in project area.
2	Plantation details (Existing/proposed) along with species to be used, capital and recurring expenditure for maintenance of the same.	Plantation details are given in section 2.10 of chapter 2 and in chapter 4
3	Layout plan clearly earmarking space for development of peripheral green belt.	Layout Plant attached

1 Introduction

1.1 Purpose of the Report

M/s Kaalendi Ventures L.LP, Khirodharpur, Fatuha, District-Patna, State- Bihar, is an existing secondary steel based industrial unit which is engaged in production of MS pipe (Tube) 60000 TPA & Shutter profile 30000 TPA using reheating furnace at the site. The company owns a total land area 9.196Acre. (Existing area-3.715 Acre + Proposed- 5.482 Acre. The Proposed capacity of the unit is MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA). The Project falls under Category B-1 as Metallurgical Industries (secondary metallurgical processing) Item 3(a) of the schedule of EIA notification of Sept 14, 2006 issued by MOEF & CC.

The existing industrial unit has "Consents to operate" valid to 31/12/2026 (Attached as Annexure I). The proposed modification will be done in the existing plant premises.

This secondary metallurgical processing industry is listed as Item 3(a) of the schedule and needs Environmental Clearance from the MoEF&CC as per the EIA Notification, 2006 as the project is classified under Category B as in case of the secondary metallurgical processing industrial unit involved in operation of furnace only having the production capacity from induction furnace is more than 30,000 TPA would require environmental clearance.

The purpose of EIA study is to take stock of the prevailing quality of environment, to assess the impacts of proposed industrial activity on environment and to plan appropriate environmental control measures to minimize adverse impacts and to maximize beneficial impacts. The following major objectives have been considered:

- Assess the existing status of environment
- Assess the impacts due to the modification-cum-expansion of the project
- Suggest pollution control and mitigation measures
- Prepare an action plan for implementation of suggested ameliorative measures.
- Suggest a monitoring program to assess the efficacy of the various adopted environmental control measures.
- Assess financial considerations for environmental control plans.

In pursuance of Government of India Policy, under 'The Environment (Protection) Act 1986' and Bihar State Pollution Control Board (BSPCB), the proposed modification will require clearance from environmental point of view. The present EIA/EMP report is prepared on the basis of monitored data for one season from March 2022 to May 2022.

The present report is prepared in accordance with the guideline of MOEF&CC and as per the Terms of Reference issued by SEIAA Bihar vide letter F. No. SIA/3(a)/2048/2022 dated 23-01-2023 For carrying out Environmental Impact Assessment (EIA) study, the area falling within 10 km radius of project site located at Khirodharpur, Fatuha, District-Patna, State- Bihar, has been considered for generation of baseline data with respect to present air quality, water quality, noise level, soil quality, ecology, socio-economic and meteorology etc.

An in-depth analysis of the baseline environmental data generated by actual field monitoring and collected from various secondary sources has been carried out for identifying and predicting the probable environmental impacts due to the modification of project. Reasonable assumptions have been made, wherever data is found lacking. Based on the findings a suitable environmental management plan has been suggested.

1.1.1 Identification of Project & Project Proponent

1.1.2 The Project

M/s Kaalendi Ventures LLP. is existing secondary steel based industrial unit located at Khirodharpur, Fatuha, District-Patna, State- Bihar. In the process the industrial unit will modify its molten metal generation capacity, modification of continuous casting machine (CCM) and enhancing re-rolling mill capacity. After proposed modification, installed production capacity of the industrial unit will become MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA).

1.1.3 Project Proponents -

1. Director, M/s Kaalendi Ventures L.L.P

1.2 Brief description of the project nature, size, location of the project and its importance to the country, region

As per EIA Notifications dated 14th September 2006 and its subsequent amendments, **M/s Kaalendi Ventures L.L.P.** falls under activity 3(a) as a Metallurgical Industry Project. The proposed project planning needs Environmental Clearance from the MoEF&CC as per the EIA Notification, 2006. The project is classified under "Category B" as secondary metallurgical processing industrial units and projects involving operation of furnace such as induction furnace having capacity of more than 30,000 TPA. The land is owned by **M/s Kaalendi Ventures L.L.P.** utilized for industrial purposes.

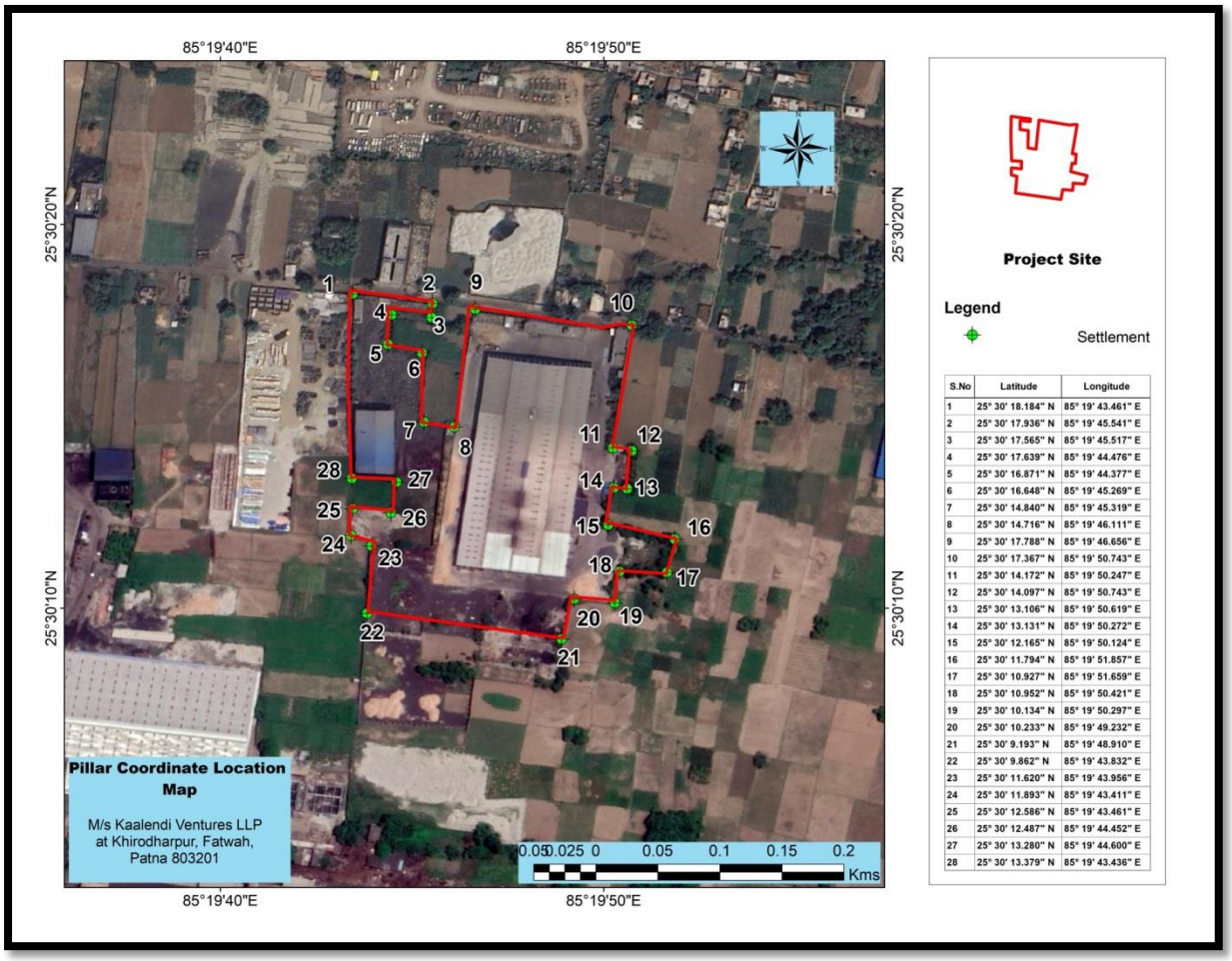
1.3 Size of the Project

TABLE 1-1: SALIENT FEATURE OF THE PROJECT

S. No	Parameters	Description
1	Identification of project	Project falls under Metallurgical Industries **(secondary metallurgical processing)** Item **3(a)** Metallurgical industries (ferrous & nonferrous) of the schedule of EIA notification of Sept 14, 2006 issued by **MOEF&CC.**
2	Brief description of nature of the project	The unit is for manufacturing of MS pipe (Tube), Shutter profile, TMT Bar & MS Billet
3	**Salient Features of the Project**	
3.1	Proposed plant capacity	Proposed production capacity is MS pipe (Tube)- 80,000 TPA, Shutter profile- 32,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA).
3.2	Total Plot Area	9.196 Acre. (Existing area 3.715 Acre + Proposed 5.482 Acre)
3.3	Location	Village- Khirodharpur, Fatuha, District-Patna, State- Bihar.
S. No	**Parameters**	**Description**
3.4	Water requirement	Water is required to meet process cooling water make-up (~45.0 m3/day) and domestic requirement (~6.5m3/day). The cooling water will be normal raw water for rolling mill activities and RO treated water for induction furnaces.
3.5	Source of water	Borewell and rain water
3.6	Wastewater	The domestic water consumption will result in generation of ~6 m^3/day of domestic wastewater. The wastewaters will be treated and entirely reused.
3.7	Manpower	Around 100 people.
3.8	Electricity/Power requirement	The electrical power requirement will increase to ~12400 KVA One DG of Capacity 250 KVA as power back-up and One DG of 500 KVA is proposed.
3.9	Alternative site	The proposed addition will be established in the existing plant premises only.
3.10	Land form, Land use and land ownership	Land is owned by M/s Kaalendi Ventures L.L.P.
4	Project cost	The estimated cost of the Project is approximately Rs. **38.3 Crs.**

1.3.1 Location of the project

The proposed project site is located at Khirodharpur, Fatuha, District-Patna, State- Bihar. The company will aim for efficient management of the unit, which will require judicious manpower planning, selection of qualified and experienced personnel and also appropriate organizational structure, clearly defining the functions and responsibilities of the managerial and supervising staffs for ensuring, maintaining and compliance of committed environmental guidelines on obtaining environment clearance. The coordinates of the project location are as below:



S.No	Latitude	Longitude
1	25° 30' 18.184" N	85° 19' 43.461" E
2	25° 30' 17.936" N	85° 19' 45.541" E
3	25° 30' 17.565" N	85° 19' 45.517" E
4	25° 30' 17.639" N	85° 19' 44.476" E
5	25° 30' 16.871" N	85° 19' 44.377" E
6	25° 30' 16.648" N	85° 19' 45.269" E
7	25° 30' 14.840" N	85° 19' 45.319" E
8	25° 30' 14.716" N	85° 19' 46.111" E
9	25° 30' 17.788" N	85° 19' 46.656" E
10	25° 30' 17.367" N	85° 19' 50.743" E
11	25° 30' 14.172" N	85° 19' 50.247" E
12	25° 30' 14.097" N	85° 19' 50.743" E
13	25° 30' 13.106" N	85° 19' 50.619" E
14	25° 30' 13.131" N	85° 19' 50.272" E
15	25° 30' 12.165" N	85° 19' 50.124" E
16	25° 30' 11.794" N	85° 19' 51.857" E
17	25° 30' 10.927" N	85° 19' 51.659" E
18	25° 30' 10.952" N	85° 19' 50.421" E
19	25° 30' 10.134" N	85° 19' 50.297" E
20	25° 30' 10.233" N	85° 19' 49.232" E
21	25° 30' 9.193" N	85° 19' 48.910" E
22	25° 30' 9.862" N	85° 19' 43.832" E
23	25° 30' 11.620" N	85° 19' 43.956" E
24	25° 30' 11.893" N	85° 19' 43.411" E
25	25° 30' 12.586" N	85° 19' 43.461" E
26	25° 30' 12.487" N	85° 19' 44.452" E
27	25° 30' 13.280" N	85° 19' 44.600" E
28	25° 30' 13.379" N	85° 19' 43.436" E

FIGURE 1-1 : PILLAR CO-ORDINATE OF THE PROJECT SITE

1.3.2 Importance to the Country & Region

India is the world's second-largest steel producer with production standing at 77.74 million Tonnes in 2021. The growth in the Indian steel sector has been driven by domestic availability of raw materials such as iron ore and cost-effective labour. Consequently, the steel sector has been a major contributor to India's manufacturing output. The Indian steel industry is modern with state-of-the-art steel mills. It has always strived for continuous modernization of older plants and up-gradation to higher energy efficiency levels. Indian steel industry is classified into three categories - major producers, main producers and secondary producers. The National Steel Policy, 2017 envisage 300 million Tonnes of production capacity by 2030-31. The per capita consumption of steel has increased from 57.6 kgs to

74.1 kgs during the last five years. The government has a fixed objective of increasing rural consumption of steel from the current 19.6 kg/per capita to 38 kg/per capita by 2030-31. Between April 2020 and February 2021, India's cumulative production of finished steel is 85.60 MT. While for the period of April 2020 to February 2021, India's cumulative production of crude steel stood at 92.78 million Tonnes. Export and import of finished steel stood at 8.24 million Tonnes and 6.69 million Tonnes, respectively, in FY 20 P and export and import of finished steel stood at 9.49 million Tonnes and 4.25 million Tonnes, respectively, between April 2020 and February 2021.

1.4 Scope of EIA study

The scope of EIA study covers all the disciplines of environment and field monitoring in relevant disciplines of environment over one season (excluding monsoon months). The EIA report is prepared as per MoEF& CC Notification dated 14.09.2006, according to which secondary ferrous metallurgical processing industry fall in within the item 3(a) of the schedule and those projects with applicability of General Condition (GC) requires prior Environmental Clearance from the Ministry of Environment and Forests (MoEF& CC), GOI else from State Level Environment Impact Assessment Authority if no GC is applicable. It is inevitable to frame a picture of current environment in project area. This has been accomplished by carrying out a field survey and secondary data collection, based on which the mitigation measures, environment monitoring plan and environment management plan for the proposed project have been suggested and the EIA report prepared. The EIA study of proposed project has been carried out as per the following methodology-

- Establishment of baseline environmental status/condition of the environment in the study area of 10 km radius around the project site.
- Collection and review of available secondary literature/data/information.
- Field study, survey and monitoring in the study area for primary data collection.
- Study of the project activities in terms of construction and operation to identify the potential sources/causes of impacts.
- Identification and assessment of potential impacts on the environment during construction and operation phase of the project.
- Recommendation of preventive, control and mitigation measures to eliminate/minimize the adverse impacts.
- Formulation of an effective Environmental Management Plan (EMP) to ensure the implementation of mitigation measures for environmental sustainability.

State Level Expert Appraisal committee (considered the case during its meeting on dated 11/12/2022 and approved the TOR (F. No. SIA/3(a)/2048/2022 dated 23-01-2023). The baseline data has been collected from March 2022 to May 2022 as per TOR for undertaking detailed EIA/EMP study.

1.5 Structure of the EIA Report

The purpose of this report is to carry out Environment Impact Assessment study for the metallurgical plant for production of MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA) by M/s Kaalendi Ventures L.L.P. and to prepare Environment Management Plan. The report is divided into eleven chapters including this chapter, the details of which are summarized below:

Chapter 1: Introduction - The present chapter gives brief outline of the project and its proponent, brief description of the nature, size, and location of the project and its importance, and extent of the EIA study, including the scope of the study.

Chapter 2: Project Description - This chapter deals with the details of the project and various parameters like mineral existing production, proposed production, site location details etc. and also the facilities to monitor and treat the pollutants. The various features of the proposed project are described in this chapter.

Chapter 3: Description of Environment - This chapter presents the baseline data of existing situation of air, water, noise, soil, flora and fauna and socio-economic environment. Various sections of the chapter discuss the site profile, landform and existing land use and drainage pattern, climate and meteorological parameters. Both primary and secondary data collected for the study are depicted in this chapter.

Chapter 4: Impact Assessment & Mitigation Measures - This chapter describes the anticipated impact on the environment and mitigation measures. The method of assessment of impact including studies carried out and modeling techniques adopted to assess the impact where pertinent have been elaborated in this chapter. The details of the impact on the baseline parameters, both during the construction and operational phases and the mitigation measures to be implemented by the proponent have been suggested.

Chapter 5: Analysis of Alternatives (Technology & Site) - This chapter gives details of various alternatives both in respect of location of site and technologies to be deployed. Alternatives have been compared in terms of their potential environmental impacts, suitability under local conditions, and institutional training and monitoring requirements.

Chapter 6: Environment Monitoring Plan - This chapter covers the planned Environmental Monitoring Program. It also includes the technical aspects of monitoring the effectiveness of mitigation measures.

Chapter 7: Additional Studies - This chapter covers the details of the additional studies required in addition to those specified in the ToR and which are necessary to cater to more specific issues applicable to the project.

Chapter 8: Project Benefits - This chapter highlights the benefits accruing to the locality, neighborhood, region and nation as a whole. It brings out details of benefits by way of improvements in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit Analysis - This chapter includes Project Cost, cost of pollution control facilities and project implementation schedule.

Chapter 10: Environment Management Plan - This chapter comprehensively presents the Environmental Management Plan (EMP), which includes the administrative and technical setup, summary matrix of EMP, the cost involved to implement the EMP, both during the construction and operational phase and provisions made towards the same in the cost estimates of project construction and operation.

Chapter 11: Summary & Conclusions – This chapter deals with the overall summary of the project giving details of project i.e., salient features, baseline monitoring of various attributes of environment their mitigation measures, project benefits etc. which have discussed in the above chapters

Chapter 12: Disclosure of the Consultant - This chapter presents in brief about the consultant engaged along with the key experts as per QCI/ NABET accreditation scheme.

2 Project Description

2.1 Type of Project

M/s Kaalendi Ventures L.L.P. is planning for augmentation of the plant by proposed addition of 2 Induction furnace 15 ton each and 1 reheating furnace, slag crusher of 10 TPH and Rolling mill of matching capacity. At present the plant has Reheating furnace which is used to produce MS Pipe (Tube) 60,000 TPA & Shutter Profile 30,000 TPA, After the expansion the capacity of the plant will be MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA).

The industrial unit has **"Consents to Operate"** for production of MS pipe (Tube) – 60,000 TPA, Shutter Profile – 30,000 TPA (***Attached as Annexure I***). The proposed modification will be done in 9.196Acre of land including (Existing area-3.715 Acre + Proposed- 5.482 Acre. The proposed project planning needs "Environmental Clearance" from the MoEF&CC, Bihar as per the EIA Notification, 2006. The project is classified under Category B-1 as Metallurgical Industries" (secondary metallurgical processing industrial units, those projects involving operation of furnace such as induction furnace having capacity of more than 30,000 TPA) as Metallurgical Industries (secondary metallurgical processing), listed as Item (a) of the schedule of the EIA Notification.

2.2 Need of the Project

The growth in the Indian steel sector has been driven by domestic availability of raw materials such as iron ore and cost-effective labor. Consequently, the steel sector has been a major contributor to India's economic development. The production volume of crude steel in India at the end of the fiscal year 2020 amounted to 108.5 million metric tons. The government of India does not set any targets for steel production as it has been a deregulated sector since 1991. India entered the top ten steel producing nations in the year 2005.

The Indian steel industry is very modern with state-of-the-art steel mills. It has always strived for continuous modernization and up-gradation of older plants to achieve higher energy efficiency levels. Along with public sector, the private sector is considered to be the engine of growth in the steel industry and technological changes and modernization are taking place in both the public and the private sector integrated steel plants in India. Since financial year 2014, there was an increase in the share of steel manufactured by using basic oxygen furnace. This was the major method by which steel was produced in the country. Another technique was to use an electric arc furnace. Although this was more environmentally sustainable, it is not widely used. Another method is the induction furnace. Here, a high voltage electrical source is used, which transfers the energy via the induction.

2.3 Location of the Project

The proposed project site is located at Village Khirodharpur, Fatuha, District-Patna, State- Bihar. (India). The coordinates of the project location are as below:

The Total area of the plant is 3.721 ha (9.196 Acres) Breakup of land use for the proposed expansion is as follows.

TABLE 2-1: LAYOUT DETAILS (AREA BREAKUP AFTER PROPOSED EXPANSION)

SL No	TYPE OF USE	AREA (sq. mt)	%
1	Production & Allied facilities	17,082.6	45.90%
2	Entrance, Roads, Pavements, vacant area etc	7,851.36	21.10%
3	Green Belt	12,280.9	33.0%
	TOTAL	37,214.89	100%

Approx 12,280.9 sqm of land within the site is having existing tree plantation which is considered as green belt for the proposed project.

All the existing trees will be retained at site and no tree will be cut without having permission from the competent authority.

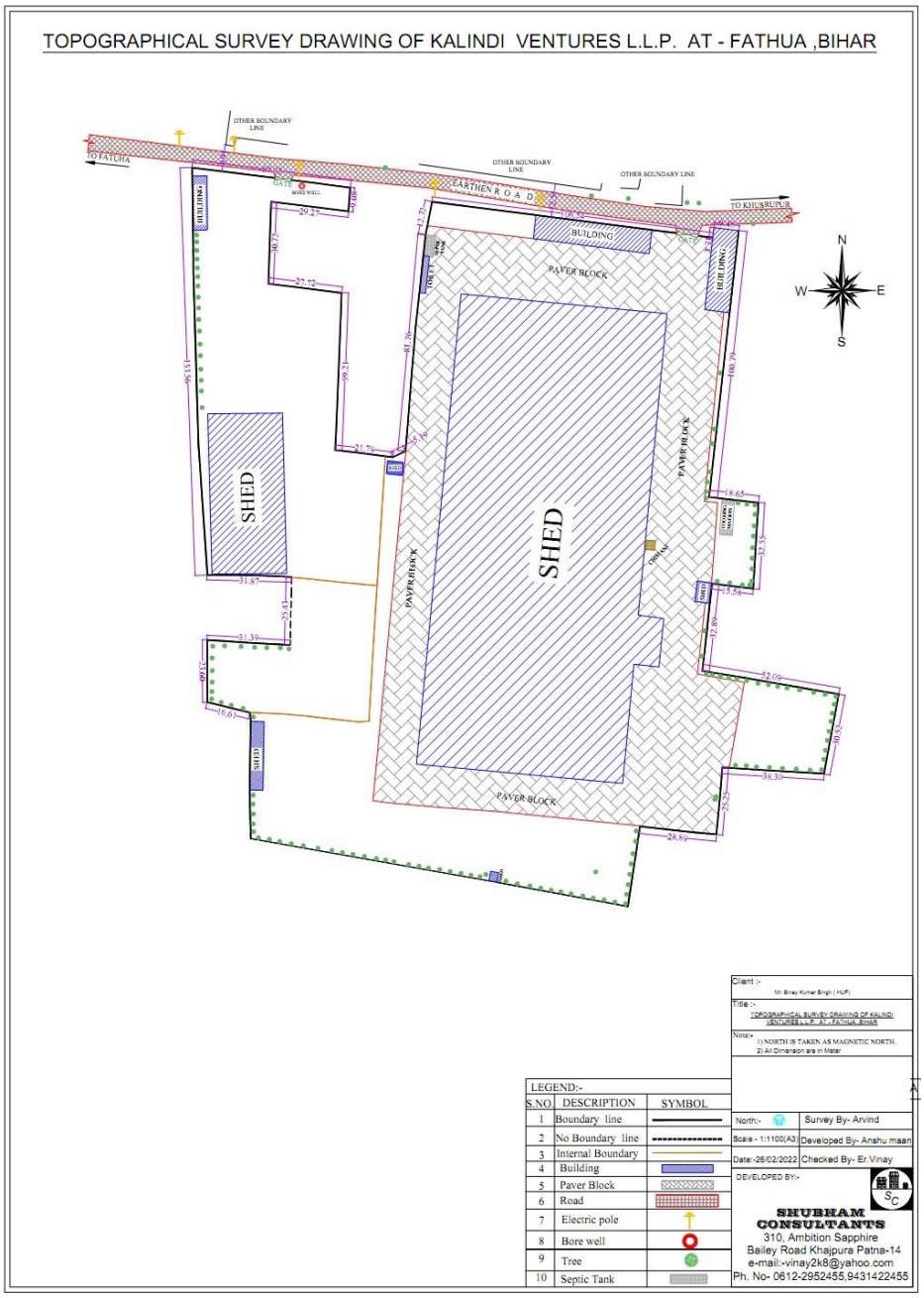


Figure 2-1 : Site layout Plan

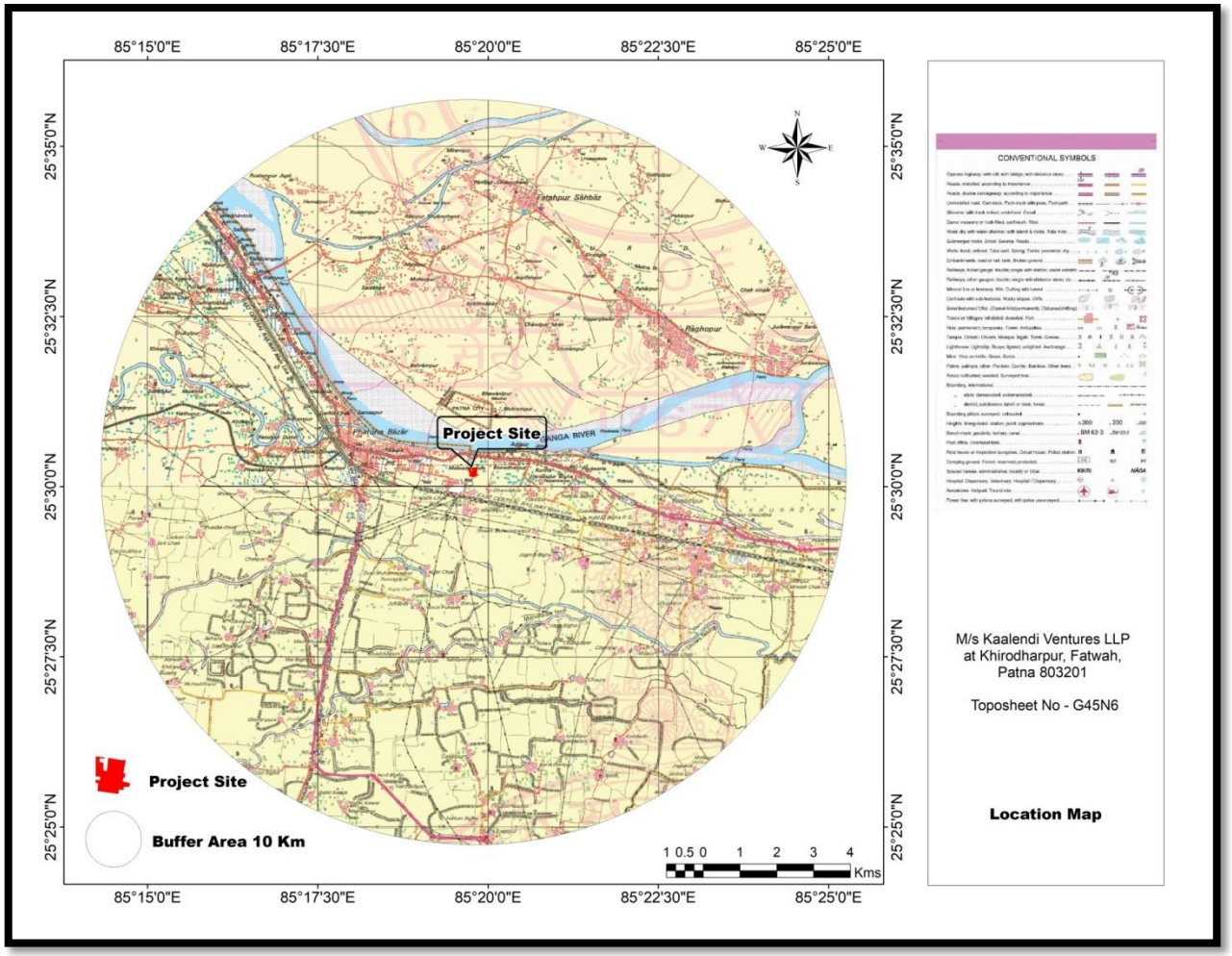


FIGURE 2-2 : 10 KM TOPOSHEET BUFFER MAP

FIGURE 2-3 : SITE PHOTOGRAPHS

2.4 Size and Magnitude of operation

The proposed project in steel manufacturing will be MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA).

2.5 Technology and Process Description

M.S. Billets are manufactured by melting of Sponge Iron and M.S scraps in induction Furnaces and casted in cast iron moulds to get Billets. The raw materials required for the manufacture of M.S Billets are M.S scrap obtained from the open market. Required quantities of M.S scraps from the stock yard are transported through trucks into the furnace yard by the electro magnet and crane fed into furnace. A minimum manual shoveling is required.

TABLE 2-2: FEATURES OF THE PROJECT

Sl no	Particulars	Existing	Expansion proposal	Proposed after expansion
1	Unit processes/ machinery	Reheating furnace	2 Induction furnace 15 ton each	2 Induction furnace 15 ton each and 1 reheating furnace
2	Installed production capacity	MS Pipe (Tube) 60,000 TPA & Shutter Profile 30,000 TPA	MS Billet-90,000 and ~68,000 TPA of TMT bar along with MS Pipe (Tube) ~19,500 TPA & Shutter Profile ~2,200 TPA, Slag crusher 10 TPH	MS Billet-90,000 and ~68,000 TPA of TMT bar along with MS Pipe (Tube) ~80,000 TPA & Shutter Profile ~32,200 TPA, Slag crusher 10 TPH
3	Fixed capital investment (Rs)	20.06 Cr	~18.24 Cr	~38.3 Cr
4	Electrical power requirement & backup	2400 KVA DG 250 KVA	~10000 KVA DG 500 KVA	~12400 Kva 2 (DG 250 KVA & DG 500 KVA)
5	Sponge iron	Nil	85000 MTPA	85000 MTPA
6	Ferro-alloys	Nil	947 MTPA	947 MTPA
7	MS scrap from inhouse metal	Nil	14823 MTPA	14823 MTPA
8	Ingots/billets (Only for rolling and other product)	nil	~90,000	~90,000
9	Manpower requirement	~50	~100	~150
10 (a)	Process water requirement (Total)	~5 m3/day	~46.5 m3 /day	~51.5 m3/day
10 (b)	Make up water requirement	~3 m3/day	~42 m3 /day	~45 m3 /day
11	Domestic water requirement	~2 m3/day	~4.5 m3/day	~6.5 m3/day

12	Domestic wastewater generation	~2 m3/day	~4.0 m3/day	~6 m3/day
13	Slag rejects (reusable material)	Nil	~9,500 TPA	~9,500 TPA
14	Fuel	Coal/PNG for Re-heating furnace, Electricity- Induction furnace/Furnace Oil HSD-DG Set		

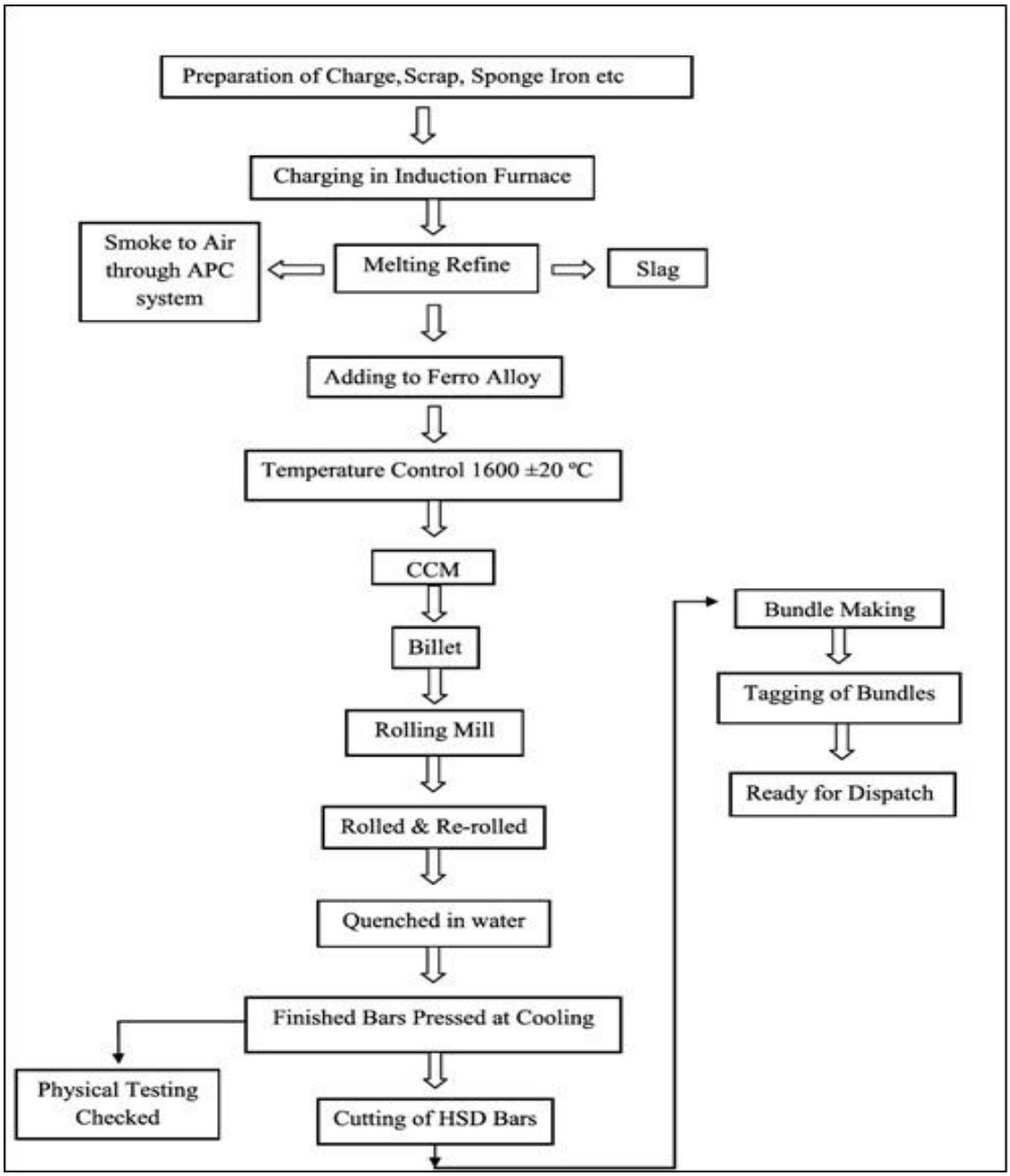


FIGURE 2-4: PROCESS FLOW CHART

2.6 Process Description Induction Furnace

The industrial unit is planning for augmentation of the plant by proposed addition of 2 Induction furnace 15 ton each to produce, MS Billet- 90,000 TPA.

Proposed unit: -

The industrial unit is planning for construction of integrating melting and rolling facility. In the process, the molten metal production will be ~300 MT/day. Proposed induction furnaces will have aggregate capacity of 2*15 Tons/day. The raw material requirement for the rolling facility will be fulfilled by the in-house melting capacity. At times the raw materials may (billets) may be sourced externally also. The excess raw material, if required it will be sourced externally. For reheating of the externally sourced raw material, the industrial unit will add one reheating furnace.

The production capacity of final/end product will be MS Billet- 90,000 and ~68,000 TPA of TMT bar along with MS Pipe (Tube) ~20000 TPA & Shutter Profile ~2,000 TPA, while operating round the clock. The activities can be summarized as under;

a. Basic raw material (MS scrap and DRI) @~305 MT/day is used in induction furnace to generate molten metal @~273 MT/day.
b. The industrial unit will have its induction furnace capacity aggregating to about ~30 MT/heat using multiple induction furnaces.
c. The melting will generate ~29 MT/day of slag which will be processed in-house (crushing followed by magnetic separation) to recover metallic contents. ~3.0 MT/day of it is recovered as useful metal (are reused as feed for melting). Remaining slag, ~26 MT/day, will be disposed-off and is usable as building/construction material.
d. Ferro-alloys are dosed into the molten metal to obtain product of requisite content.
e. The induction furnace burning loss will be ~4 MT/day.
f. The molten metal will be subjected to processing through LRF (to reduce S and P from ~5% to ~0.1%).
g. Subsequently, the molten metal will be casted into billets (in continuous casting machine), which will be directly used for rolling (eliminating the need for reheating).
h. The billets, which are sourced externally, will be heated to 1150 to 1200°C, in a reheating furnace. The reheating furnace will use furnace oil as fuel.
i. The hot billets/ingots (indigenous/outsourced) are rolled through a series of roller mills (in the order of roughing mill, intermediate mill, first finishing mill, and second finishing mill) to obtain desired shapes and sizes.

j. Finishing operations of rolled product will result in ~2% of cuttings and trimming which is about ~5.0 MT/day, are reusable as input feed to induction furnace.

k. Rolling operations will also result in generation of <1% of mill scale (burnt/oxidized top layer of the rolled product) which is ~2Mt/day will be sold to authorized recyclers.

l. The flue gas emissions from the induction furnace, and LRF will be cleaned through gas cleaning device (bag-house filter) and dust collected will be sold to recyclers or disposed-off as hazardous waste through TSDF facility.

m. The combustion emissions from the reheating furnace will be cleaned through multi-cyclonic separator followed by a wet scrubber – for gas cleaning – before being discharged into atmosphere.

n. Water will be required to meet process cooling water make-up (~8.0 m3/day) and domestic requirement (~4.5 m3/day). The cooling water will be normal raw water for rolling mill activities and RO treated water for induction furnaces.

o. The domestic water consumption will result in generation of ~4.5 m3/day of domestic wastewater.

p. The wastewaters will be treated and entirely reused.

q. The electrical power requirement will increase to ~ ~12400 KVA

r. One DG set of 250 kVA already installed (as power back-up) and one DG of 500 KVA is proposed.

2.6.1 Induction furnace

A coreless induction furnace operates on a similar principle to a transformer, i.e., the induction coil acts as primary coil, having many turns, and the charge acts as a secondary coil, with only as single turn. When an alternating current is applied to the induction (primary) coil of a furnace, a significantly larger current is induced in the metallic charge materials. The resistance to the passage of induced 5 MVA current within the furnace charge causes the charge to heat up until it eventually melts. Once the metal is molten, the magnetic field generated creates a stirring action in the bath, producing both homogenization of the chemical composition and assimilation of any bath additions. Electrical energy at 11 kV (3-phase) is converted to 1250 V, through a transformer. It is further subjected to a 3-phase rectifier and inverter system which converts the power to single phase, high voltage-high frequency. The frequency converter amplifies the frequency from 50 Hz to 500 Hz. This power is applied to furnace coil to generate heat.

2.6.2 Continuous casting machine (CCM)

The machine is used to cast billets from the molten metal in a continuous fashion. Molten metal is tapped into the ladle from furnaces. After undergoing any ladle treatments, such as alloying and

degassing, and arriving at the correct temperature, the ladle is transported to the top of the casting machine. Usually, the ladle sits in a slot on a rotating turret at the casting machine. One ladle is in the "on-cast" position (feeding the casting machine) while the other is made ready in the "off-cast" position, and is switched to the casting position when the first ladle is empty.

From the ladle, the hot metal is transferred via a refractory shroud (pipe) to a holding bath called a tundish. The tundish allows a reservoir of metal to feed the casting machine while ladles are switched, thus acting as a buffer of hot metal, as well as smoothing out flow, regulating metal feed to the molds and cleaning the metal.

Metal is drained from the tundish through another shroud into the top of an open-base mold. The mold is water-cooled to solidify the hot metal directly in contact with it; this is the primary cooling process. It also oscillates vertically (or in a near vertical curved path) to prevent the metal sticking to the mold walls. A lubricant (either powder that melt on contact with the metal, or liquids) is added to the metal in the mold to prevent sticking, and to trap any slag particles – including oxide particles or scale – that may be present in the metal and bring them to the top of the pool to form a floating layer of slag. The shroud is set so the hot metal exits it below the surface of the slag layer in the mold.

In the mold, a thin shell of metal next to the mold walls solidifies before the middle section, now called a strand, exits the base of the mold into a spray chamber. The bulk of metal within the walls of the strand is still molten. The strand is immediately supported by closely spaced; water cooled rollers which support the walls of the strand against the ferro-static pressure (compare hydrostatic pressure) of the still-solidifying liquid within the strand. To increase the rate of solidification, the strand is sprayed with large amounts of water as it passes through the spray chamber; this is the secondary cooling process. Final solidification of the strand may take place after the strand has exited the spray-chamber.

It is here that the design of continuous casting machines may vary. This describes a 'curved apron' casting machine; vertical configurations are also used. In a curved apron casting machine, the strand exits the mold vertically (or on a near vertical curved path) and as it travels through the spray-chamber, the rollers gradually curve the strand towards the horizontal. In a vertical casting machine, the strand stays vertical as it passes through the spray-chamber. Molds in a curved apron casting machine can be straight or curved, depending on the basic design of the machine.

In a true horizontal casting machine, the mold axis is horizontal and the flow of steel is horizontal from liquid to thin shell to solid (no bending). In this type of machine, either strand or mold oscillation is used to prevent sticking in the mold. After exiting the spray-chamber, the strand passes through straightening rolls (if cast on other than a vertical machine) and withdrawal rolls. There may be a hot rolling stand after withdrawal to take advantage of the metal's hot condition to pre-shape the

final strand. Finally, the strand is cut into predetermined lengths by mechanical shears or by travelling oxyacetylene torches, is marked for identification, and is taken either to a stockpile or to the next forming process.

For hot rolling, the strands are allowed to continue through additional rollers and other mechanisms which flatten, roll or extrude the metal into its final shape.

2.6.3 Slag handling

The furnace slag is / will be taken out by means of spoons and collected in the slag boxes. The slag boxes will then be emptied on the ground after which, the slag is sent to Slag Crushing Unit, in-house for further process.

2.6.4 Reheating furnace

Reheating Furnace is used for heating of billets before hot rolling in Rolling Mill. The plan has an existing reheating furnace (coal fired). Reheating Furnace will be provided with dual type burners using FO. Billets will be heated to a temperature up to 1020oC. Billets will be directly fed from CCM to the rolling mill bypassing the reheating furnace. Reheating Furnace shall only be used for the billets purchased from the market or are not directly rolled due to any reason like shutdown of Polling Mill for Maintenance etc.

2.6.5 Rolled Product

After the billet formation hot billet will transfer to the rolling mill for making of TMT Bar. Rolling is the most rapid method of forming metal into desired shapes by plastic deformation in between rolls. The crystals are elongated in the direction of rolling, and they start to reform after leaving the zone of stress, but in cold-rolling they retain substantially the shape given to them by the action of the rolls.

In the hot rolling process, metal in a hot plastic state is passed between two rolls revolving at the same speed but in opposite direction. As the metal passes through the rolls, it is reduced in thickness and increased in length. The forming of bars, plates, sheets, rails and other structural sections requires many passes through plain or grooved rolls. Extruding is a process in which a heated billet or slug of metal is forced by high pressure through an office that is shaped to provide the desired form to the finished part. An everyday analogy is the squeezing of toothpaste from a collapsible tube. Because of the large forces required in extrusion, most metals are extruded hot under conditions where the deformation resistance of the metal is low. However, cold extrusion is possible for many metals and is rapidly taking an important commercial position.

The reaction of the extrusion billet with the container and die results in high compressive stresses which are effective in reducing the cracking of the materials during primary breakdown from the

ingot. This is an important reason for greater use of extrusion in the working of metals difficult to form, e.g., stainless steels, nickel-base alloys, and molybdenum.

Most hot extrusion is done on horizontal hydraulic presses especially constructed for this purpose. Common sizes are rated from 250 to 5500 tones. Temperatures of the billets 1200 to 1300^0C with pressures normally vary from 4998 to 7038 kgf/cm^2 (69 x 107 N/m^2). Lubrication of the extrusion chamber, die and ram is necessary and is ordinarily achieved by mopping with oil supported graphite. Vegetables oils are better than petroleum oil for this purpose. The extrusion of steel at high temperature is most successfully done by using glass which, at the temperatures involved, acts as a lubricant. By the process of hot rolling there will be saving of the energy as the hot metal directly passes to the rolling mill for production of TMT Bar. In this process the reheating furnace for the production of TMT bar has been skipped.

2.7 Machinery Requirement

All the equipment which is used during the operation period of the project is of latest technologies and having maximum efficiency.

TABLE 2-3 : LIST OF MACHINERY

S. No.	Machinery
1.	Induction Furnace
2.	Roughing Mill
3.	Reduction Gear
4.	Pinion Gear
5.	Electric Motor
6.	Electric Transformer
7.	Mobile Crane
8.	Shearing/Cutting Machine
9.	Striating Machine
10.	Lathe Machine
11.	Shaper Machine
12.	Roller of equal Angles & Channel of size 35, 40, 50, 65, 75&100, 75
13.	Drill Machine
14.	Grinder
15.	Welding Machine
16.	Electric Generator
17.	Reheating Furnace
18.	Slag Crusher

2.8 Water Demand

The total water requirement of the plant is estimated will be approximately 12.5 cum/day. Water will be sourced from ground water through bore-wells, permission for the same will be obtained from

CGWA. The existing ground water is having NOC is obtained for 5 kld vide NOC no - CGWA/NOC/IND/ORIG/2022/16798 dated : 18/10/2022 Details of water requirement is given below

S.No.	Particulars/Uses	Make-up Requirement (in Cum/day)
1.	Industrial Use	~45.0
2.	Domestic & other uses	~6.5
	Total	**~51.5**
*Reuse of treated waste water - for plantation and dust suppression		

2.9 Power Requirement

The electrical power requirement will increase to ~12400 KVA. Source of power is SBPDCL For Emergency Power: DG set of (250 (already installed) + 500 KVA (proposed) (as power back-up).

2.10 Sources of Pollution and Control Measures

2.10.1 Air pollution

a. The air pollution will be potentially through;
b. Process emissions from induction furnaces. The air pollution will be the result of the heating and melting process in the induction furnace. The gaseous emissions coming out of the mouth of the furnace crucible will be polluted and need cleaning before discharging it into the atmosphere.
c. The gaseous emissions will comprise of vapors/fumes, suspended particles, and some gases. The vapours are, primarily, of metals (chiefly iron) and metal oxides, oil/grease (in very low quantities). Dust and metal particles also contribute to the suspended particulates. Gaseous pollutants are, mainly, carbon di-oxide, carbon mono-oxide, and nitrogen oxides, though in very low amounts. The vapours on condensation, add to the strength of SPM.
d. The critical suspended particulate matter (SPM) concentration will be about 2000-2500 mg/Nm^3. Most of the particulates (about 75%) are expected to have size in the range of 1-5 microns. The emissions (after dilution) will have temperature of about 150-200°C.
e. As per the applicable statutory norms, the SPM level in the gas emission, at discharge point, shall not exceed 50 mg/Nm^3. Additionally, the stack height requirements for discharge of process emissions is also to be complied with.
f. Also, ambient air quality within the premises should not have particulate matter concentration exceeding 100µg/m^3 on 24-hour basis, and 60µg/m^3 averaged on annual basis.

g. Combustion emissions – from reheating furnace. The air pollution is a result of the combustion process in the reheating furnace. The complete combustion, of hydrocarbons, can be represented as; $C_xH_y + (4x + y)/4\ O_2 \longrightarrow xCO_2 + (y/2)\ H_2O$

h. The flue gas coming out of the furnace, where the coal/furnace oil is used as fuel, is expected to be polluted and needs to be cleaned before discharging it into the atmosphere. For a system where complete combustion is taking place in excess air, the pollutants of concern, in the flue gas, are ash, in the form of suspended particulate matter (SPM), and sulphur dioxide, from the sulphur present in the fuel. The quantity of SO_2 generated can be estimated, stoichiometrically, based on the equation; $S + O_2 \longrightarrow SO_2$

i. From the equation, every 32 g of S gives 64 g of SO_2, i.e., the ratio of the quantity of S combusted to that of SO_2 produced is 1:2.

j. As per the statutory norms (as applicable to the industry), the flue gas emission shall not have SPM levels (in the stack) exceeding 50 mg/Nm^3. Regarding sulphur dioxide, adequate stack height shall be provided for proper dispersion.

k. Ultimate analysis of furnace oil (commonly used grade – HV) is: ash – 0.1%; C – 84%; H – 11%; N – 0.04%; S – 4%; O – 0.6%.

A. Flue Gas management

The flue gases generated during melting of raw material are the major source of air pollution. Quality and quantity of flue gases mainly depends upon type of raw material used in Furnace, i.e. degree of contamination in the raw material. These flue gases need proper treatment for removal of dust particles before being discharged into the atmosphere. Major pollutants generated in the process will be Carbon Dioxide, Carbon Monoxide, suspended dust (PM10, PM2.5, Heavy metals like As, Cr, Pb, Cd, Zn & Mn), Sulpher Dioxide (traces), Oxides of Nitrogen (in low concentration, depending on the temp of the process) and Emissions from DG sets. Currently the Air Pollution Control Device (APCD) unit is installed at the facility & its capacity will be increased in accordance with the proposed expansion to control the emissions within permissible limit will be let-out through stack.

2.10.2 IF Gas Cleaning System

Separate fume extraction and gas cleaning facilities is / will be provided for the IF to extract the furnace fume through the roof and discharge it to the atmosphere after cleaning. The gas cleaning system will be complete with water cooled duct, gas cooler, bag house, ID Fan and sufficiently tall (30 meters) stack. The cleaned gas discharged into the atmosphere will have a dust content well within statutory limits of CPCB. The dust collected in the bag house will be stored in a dust silo. Periodically the dust will be loaded into trucks for disposal.

B. Hazardous Waste Management

There is no hazardous waste from the plant except for used oil (approx. 02-0.3 KL/Year) from equipment, which will be stored properly as per norms and is saleable to the registered recyclers in the market

C. Solid Waste

Solid waste will include;

Slag @~9,500 TPA, In-house metal recovery in slag crusher and supplied outside for further reuse in construction work.

End cuttings & Mill Scale @ ~13,500 TPA Recycled in-house along with scrap in the induction furnace.

Bag Filter Dust from process @ ~600 TPA, Partly recycled (metal content). Rest supplied outside for further reuse in construction work and Low land filling

D. Green Belt

The 33% area of the plant premises i.e. 12,280.9 sqm within the site is having existing tree plantation which is considered as green belt for the proposed project.

All the existing trees will be retained at site and no tree will be cut without having permission from the competent authority.

2.10.3 Selection Criteria of plant species for Green Development Plant

The selection of plant species for the development depends on various factors such as climate, elevation and soil. Area falls under the tropical region and thus the plants that area adapted to this condition should be selected. The plant should exhibit following characteristics in order to be selected for plantation.

a) The species should be fast growing and providing optimum penetrability.
b) The species should be wind firm and deep rooted
c) The species should form a dense canopy.
d) As far as possible, the species will be locally available
e) Species tolerances to air pollutants like PM, SO_2, and NOx should be preferred.
f) The species should be permeable to help create air turbulence and mixing within the belt.
g) There should be no large gaps for the air to spill through.
h) Tree with high foliage density, leaves with larger leaf area and hairy on both the surface.
i) Ability to withstand conditions like inundation and drought.
j) Soil improving plants (Nitrogen fixing, rapidly decomposable leaf litter).
k) Attractive appearance with good flowering and fruit bearing.
l) Bird and insect attracting tree spacing

2.11 Resource optimization/Recycling and reuse

Various steps shall be taken for recycle/ reuse in the proposed project is as mentioned below:

Wastewater generated shall be mainly from cooling and same shall be reused within the plant premises after neutralizing. Dust from Bag filters are hazardous materials generated on site, will be stored and transported to TSDF site as per Hazardous and Other Wastes. Slag crushing unit are used for metal recovery and same will be used for recycling.

3 DESCRIPTION OF ENVIRONMENT

3.1 Introduction

As a precursor for the prediction of various types of environmental impacts likely to arise due to implementation of the project, it is essential to establish the baseline environmental setting of the physical, natural and socio-cultural environmental parameters along the project and within the project influence area. Details of the baseline environmental parameters are required for assessing background environmental quality, and also for decision making for the project design, implementation and operation from the environmental point of views. The data is generated through primary data collection (direct monitoring) and secondary sources (published data).

This chapter contains information on existing environmental scenario for the following parameters.

1. Land Environment
2. Meteorology
3. Air Environment
4. Noise Environment
5. Water Environment
6. Soil Environment
7. Biological Environment
8. Socio-economic Environment

3.2 Environmental Baseline Data Collection

Baseline data for the proposed project was collected during Pre-Monsoon Season March 2022 to May 2022 to assess the present scenario of the area.

3.2.1 Primary Data

An area, covering a 10 km radial distance from the project site is considered as study area for the purpose of baseline studies. The environmental monitoring for the study, for the proposed project, was undertaken for the pre-monsoon season. Initially, a reconnaissance survey of the study area was carried out and then field monitoring for measuring ambient air quality, water quality, and soil quality and noise levels was carried out from March 2022 to May 2022. In addition, certain aspects like land area, socio-economic status, climatological conditions, etc., have been analyzed based on secondary information available from sources like district census reports, district gazetteers, Indian Meteorological Department, etc. The baseline status of various environmental components is described in the succeeding sections.

For baseline environmental monitoring services of an NABL & MOEF&CC accredited approved laboratory – was engaged for sampling and analyses.

TABLE 3-1: PRIMARY DATA COLLECTION

Sl. No.	Description
1.	**Meteorology** Meteorological parameters on hourly basis at project site. Parameters: Temperature, Relative humidity, Wind Speed & Wind Direction.
2.	**Air** Ambient air quality monitoring (24 hourly), twice a week. Parameters: PM10, PM2.5, SO2, NO2 & CO. No. of Locations: **08** locations in core and buffer zone.
3.	**Noise** Noise level monitoring (day & night time), once in a season. No. of locations: **08** locations in core and buffer zone.
4.	**Water** Ground water sampling, once in a season. No. of Locations: **08** locations in core and buffer zone. Tested for physical and chemical parameters. Surface water sampling, once in a season. No. of Locations: **08** locations in core and buffer zone. Tested for physical and chemical parameters.
5.	**Soil** Soil sampling, once in a season. No. of Locations: **08** locations in core and buffer zone.
6.	**Biological Environment.** Biodiversity survey, once in a season. Location: Core and buffer zone.
7.	**Socio-economic Environment** Socio-economic survey, once in a season. Location: Core and buffer zone.

3.2.2 Source of Primary Data

The Primary data has been collected by ENVIRO-TECH SERVICES. NABL & MOEF accredited Lab. Correspondence address & Lab: -Plot No. 1/32, South Side G.T. Road Industrial Area Ghaziabad (UP)-201001. Head Office: - G-232, M.G. Road Industrial Area, Harpur -Ghaziabad (UP)-201015.

3.2.3 Instrument used for Environmental Baseline Data Collection

The following instruments were used at the site for environmental baseline data collection work.

1. Respirable Dust Sampler with attachment for gaseous Pollutants.
2. Fine Particulate Matter (FPM) Sampler
3. Weather Monitoring Station.
4. Global Positioning System (GPS).
5. Digital D.O. Meter.
6. Sound Level Meter Model

Apart from collecting samples of air, water, noise and soil from representative sampling points given in proceeding sections, the data on land use, vegetation and agricultural crops were also collected by the field team through interaction with a large number of local inhabitants of the study area and different Government departments / agencies. This has provided an excellent opportunity to the members of the field team for obtaining clear scenario of the existing environment of the study area.

3.3 Secondary Data

The secondary data collected from different Department has been mentioned in Table 3.2

TABLE 3-2: SOURCE OF SECONDARY DATA

Sl. No	Description	Source
1	Land Use & Topography	Survey of India (SOI) Maps Google Maps GIS Revenue Record
2	Hydrology	District Hand book
3	Geology	District Hand book
4	Meteorology	Indian Metrological Department (IMD)
5	Ecology	IUCN, Forest department ZSI and BSI
6	Socio Economic	Census 2011 Administrative Atlas

3.4 Location & surrounding features

The site is located at Khirodharpur, Fatuha, Patna-803201 at Khata and plot no the site is as below: Khata No 123, 113, 114, 155, 118, 127 Khasra No – 536, 531, 532, 533, 524, 535, 527, 528, 534. Proposed plan will be done on the an area of 3.721 ha (9.196 Acres) which is owned by the project proponent. The Project is located near to Fatwah town of Bihar. It is well connected NH-31 at a distance of approx. 1.74 km, NH-431 at a distance of approx. 2.87 km and Patna- Bakhtiyarpur Rd at a distance of approx. 0.36 km towards North. The neighboring city Fatwah located about 2.67 km away from project site. The nearest railway station is Fatuha Railway station about 2.48 km in West direction The Nearest Airport is Patna Airport about 25.93 km away from project site.

3.5 Geology

The Proposed project is located in Patna. Patna is situated on the Southern bank of river Ganges in the Eastern part of the Indo-Gangetic plain which is characterized with the presence of highly fertile alluvial soil. It is situated on the converge of three rivers- the Ganges, Sone and Punpun, each coming from the East, South and North direction respectively. Not far away is the converge of Ghaghra and

Gandak river into the Ganga, making the area as one of the largest riverine of the world. The width of river Ganges stretches from 4-6 km at Patna.

3.6 Climate & Rainfall

The climate of the district is somewhat extreme in nature, i.e., quite hot during the summer and fairly cold during the winter. January is the coldest month. The temperature starts rising from March and reaches its peak in May. Rain starts sometime in mid-June and lasts till mid-September. Maximum rains occur during the monsoon months of July and August. Sometimes winter rains occur in Jan-February. The normal annual rainfall in the district is around 1076 mm.

Source: http://cgwb.gov.in/District_Profile/Patna/BIHAR.pdf .

3.7 Soil Classification

Soils are predominantly sandy loam with clay loam at places with low to medium nutrient status. It is generally alkaline with pH value ranging from 6.3 to 8.2. Traditionally soils in an area are classified on the basis of mode of deposition. Soils are divided into three groups viz. (i) Recent alluvium (ii) Tal and (iii) Older alluvium. The soils of the district have developed on alluvial deposits transported from relatively younger geological formations where physical weathering is predominant and the soils developed in them are generally coarser in texture

3.8 Seismology

Project comes under India's seismic zone-IV, indicating its vulnerability to major earthquakes, but earthquakes have not been common in recent history. Patna also falls in the risk zone for floods and cyclones.

3.9 Drainage Pattern of the area

The district falls in the Ganga Basin and is drained by the mighty Ganga in the north, by the Sone in the West, and by the Punpun, Falgu and their tributaries in the central part of the terrain.

3.9.1 Hydrogeology

The area is underlain by Quaternary alluvial formation comprising various grades of clay, silt, sand with occasional and gravel. From the groundwater potential point of view the entire district falls under good to very good category. The presence of *kankar (nodules of* $CaCO_3$) and fine sand at places render the top clay zone semi-pervious in nature, where ground water occurs under phreatic condition. The deeper aquifers are made up of medium to coarse grained sand with occasional gravels.

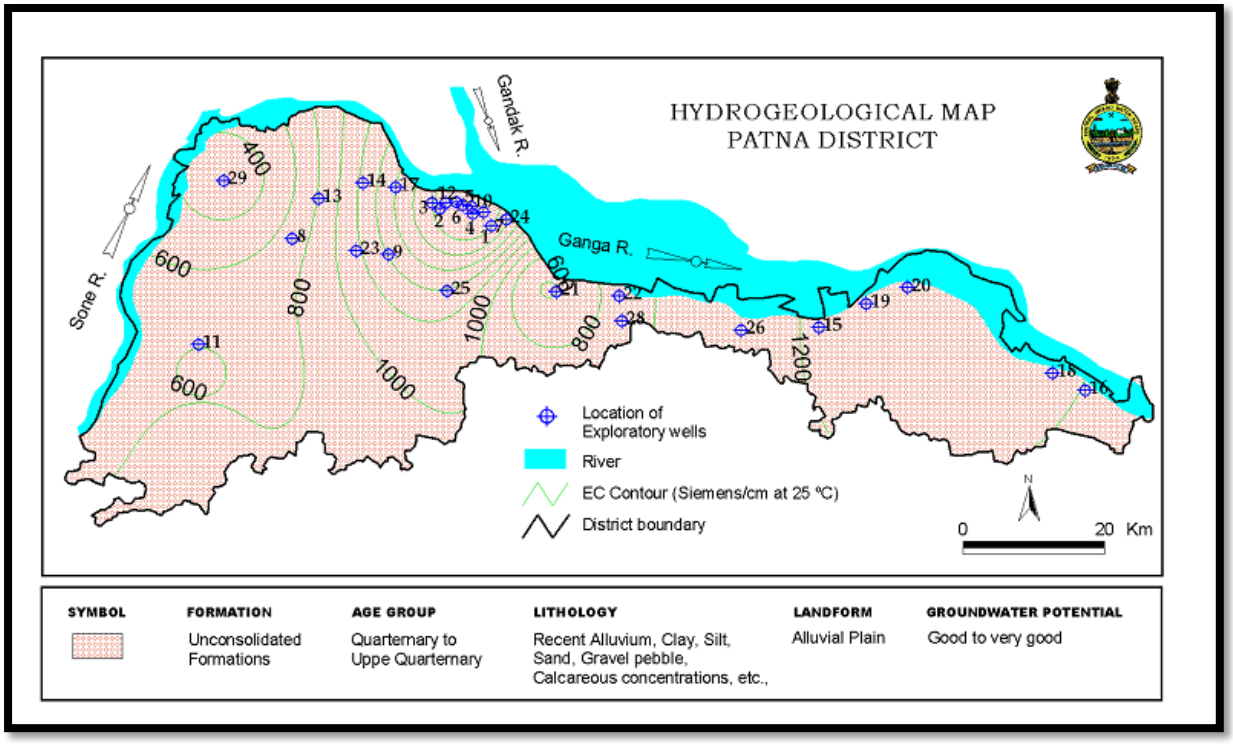


FIGURE 3-1: HYDROGEOLOGICAL MAP OF THE PATNA DISTRICT

3.9.2 Depth to Water Level

The depth from ground at which the ground water rests is called Depth to Water level. It is deepest during pre-monsoon and attains its maximum peak. It is shallowest during August and again stabilizes during the month of November and this level represents post-monsoon level.

a) Pre-Monsoon Depth Water Level

During pre-monsoon season, the minimum and maximum water levels were observed as 3.64 and 10.09 m bgl respectively. About 20 % of the wells have the water level in the range of 2 – 5 m bgl. In majority of the wells (70 %), the water levels remain in the range of 5 – 10 m bgl. The spatial distribution of water levels during this season reveals that the south-west and central parts of the district are observed with a depth range from 2 to 5 m bgl while in the eastern part the depth to water level is > 10 m bgl.

b) Post- Monsoon Depth Water Level

The water level measurement during post-monsoon season ranges from 1.40 to as deep as 7.12 m bgl. There are each 45.45 % of wells observed in depth range of 0 – 2 and 2 – 5 m bgl whereas about 18.18 % of wells observed in 5 – 10 m bgl depth range. Spatial distribution of water level shows that maximum area is covered with the range of 2 to 5 mbgl. In the southern, central & eastern part of the area water level is > 10 m bgl (Fig. 5).

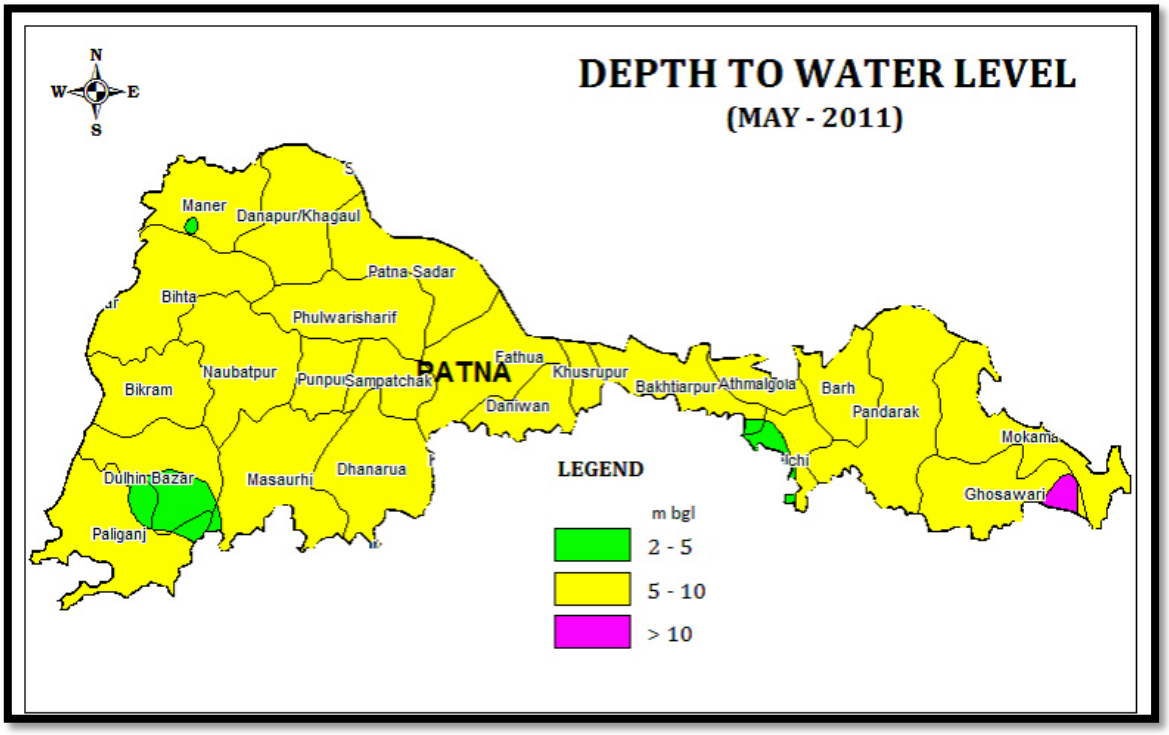


FIGURE 3-2: DEPTH OF WATER LEVEL MAP OF THE AREA (PRE-MONSOON)

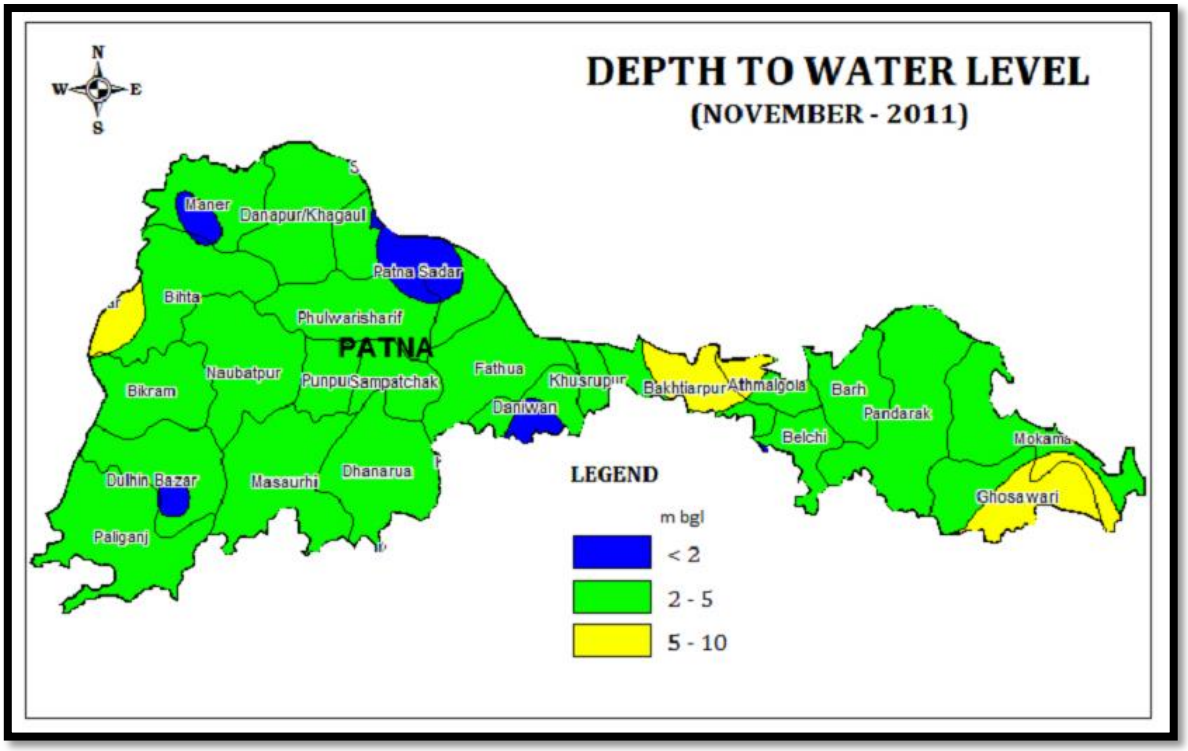


FIGURE 3-3: DEPTH OF WATER LEVEL MAP OF THE AREA (POST MONSOON)

3.10 Land Environment

Landuse Landcover Analysis For Kaalendi Ventures LLP.

Landcover data highlights the area covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. Water types include wetlands or open water. Landuse shows how people use the landscape for development, conservation or for other purposes. Therefore its highlights the current scenario as well as predict the impact.

1. **Objectives:** Main objectives are:

•To prepare the landuse landcover map of study area based on recent satellite imageries.

•To assess the impact of proposed project on existing landuse and landcover

•To suggest mitigations measures

2. Hardware: The equipment used during the present investigation includes ground truth hand held GARMIN 12 GPS receiver for ground truth collection, besides the visual observation and analysis.

3. Software: The following software were applied to extract indicators and maps:

- **ERDAS Imagine:** The Erdas imagine version 2016 is used to process Landsat-8 satellite data and to extract the required indicators through spatial & spectral analysis.

- **ArcGIS:** The ArcGIS version 10.3 has been used to prepare the final Maps for indicators through the outcomes of ERDAS software.

4. Methodology: The methodology applied for the study involved obtaining satellite images from open source, and then using a range of software to process the images and also by GPS coordinates (ground truthing) for drawing observations. The detailed methodology is explained as below:

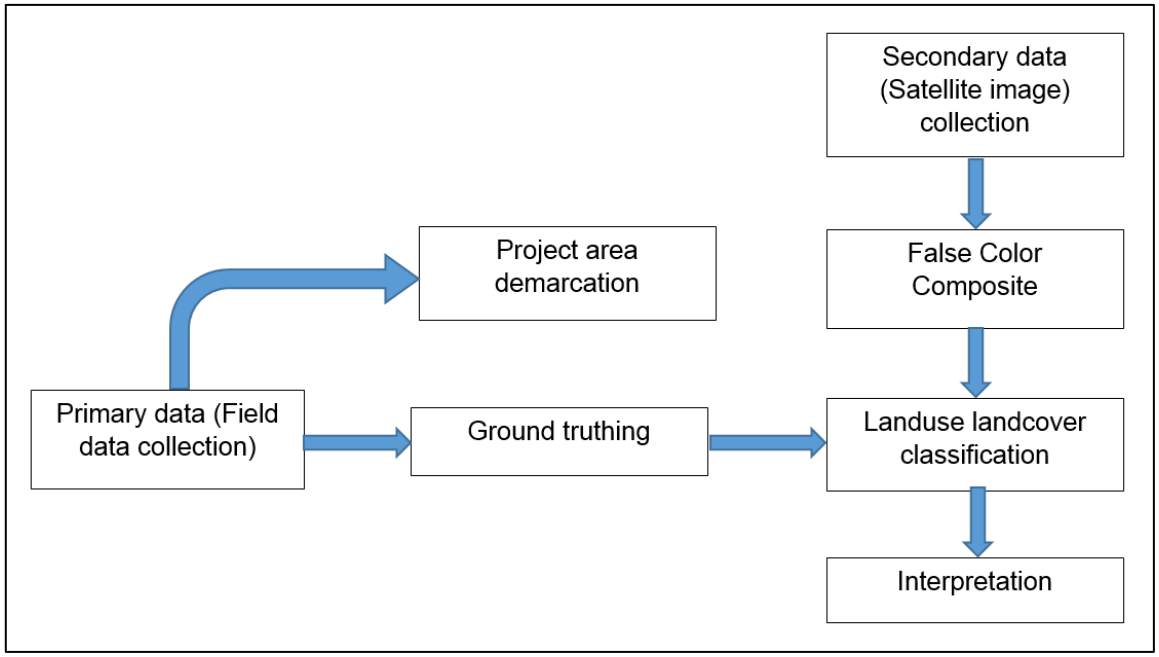


FIGURE 3-4: FLOW CHART: METHODOLOGY

- **Primary Data:** The coordinates along land features of project area is collected with the help of GPS device for ground truthing. This data is primary data. On the basis of this data, landuse landcover analysis is appropriate.

- **Secondary Data:** Satellite image (secondary data) is required to show the current land features of the project area and buffered area (10 km). Landsat 8 Satellite image is used, which is collected from open source.

The path, row, date, resolution of satellite data used were as follows.

Path	141
Row	42
Date of pass	11 April 2022
Resolution (panchromatic)	15 Meter

Landsat 8 Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) images consist of nine spectral bands with a spatial resolution of 30 meters for Bands 1 to 7 and 9. The ultra-blue Band 1 is useful for coastal and aerosol studies. Band 9 is useful for cirrus cloud detection.

False Color Composite (FCC): False color (or false colour) refers to a group of color rendering methods used to display images in color which were recorded in the visible or non-visible parts of the electromagnetic spectrum. A false-color image is an image that depicts an object in colors that differ from those a photograph (a true-color image) would show. False-color image sacrifices natural color rendition in order to ease the detection of features. The FCC for 10 km buffer zone of the project area is shown in **Figure 3.6**.

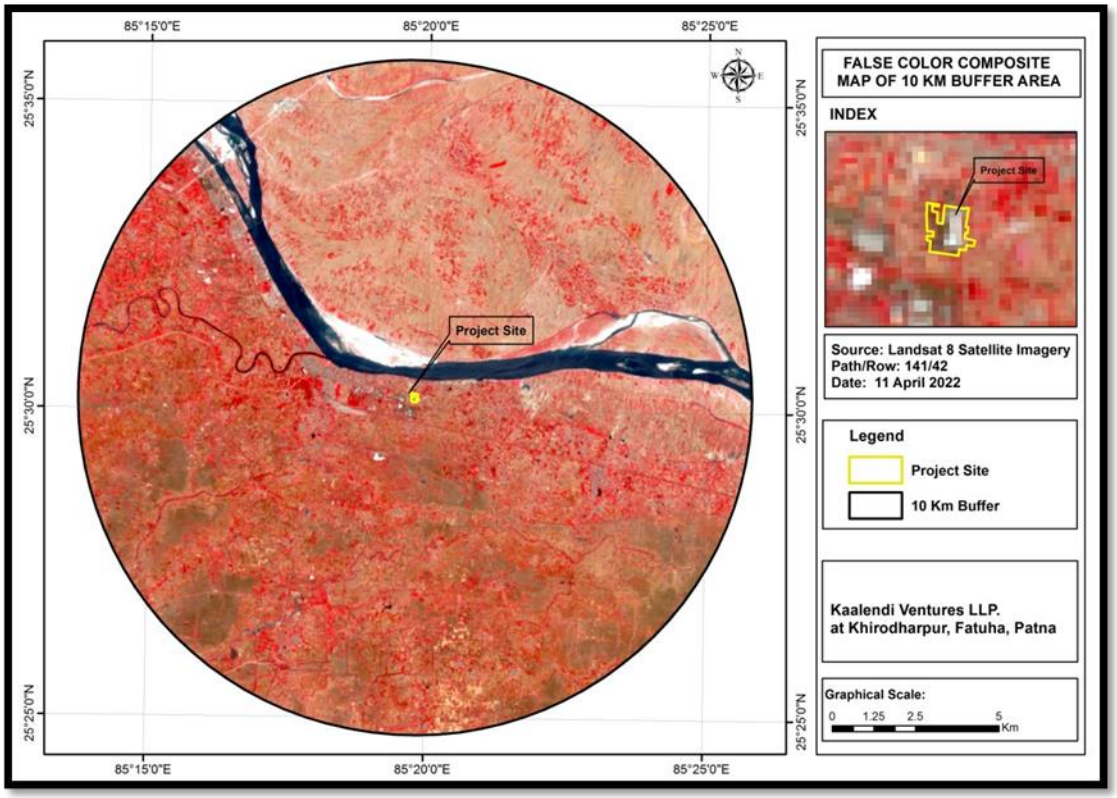


FIGURE 3-5: SHOWS THE FALSE COLOR COMPOSITE MAP OF THE STUDY AREA

Land use landcover classification & Interpretation: The classification approach is applied on the basis of various characteristics like colour, texture, shape, association etc. The Landuse landcover map for 10 km buffer zone of the project area is shown in **figure 3.5.**

The unsupervised classification approach was obtained for the Landuse and Landcover classification by using ERDAS Imagine software. In this approach, the pixels of the project area are clustered in several classes on the basis of spatial & spectral variation in pixel value which are following:

I. **Built-up land:** 3.17 per cent of the total project area is covered by built-up land. The entire built-up land comes under rural areas. This area is identified by grey color and square/rectangular shape in the satellite image. Built-up land can be described as an area of intensive use with much of the land covered by structures. Areas included in this category

are cities, towns, villages, strip developments along with highways, transportation, power, and communications facilities, and other areas such as those occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may, in some instances, be isolated from built-up areas.

II. **Agricultural land:** 44.21 per cent of the total project area is covered under agricultural land. Agricultural land may be defined as the land that is used primarily for the production of food and fiber. In the satellite imageries, cropland is identified by light pinkish to dark pinkish color or red, fine texture and rectangular/square shape.

III. **Agricultural fallow land:** It is the type of cropland which is not seeded for a season so as to allow the fields become fertile again. The practice of allowing fields to remain fallow dates back to ancient times when farmers realized that using soil over and over again depletes its of its nutrients. Agricultural fallow land covers 46.57 per cent of the total project area.

IV. **Open Land:** Open land is any degraded land or a land which is currently underutilized but can be brought under vegetative cover with reasonable efforts. This type of land covers 0.30 per cent of the total project area. This area is identified by off-white color and rough texture in the satellite image.

V. **River/Water Bodies:** All natural and man-made ponds, reservoirs, river come under this class. A river is a natural flowing watercourse, usually freshwater, flowing towards an ocean, sea, lake or another river. In some cases a river flows into the ground and becomes dry at the end of its course without reaching another body of water. This feature is identified by dark blue to black color, fine texture in the satellite image and cover only 4.09 percent of the total project area.

VI. **Riverbed:** A riverbed or streambed is the channel bottom of a stream or river, the physical confine of the normal water flow. The riverbed of the project area is consist of sand and cover only 1.65 percent of the total project area. This area is identified by white color and fine texture in the satellite image.

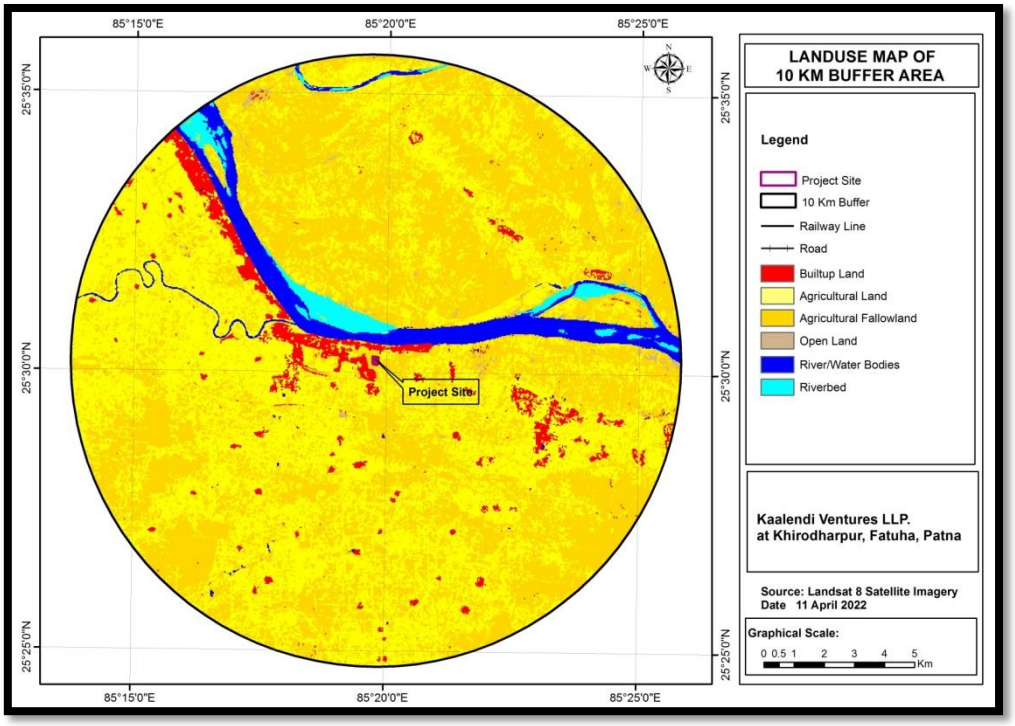


FIGURE 3-6: SHOWS LAND USE LANDCOVER CLASSIFICATION

On the basis of the landuse landcover classification, the areas of different land features are as follows:

Class Name	Area (Ha)	Area (%)
Built-up Land	1024.61	3.17
Agricultural Land	14309.50	44.21
Agricultural Fallow land	15073.90	46.57
Open Land	97.97	0.30
River/Water Bodies	1324.91	4.09
Riverbed	534.08	1.65
Total	32364.97	100.00

Impact Analysis:

This Project has some anticipated impacts which are as follows

1. Creation of employment, quality shelter and improved infrastructure.
2. The surrounding land use pattern will be changed. The agricultural and agricultural fallow land will be changed into residential area.
3. Road network will be developed.
4. Impact on the public utilities arising out of the utilities for the project activities.
5. Impact on the natural drainage system and soil erosion.
6. Impact of construction activity on the fertility status of soil in the study area

Mitigation measurement:

Mitigation measures are means to prevent, reduce or control adverse environmental effects of a project, and include restitution for any damage to the environment caused by those effects through replacement, restoration, compensation or any other means. The mitigation measures are as follows:

1. Selection of suitable local plant species for greenbelt development in and around the sites.
2. Top soil conservation plan and its re-utilization depending on its quality
3. Recycling of recyclable non-biodegradable garbage and only non-recyclable portion shall be handed over to local authority to reduce the load on dumping grounds

3.10.1 Regional Meteorology

Temperature: The temperature of the district varies between mean minimum temperature of 5°C in winters and mean maximum temp. of 40°C in summer. Temperature varies between 40°c to 46°c in general.

Rainfall: The average rainfall (10 years) in the district is 1125.1mm. Monthly average rainfall of the district is given below-

Month	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	4.5	6	8	6.7	25.1	165.7	323.7	322.9	214.3	40	4.0	4.2

3.10.2 Wind Rose

The wind direction is predominantly from NE to SW during summer season study period. The wind rose diagram prepared from data collected at site is shown in **Fig. 3.8.**

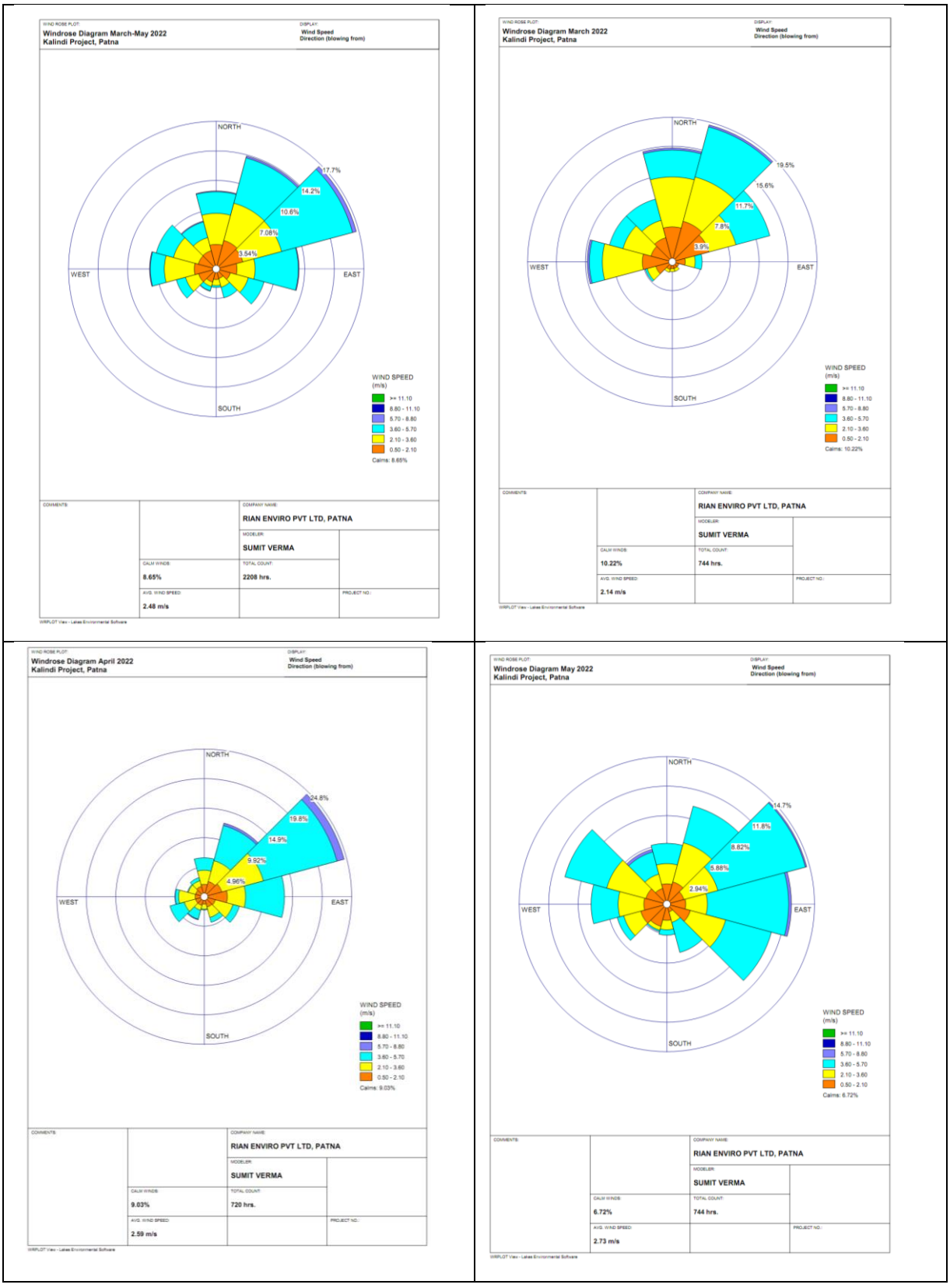


FIGURE 3-7: WIND ROSE DIAGRAM

3.10.3 Interpretation of Micrometeorological Data

Wind rose diagrams indicate that dominant wind direction was NE to SW. Based on micrometeorological data of wind direction and wind speed it is interpreted that chances of maximum dispersion of pollutants will be in SW during the period March-2022 to May-2022.

3.11 Air Environment

3.11.1 Reconnaissance

The quality of ambient air depends upon the background concentrations of specific contaminants, the emission sources and meteorological conditions. The study on baseline ambient air quality status in the project area is an essential and primary requirement for assessing the impacts on air environment due to any proposed developmental activity.

The baseline studies on air environment include identification of specific air pollution parameters expected to have significant impacts and assessing their existing levels in ambient air within the impact zone. To assess the baseline status of ambient air quality in the study area, monitoring is undertaken to ascertain the baseline pollutant concentrations in ambient air.

3.11.2 Methodology for air Monitoring

AAQM was carried out and AAQM locations were monitored on 24 hourly average bases twice in a week as per guidelines of CPCB and NAAQS. The conventional and project specific parameters such as particulate matter PM10 (size less than 10 µm), particulate matter PM2.5 (size less than 2.5µm), Sulphur Dioxide (SO_2) & Oxides of Nitrogen (NOx) were monitored during the period of March 2022 to May 2022.

3.11.3 Selection of Stations for Sampling

For EIA, the purpose is to ascertain the baseline pollutant concentrations in ambient air. Accordingly, the criterion can be selected to ascertain quality of air on human settlements or environmentally sensitive areas if any located in the 10 km radius study area.

The locations for AAQM study were selected within the 10 km radius of the proposed project. Ambient air quality was monitored on 08 locations to generate representative ambient air quality data.

TABLE 3-3: AMBIENT AIR QUALITY MONITORING LOCATIONS

Sample ID	Monitoring Location	Distance & Direction from project site	Coordinates
AAQ1	Project Site	----	25°30'15.78"N 85°19'49.12"E
AAQ2	Government office Khirodharpur	0.23, NE	25°30'20.73"N 85°19'54.89"E
AAQ3	High School Chandpura Raghopur	4.45, NNE	25°32'33.56"N 85°20'27.16"E
AAQ4	Middle school Jafrabad	3.54, SSW	25°28'16.56"N 85°18'56.08"E
AAQ5	Daffodils Public	2.89, WNW	25°30'41.32"N 85°18'5.21"E
AAQ6	Baikathpur	4.91, ESE	25°29'35.31"N 85°22'38.77"E
AAQ7	Rasulpur Kurtha	3.81, West	25°30'13.06"N 85°17'25.72"E
AAQ8	Middle School, Katauna	4.60, SSE	25°28'28.01"N 85°21'48.52"E

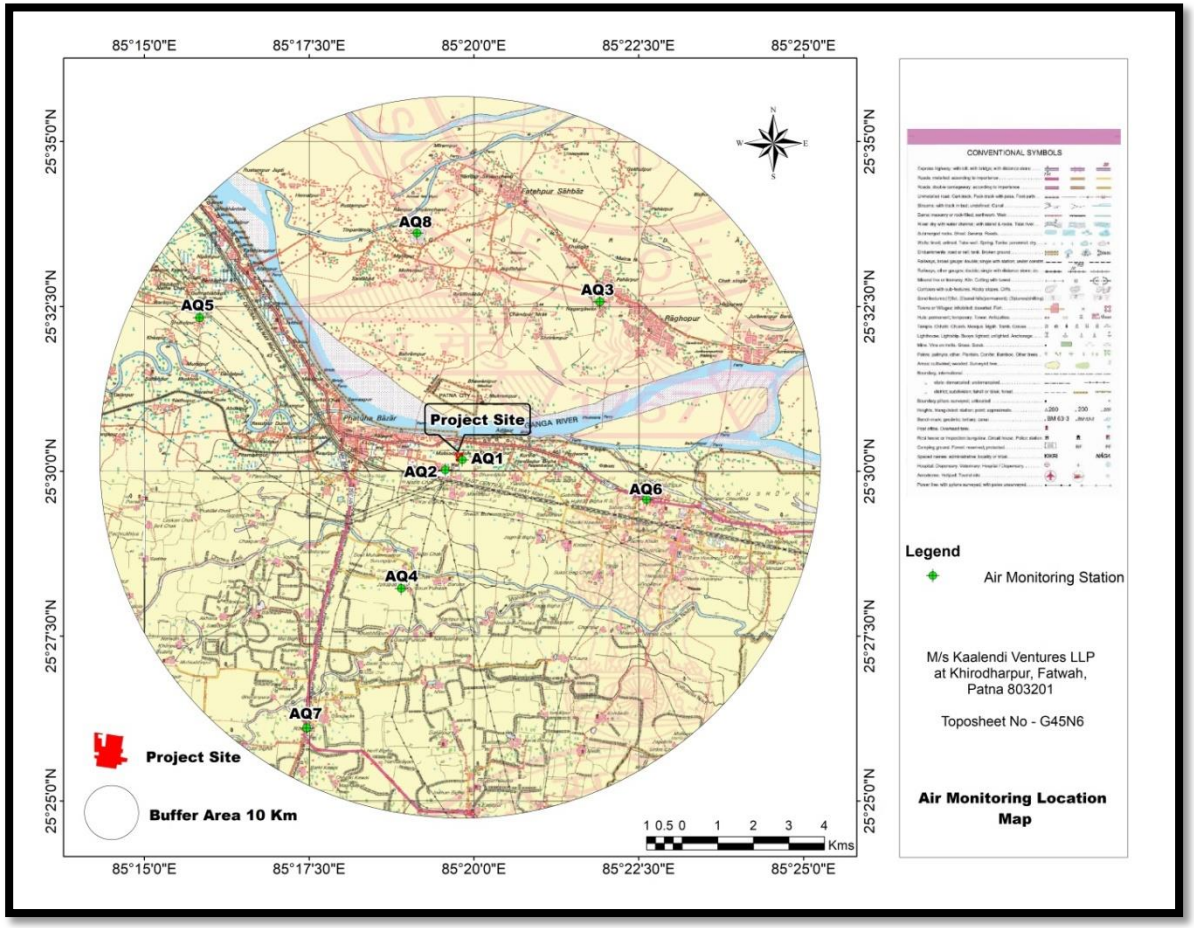


FIGURE 3-8: AMBIENT AIR MONITORING LOCATION MAP

TABLE 3-4: SUMMARY OF AMBIENT AIR QUALITY IN STUDY AREA

Parameter		AQ1	AQ2	AQ3	AQ4	AQ5	AQ6	AQ7	AQ8	NAAQS
		Project Site	Government office Khirodharpur	High School Chandpura Raghopur	Middle school Jafrabad	Daffodils Public	Baikathpur	Rasulpur Kurtha	Middle School, Katauna	
PM_{10} ($\mu g/m^3$)	Min.	154.36	146.68	143.77	139.33	131.98	133.46	126.94	125.76	100
	Max.	198.74	192.58	189.01	182.90	173.30	191.22	180.58	178.90	
	Mean	171.82	164.73	159.99	156.48	148.25	149.20	153.77	152.35	
	98 %*	198.46	191.95	186.96	182.34	172.74	182.06	179.75	178.08	
$PM_{2.5}$ ($\mu g/m^3$)	Min.	82.54	78.43	76.88	74.56	70.63	71.36	73.01	80.15	60
	Max.	124.94	104.88	116.43	99.59	94.32	108.00	116.50	127.89	
	Mean	96.84	87.91	89.84	83.58	79.18	83.40	84.65	92.93	
	98 %*	124.28	104.29	115.76	99.02	93.79	107.40	115.01	126.25	
SO_2 ($\mu g/m^3$)	Min.	10.64	10.36	9.40	11.40	10.40	9.60	9.99	11.10	80
	Max.	17.77	15.39	15.70	18.50	17.60	14.25	15.12	16.80	
	Mean	14.49	12.59	12.78	14.11	12.86	11.73	12.24	13.60	
	98 %*	17.63	15.26	15.56	17.78	16.59	14.21	14.87	16.52	
NO_X ($\mu g/m^3$)	Min.	27.65	23.85	24.40	23.85	23.90	21.76	25.35	31.30	80
	Max.	35.25	30.40	31.10	32.54	30.40	27.74	37.18	45.90	
	Mean	30.70	26.49	27.05	26.82	26.72	24.25	31.60	39.01	
	98 %*	34.59	29.88	30.55	31.56	29.89	27.22	36.77	45.39	

(CO) (mg/m^3)	**Min.**	1.46	1.54	0.97	1.02	0.99	0.90	0.85	0.93	**1 Hrs.=04**
	Max.	3.95	4.17	4.19	4.26	3.23	4.72	3.11	5.12	
	Mean	2.74	2.71	2.68	2.72	2.31	2.29	1.53	1.76	
	98 %*	3.91	4.07	4.04	4.19	3.23	4.03	3.06	4.34	

TABLE 3-5: NATIONAL AMBIENT AIR QUALITY STANDARDS AND METHODS OF MEASUREMENT

Sr. No.	Pollutants	Time Weighted Average	National Ambient Air Quality Standards (NAAQS)		
			Industrial, Residential, Rural and other area	Ecologically Sensitive Area	Methods of measurement
1	SO_2 (µg/m^3)	24 hours	80	80	Improved West and Gaeke method.
2	NOx (µg/m^3)	24 hours	80	80	Modified Jacob & Hochheiser (Sodium Arsenite).
3	PM_{10} (µg/m^3)	24 hours	100	100	Gravimetric Method
4	$PM_{2.5}$ (µg/m^3)	24 hours	60	60	Gravimetric Method
5	CO (mg/m^3)	8 hours	2	2	Non-Dispersive Infra-Red Spectroscopy

(Source: http://cpcb.nic.in/National_Ambient_Air_Quality_Standards.php)

The summary of results of ambient air quality monitoring of PM2.5, PM10, SO2, NO2, VOC are presented in Table 3-14. Detailed monitoring results are given in Annexure- XIII. The graphical representation of ambient air quality in the study area is given in Figure 3.8 to Figure 3.11. On the basis of tabulated data in Table 3-14, the following observations can be made:

Particulate Matter (PM_{10})

The maximum and minimum concentrations for PM10 were recorded as 198.74µg/m3 and 125.76µg/m3, respectively. The maximum concentration of PM10 was recorded at the (AAQ1) Project Site and minimum concentration was observed at (AAQ8) Middle School, Katauna. The average concentrations range between 148.25µg/m3 to 171.82µg/m3. 98th percentile values for PM10 during study period range between 172.74µg/m3 to 198.45µg/m3.

Fine Particulate Matter (PM2.5)

The maximum and minimum concentrations for $PM_{2.5}$ were recorded as 127.89µg/m^3 and 70.63µg/m^3, respectively. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ5) Daffodils School. The average concentrations range between 79.18µg/m^3 to 96.84µg/m^3 was recorded. 98th percentile values for $PM_{2.5}$ during study period range between 93.79µg/m^3 to 126.25µg/m^3.

Nitrogen Oxide (NO2)

The maximum and minimum NO_2 concentrations were recorded as 45.90µg/m^3 and 21.76µg/m^3. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ6) Baikathpur. The average values for NO_2 were observed in the

range between 24.25µg/m^3 to 39.01µg/m^3. 98th percentile values for NO_2 during study period range between 27.22µg/m^3 to 45.39µg/m^3.

Sulphur Dioxide (SO_2)

The maximum and minimum SO_2 concentrations were recorded as 18.50µg/m^3 and 9.40µg/m^3. The maximum concentration was recorded at (AAQ4) Middle School, Jafrabad and the minimum concentration was recorded at (AAQ3) High School, Chandpura. The average values for SO2 were observed in the range between 11.73µg/m^3 to 14.49µg/m^3. 98th percentile values for SO2 during study period range between 14.21µg/m^3 to 17.78µg/m^3.

Carbon Monoxide (CO)

The maximum and minimum CO concentrations were recorded as 5.12mg/m^3 and 0.85mg/m^3. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ7) Rasulpur, Kurtha. The average values for CO were observed in the range between 1.53mg/m^3 to 2.74mg/m^3. 98th percentile values for CO during study period range between 3.06mg/m^3 to 4.34 mg/m^3.

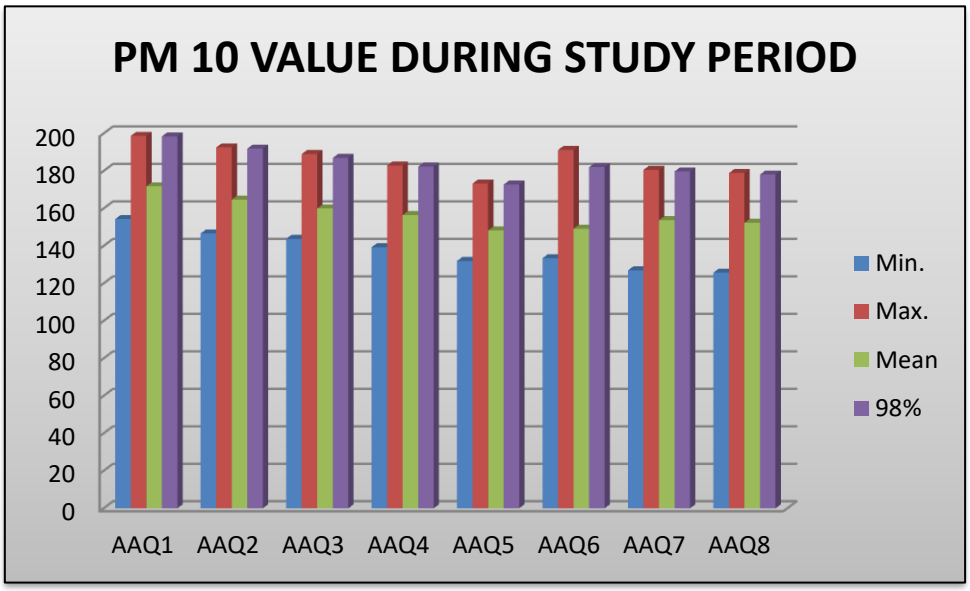


FIGURE 3-9: PM10 VALUES OF THE STUDY PERIOD

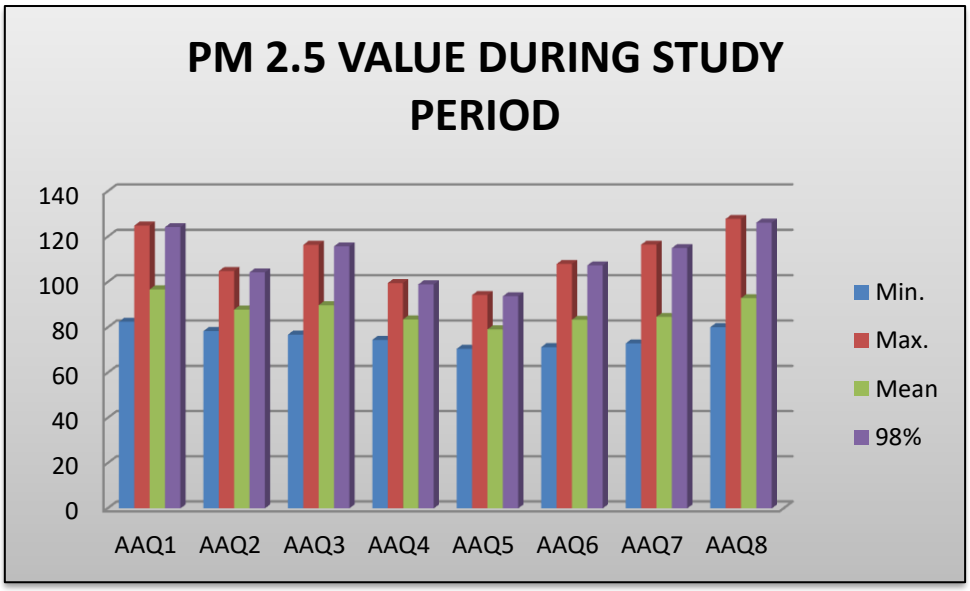


FIGURE 3-10: PM2.5 VALUES DURING THE STUDY PERIOD

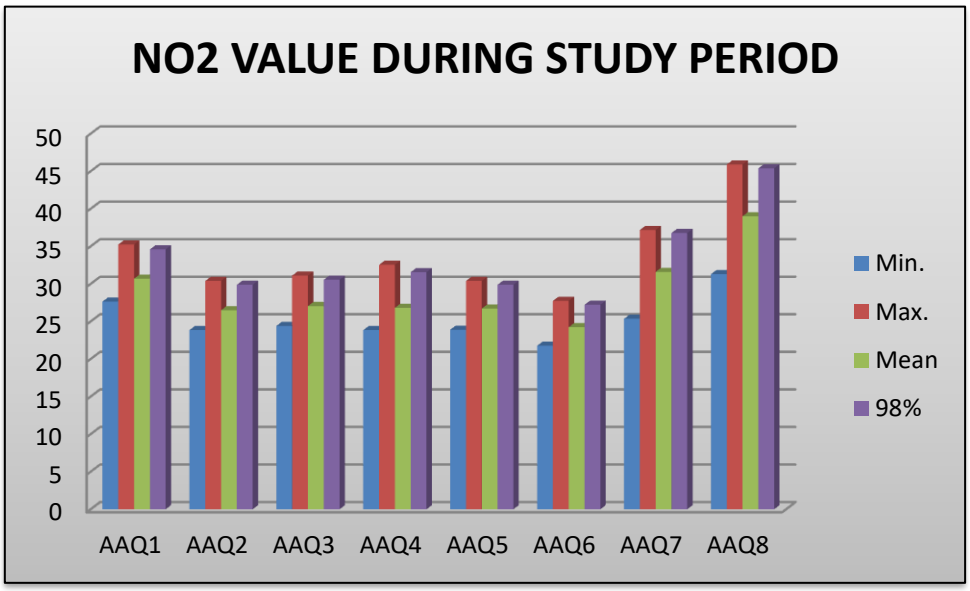


FIGURE 3-11: NOX VALUES DURING THE STUDY PERIOD

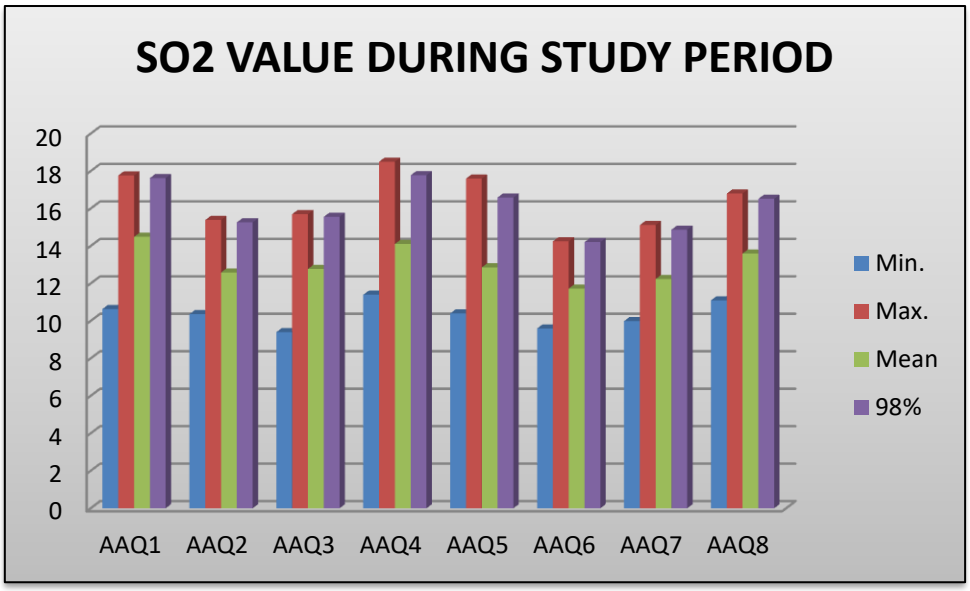


FIGURE 3-12: SO2 VALUES DURING THE STUDY PERIOD

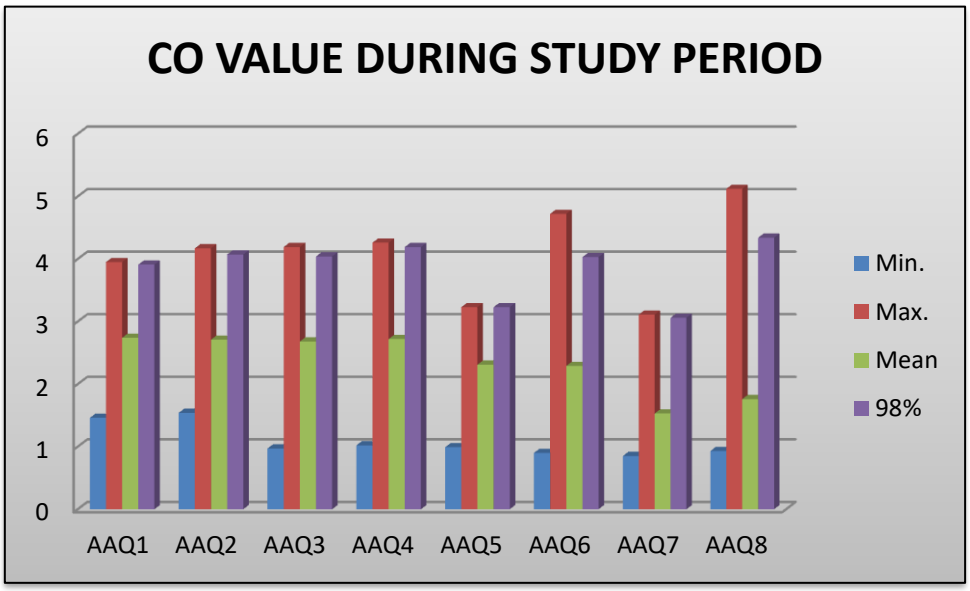


FIGURE 3-13: CO VALUE DURING THE STUDY PERIOD

3.12 Noise Environment

Noise can be defined as an unwanted sound. It interferes with speech and hearing. If intense enough, it can damage hearing, or is otherwise irritating. The definition of noise as unwanted sound implies that it has an adverse effect on human beings and their environment. Noise can also disturb natural wildlife and ecological system.

The objective of the noise pollution survey in the study area is to identify existing noise sources and to measure background noise levels.

3.12.1 Reconnaissance

In order to measure the existing noise sources and to identify the background noise levels, the noise pollution survey around the proposed site was carried out. The collection of baseline noise environment data included Identification of noise sources and to measure background noise levels and Measurement of noise levels due to transportation and other local activity.

3.12.2 Methodology for Noise Monitoring

Noise standards have been designated as per the Noise Pollution (Regulation & Control) Rules, 2000 Notified by Ministry of Environment and Forests, New Delhi, February 14, 2000. The ambient noise standards are presented in Equivalent noise levels (Leq.) have been measured twice a week during study period of March 2022 to May 2022. The measurements were carried out at each monitoring location during day time and night time.

3.12.3 Selection of stations for Sampling

A total of 08 locations were identified for ambient noise monitoring in the study area. The noise monitoring locations are given in Table 3-6.

TABLE 3-6: AMBIENT NOISE QUALITY MONITORING LOCATIONS

Sample ID	Monitoring Location	Distance & Direction from project site	Coordinates
NQ1	Project Site	----	25°30'15.78"N 85°19'49.12"E
NQ2	Government office Khirodharpur	0.23, NE	25°30'20.73"N 85°19'54.89"E
NQ3	High School Chandpura Raghopur	4.45, NNE	25°32'33.56"N 85°20'27.16"E
NQ4	Middle school Jafrabad	3.54, SSW	25°28'16.56"N 85°18'56.08"E
NQ5	Imperial Agro Pvt. Ltd.	6.27, WNW	25°31'7.42"N 85°16'10.63"E
NQ6	Baikathpur	4.91, ESE	25°29'35.31"N 85°22'38.77"E
NQ7	Rasulpur Kurtha	3.81, West	25°30'13.06"N 85°17'25.72"E
NQ8	Middle School, Katauna	4.60, SSE	25°28'28.01"N 85°21'48.52"E

(Source: Analysis during study period)

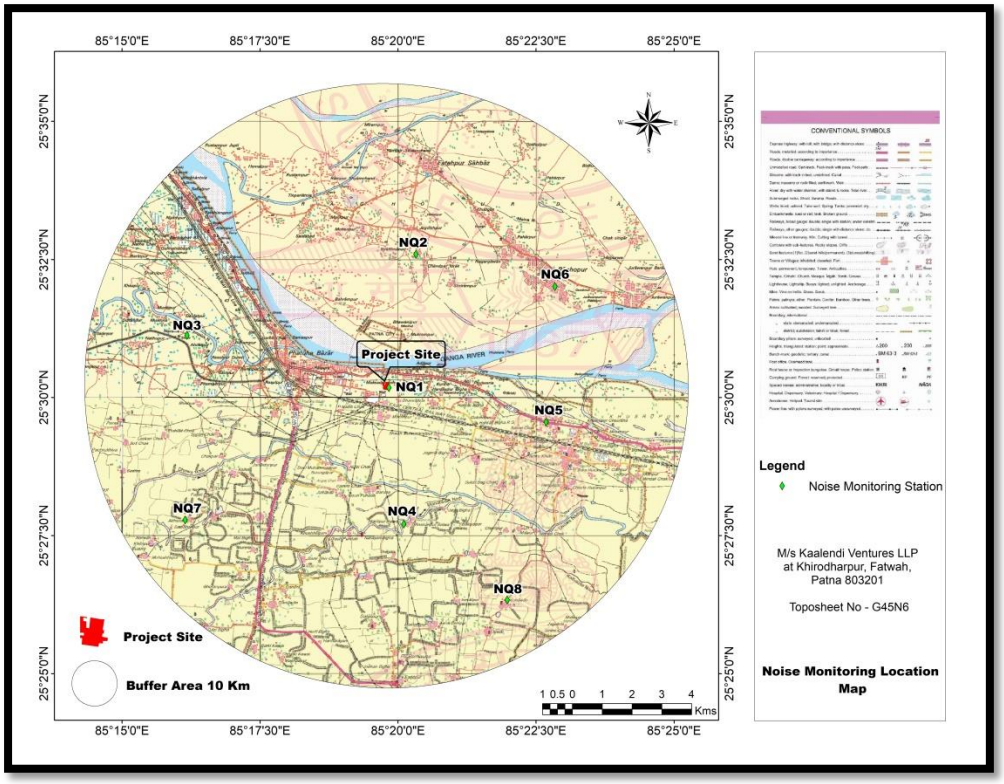


FIGURE 3-14: NOISE MONITORING LOCATION MAP

TABLE 3-7: AMBIENT NOISE QUALITY IN THE STUDY AREA

Sr. No.	Name of the Location	Category of Area/zone	Day Time In Leq dB (A)	CPCB standards in respect of Noise (Day time)	Night Time In Leq dB (A)	CPCB standards in respect of Noise (Night time)
1	Project Site	Industrial Area	68.5	75	57.3	70
2	Govt. Office Khirdharpur	Residential Area	47.5	55	36.3	45
3	High School Chandpura Raghopur	Residential Area	44.1	55	37.8	45
4	Middle Sshool Jafrabad	Residential Area	48.2	55	36.6	45
5	Imperial Agro Pvt. Ltd.	Residential Area	50.3	55	42.7	45
6	Baikathpur	Residential Area	48.5	55	37.2	45
7	Rasulpur Kurtha	Residential Area	50.6	55	36.1	45
8	Middle School, Katauna	Residential Area	45	55	32.7	45

TABLE 3-8: APPLICABLE NOISE STANDARDS

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

(Source: Noise Pollution Rules, 2000)

Note:

- Day time is reckoned in between 6 am and 10 pm.
- Night time reckoned in between 10 pm and 6 am.
- Silence zone is defined as areas up to 100 meters around such premises as hospitals, education, institutions and courts. The silence zones are to be declared by the Component Authority.
- Mixed categories of areas should be declared as one of the four above-mentioned categories by the Component Authority and the corresponding standard shall apply.

(Source: The Noise Pollution (Regulation & Control) Rules, 2000)

3.12.4 Observation on Ambient Noise Quality:

Day Time: The noise levels varied in the study area during day time from 44.1dB (A) Leq to 68.5dB (A) Leq. The maximum concentration was recorded at (NQ1) Project Site and the minimum concentration was recorded at (NQ3) High School, Chandpura. The day time noise level in the study area is within the noise Limit.

Night Time: The night time noise level in the study area is in the range of 36.1dB (A) Leq to 57.3dB (A) Leq. The maximum concentration was recorded at (NQ1) Project Site and the minimum concentration was recorded at (NQ7) Rasulpur, Kurtha. The night time noise was also within stipulated standards of CPCB.

3.12.5 Water Environment

Drainage Pattern of the study area

The district falls in the Ganga Basin and is drained by the mighty Ganga in the north, by the Sone in the West, and by the Punpun, Phalgu and their tributaries in the central part of terrain.

The project is not located within 1.0 km radius of any major river.

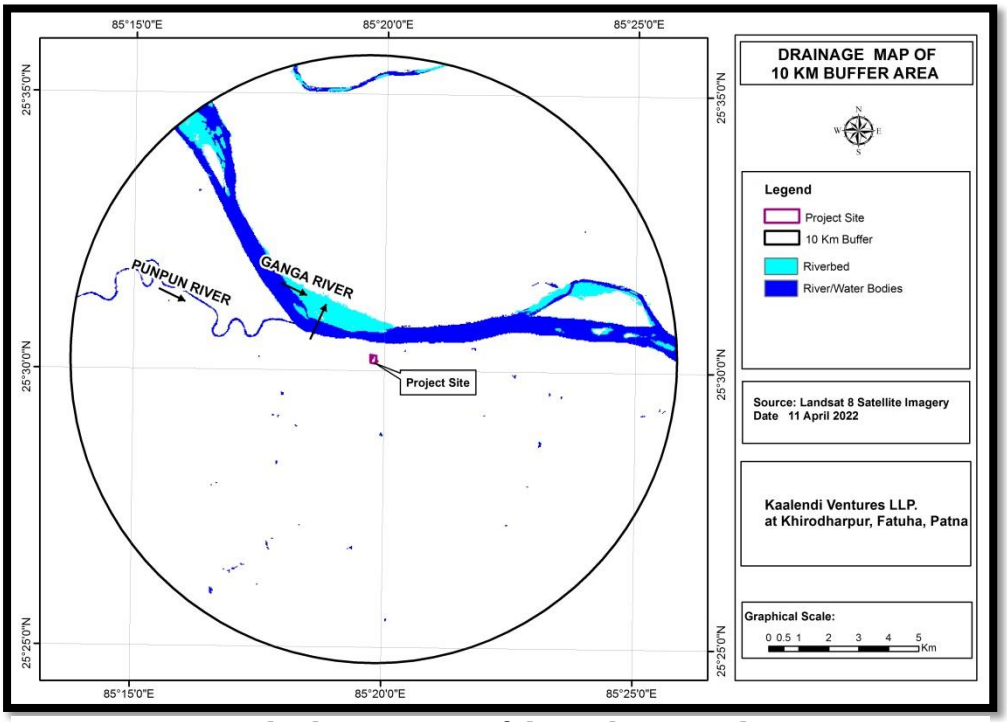


Figure 3-15: **The drainage map of the study area is shown in Map**

3.12.6 Water Quality

The water resources in the study area were divided into two categories as SW & GW for getting ideal upshot of baseline status of water quality of the region. Selected water quality parameters of ground water and surface water resources within 10 km radius of the study area has been studied for assessing the water environment and evaluate anticipated impact of the project. Understanding the water quality is essential in preparation of Environmental Impact Assessment and to identify critical issues with a view to suggest appropriate mitigation measures for implementation.

The purpose of this study is to:

- Assess the water quality characteristics; and
- Predict the impact on water resource availability and water quality, due to the existing project, and related activities.

The information required has been collected through primary data collection and secondary sources. Three (08) ground water sources covering 10 km radial distance were examined for physio-chemical, heavy metals and bacteriological parameters. The samples were collected and analysed once during the study period. The samples were analysed as per the IS-10500:2012 and procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA).

3.12.7 Methodology of Monitoring

In order to establish the baseline water quality, ground water and surface water sampling locations were selected based on availability, following standard norms and requirement. Ground water samples were collected from the identified hand pumps and wells for the characterization of water quality. Selection of surface water sampling locations has been considered as per the utilization pattern of the villagers for domestic / drinking purposes.

The samples collected were preserved, stored and analyzed as per standards methods of Analysis of Water and Waste Water.

3.12.8 Surface Water

Surface Water Quality monitoring is carried out in the study area of 10 km based on the land use pattern and ground truth of nearby villages. Surface water samples were collected from 8 locations during the study period of March 2022 to May 2022 and analyzed for a number of physico-chemical parameters. The details of surface water sampling locations are presented in Table 3-9.

TABLE 3-9: SURFACE WATER SAMPLING LOCATIONS

Sn. No	Location	Distance & Direction	Coordinate	Project Area/Study Area	Environmental Setting	Justifications
SW1	Ganga River Upstream	0.53 km in NNW	25°30'32.61"N 85°19'35.88"E	Study Area	River in buffer zone	River Ganga is the major river draining Patna district and controlling the drainage of the area. Within 10 km radius of the project area, there are several open ponds. Eight surface water sampling locations are chosen from this area to study over all surface water quality within the total study area comprising 10 km radius from the boundary of the project site.
SW2	Ganga River Downstream	0.50 km in NNW	25°30'31.71"N 85°19'39.35"E	Study Area	River in buffer zone	
SW3	Punpun River	2.97 km in NW direction	25°30'51.41"N 85°18'4.60"E	Study Area	River in buffer zone	
SW4	Phalgu River	4.36 km in SSE direction	25°28'1.23"N 85°20'54.80"E	Study Area	River in buffer zone	
SW5	Phalgu River	4.85 km in WSW direction	25°28'56.24"N 85°17'10.65"E	Study Area	River in buffer zone	
SW6	Chakchanda talab	5.78 km in SE direction	25°28'58.50"N 85°23'0.54"E	Study Area	Open talab in buffer zone	
SW7	Pond	4.69 km in SSW direction	25°28'17.11"N 85°17'50.90"E	Study Area	Open pond in buffer zone	
SW8	Pond	5.17 km in ESE direction	25°29'21.10"N 85°22'45.36"E	Study Area	Open pond in buffer zone	

(Source: Analysis during study period)

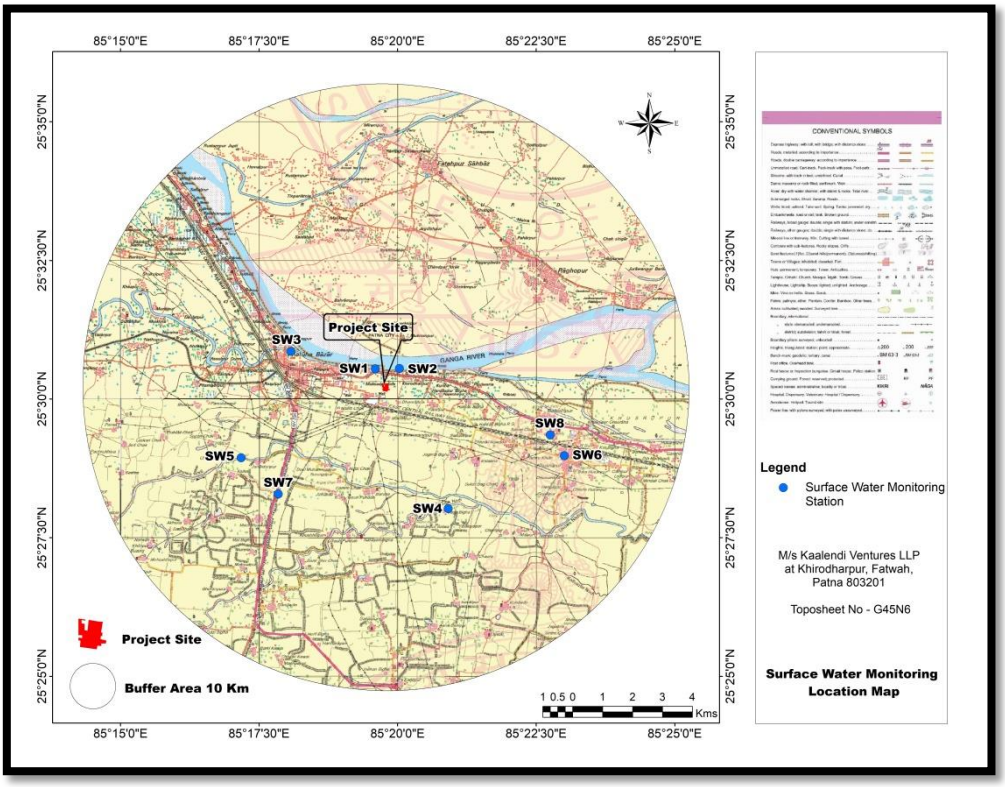


FIGURE 3-16: SURFACE WATER MONITORING LOCATION MAP

TABLE 3-10: SURFACE WATER MONITORING RESULTS

S.No.	Parameter	Unit	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	Test Method
1	Colour	Hazen	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	IS:3025 (Pt-4)
2	Odour	---	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	IS:3025 (Pt-5)
3	pH	---	7.88	7.45	7.82	7.33	7.72	7.24	7.57	7.14	IS:3025 (Pt-11)
4	Turbidity	NTU	10.6	11.1	12.6	10.0	18.7	14.1	9.5	12.54	IS:3025 (Pt-10)
5	Total Dissolve Solid (TDS)	mg/L	340.0	363.9	543.3	455.9	617.3	396.7	664.8	218.2	IS:3025 (Pt-16)
6	Total Alkalinity (CaCO3)	mg/L	157.2	134.2	182.0	284.8	384.3	123.4	271.7	190.9	IS:3025 (Pt-23)
7	Total Hardness(CaCO 3)	mg/L	181.7	173.7	264.0	246.7	250.8	167.9	362.7	112.6	IS:3025 (Pt-21)
8	Chloride (Cl)	mg/L	92.4	114.1	132.4	94.1	141.1	110.6	83.12	79.0	IS:3025 (Pt-32)
9	Calcium (Ca)	mg/L	53.1	58.0	85.9	45.4	108.3	57.2	40.75	41.7	IS:3025 (Pt-40)
10	Mineral Oil	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	IS:3025 (Pt-39)
11	Sulphate (SO4)	mg/L	40.4	35.2	67.6	30.7	71.9	33.7	32.58	36.9	IS:3025 (Pt-24)
12	Nitrate (NO3)	mg/L	1.88	1.24	4.74	1.26	65.27	0.68	0.62	1.19	IS:3025 (Pt-34)
13	Fluoride (F)	mg/L	0.13	0.30	0.67	0.37	0.37	0.30	0.16	0.22	IS:3025 (Pt-60)
14	Iron (Fe)	mg/L	0.24	0.17	0.20	0.14	0.54	0.16	0.35	0.15	IS:3025 (Pt-53)
15	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA-3500 (B)
16	Selenium (Se)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA-3113 (B)
17	Cyanide (Cn)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	APHA-4500 (C)
18	Copper(Cu)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	APHA-3111(B)
19	Magnesium (Mg)	mg/L	18.3	22.6	21.9	15.01	16.01	14.6	27.7	15.11	IS:3025 (Pt-45)
20	Manganese(Mn)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	APHA-3111(B)
21	Zinc(Zn)	mg/L	0.78	0.48	0.55	0.51	0.55	0.49	0.49	0.89	APHA-3111 (B)
22	Cadmium(Cd)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	APHA-3111 (B)

23	Lead(Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA-3111 (B)
24	Boron	Mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	IS:3026(Pt-57)
25	Mercury(Hg)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	APHA-3112 (B)
26	Molybdenum(mo)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	IS:3025(Pt-2)
27	Nickel (Ni)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA-3111 (B)
28	Arsenic(As)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA-3500 (B)
29	Chromium (Cr+6)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA-3500 Cr-B
30	Conductivity (25 °C)	µs/Cm	534.2	567.5	862.5	689.4	882.2	678.8	968.9	453.8	APHA-2510
31	Chemical Oxygen Demand (COD)	mg/L	18.82	20.8	28.0	32.6	26.2	16.6	15.5	17.0	APHA-5220 (B)
32	Biological Oxygen Demand (BOD at 27OC for 3 day)	mg/L	3.23	4.63	5.40	4.52	3.19	2.7	3.2	4.6	APHA-4500 (D)
33	Dissolve Oxygen (DO)	mg/L	6.2	7.74	8.08	5.63	7.1	5.4	6.4	3.1	APHA-5210
34	E. Coli	MPN/100ml	1270	1090	1580	2050	1820	670.	380	280	IS:1622-1981
35	Total Coliform	MPN/100ml	830	640	1070	1490	1260	450	420	120	IS:1622-1981

TABLE 3-11: STANDARDS OF SURFACE WATER QUALITY CRITERIA

Class of Water	Designated best use	Criteria
A	Drinking Water Source without conventional treatment but after disinfection	• Total Coliforms Organism MPN/100ml shall be 50 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
B	Outdoor bathing (Organized)	• Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 • Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
C	Drinking water source after conventional treatment and disinfection	• Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 • Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
D	Propagation of Wild life and Fisheries	• pH between 6.5 to 8.5 • Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less
E	Irrigation, Industrial Cooling, Controlled Waste disposal	• pH between 6.0 to 8.5 • Electrical Conductivity at 25°C micro mhos/cm Max.2250 • Sodium absorption Ratio Max. 26 • Boron Max. 2 mg/L

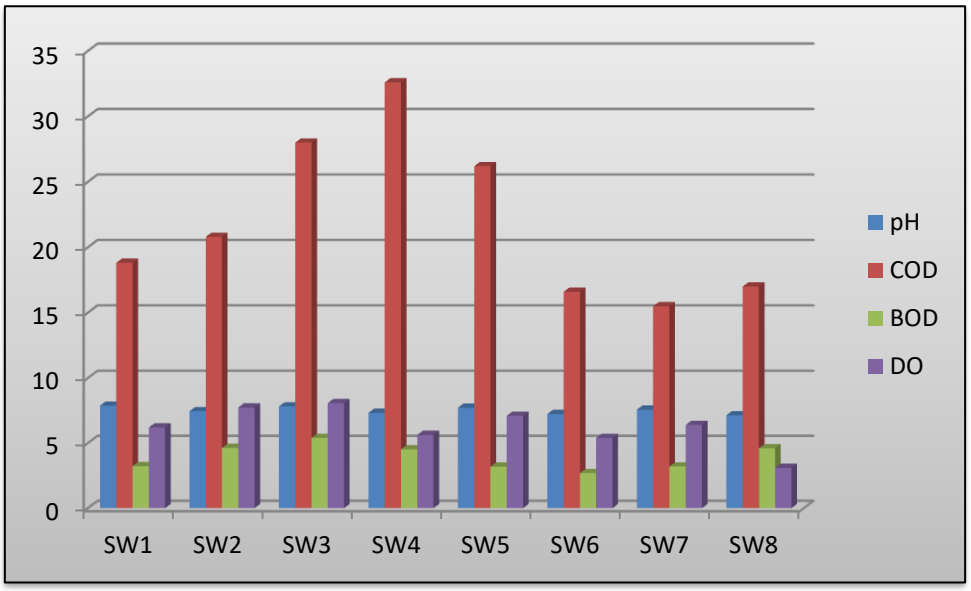
3.12.9 Observation on Surface water Quality

The baseline quality of water based on the results of the surface water quality monitoring within the study area, it is observed that,

- pH was observed in the range of 7.14 – 7.88 with minimum at Pond (SW8) and maximum at (SW1) Ganga River (Upstream).
- TDS was observed in the range of 218.2 -664.8 mg/L with minimum at Pond (SW8) and maximum at Pond No 7.
- COD was in the range of 15.5-32.6 mg/L with minimum at Pond (SW7) and maximum at Phalgu River (SW4).
- BOD was in the range of 3.19-5.40 mg/L with minimum at Phalgu River (SW5) and maximum at Punpun River (SW3).

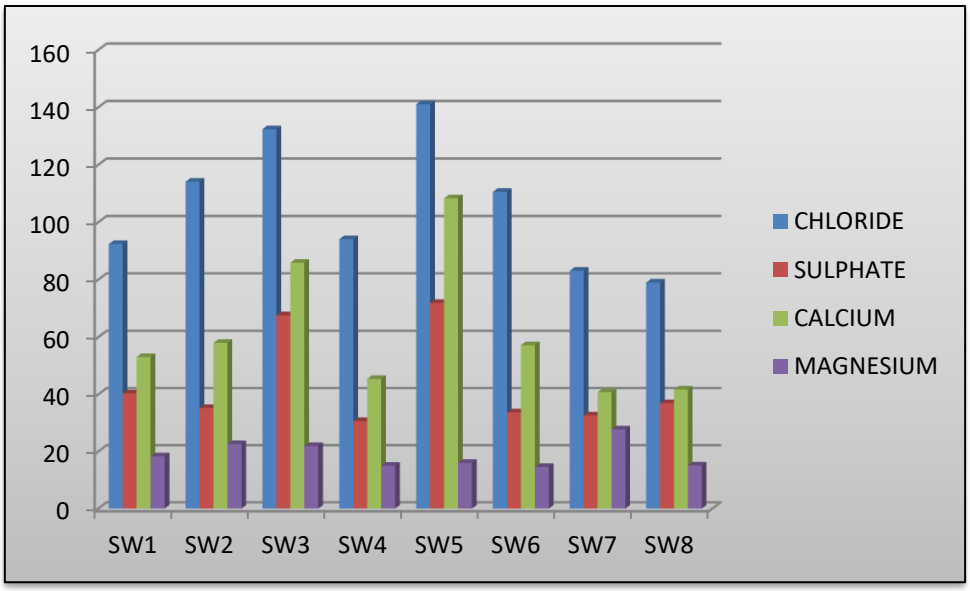
SW Quality in Study Area

Parameters – pH Value, BOD (in mg/L), COD (in mg/L) and DO (in mg/L)



Parameters – TDS (in mg/L), Conductivity (in µS/cm) and TH (in mg/L)

Parameters – Chloride (in mg/L), Sulfate (in mg/L), Calcium (in mg/L) and Magnesium (in mg/L)



3.12.10 Ground Water

Ground water samples were collected from **08** locations during the study period of March 2022 to May 2022 and analyzed for a number of physico-chemical parameters.

TABLE 3-12: GROUND WATER SAMPLING LOCATIONS IN THE STUDY AREA

Sr. No	Location	Distance & Direction	Co-ordinate	Project Area/Study Area	Environmental Setting	Justifications
GW1	Project Site	----	25°30'15.78"N 85°19'49.12"E	Project Area	Bore well Buffer Area	For sampling of Ground Water, nearby private and govt. borewells/handpumps have been identified. Those borewells whose depth is more than 100 feet was selected for collection of sampling as it can give the realistic figure of the quality of ground water in the study area. For collection of samples the electric borewells used to run atleast for 5 minutes and hand pumps after discharging 3 to 4 buckets of water than the sample was collected.
GW2	Government office, Khirodharpur	0.23, NE	25°30'20.73"N 85°19'54.89"E	Study Area	Bore well Buffer Area	
GW3	High School Chandpura Raghopur	4.45, NNE	25°32'33.56"N 85°20'27.16"E	Study Area	Bore well Buffer Area	
GW4	Middle school Jafrabad	3.54, SSW	25°28'16.56"N 85°18'56.08"E	Study Area	Bore well Buffer Area	
GW5	Daffodils Public School	2.89, WNW	25°30'41.32"N 85°18'5.21"E	Study Area	Bore well Buffer Area	
GW6	Baikathpur	4.91, ESE	25°29'35.31"N 85°22'38.77"E	Study Area	Bore well Buffer Area	
GW7	Rasulpur Kurtha	3.81, West	25°30'13.06"N 85°17'25.72"E	Study Area	Bore well Buffer Area	
GW8	Middle School, Katauna	4.60, SSE	25°28'28.01"N 85°21'48.52"E	Study Area	Bore well Buffer Area	

(Source: Analysis during study period)

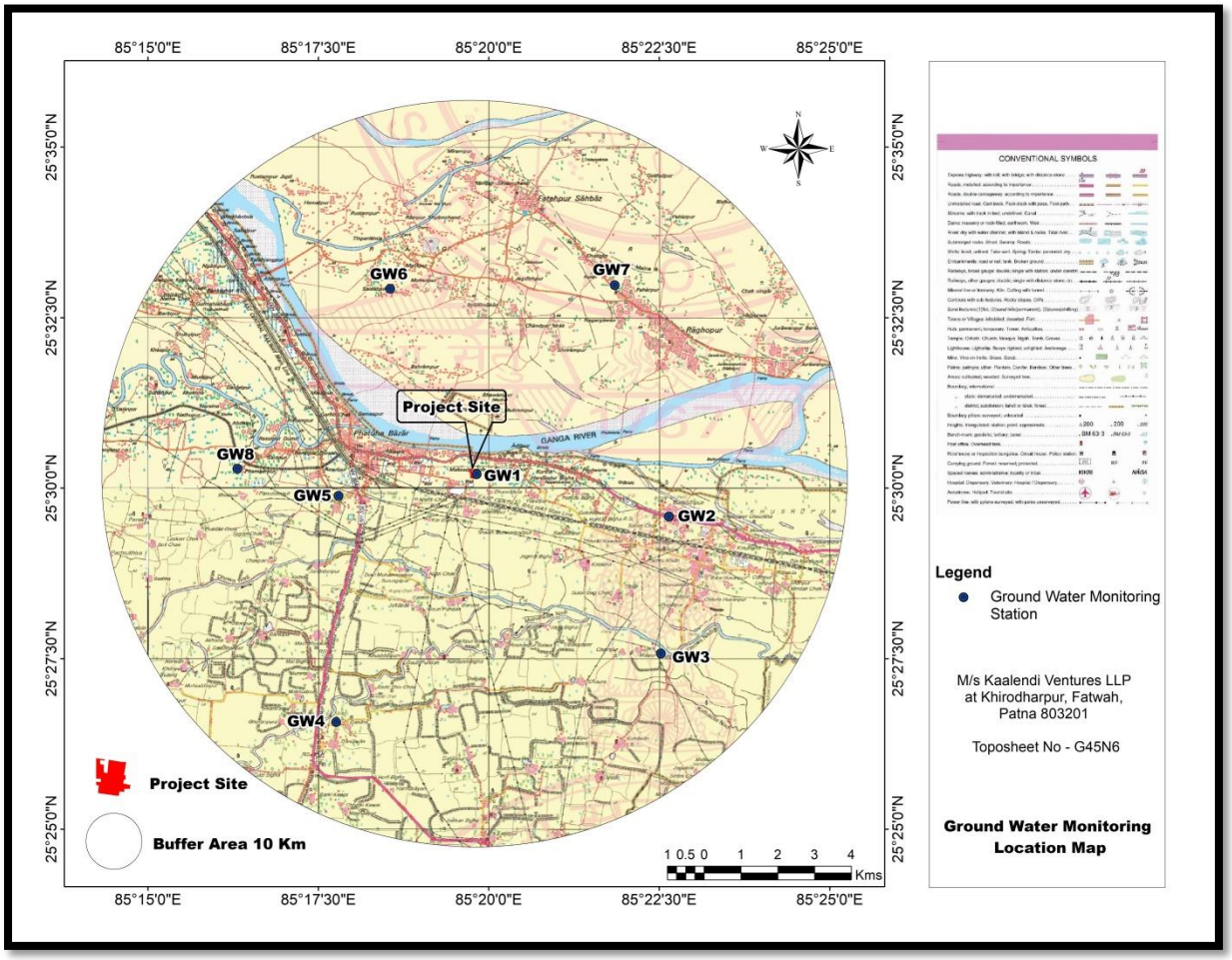


FIGURE 3-17: GROUND WATER MONITORING LOCATION MAP

TABLE 3-13: GROUND WATER MONITORING RESULTS

S.No.	Parameter	Unit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	Drinking Water Standards / Limit (IS:10500 2012)		Test Method
											Desirable	Permissible	
1	Colour	Hazen	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5	15	IS:3025 (Pt-4)
2	Odour	---	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	IS:3025 (Pt-5)
3	pH	---	7.63	7.78	7.34	7.58	7.41	7.26	7.81	7.08	6.5 - 8.5	No Relaxation	IS:3025 (Pt-11)
4	Taste	---	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	IS:3025 (Pt-8)
5	Turbidity	NTU	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	5	IS:3025 (Pt-10)
6	Total Dissolve Solid (TDS)	mg/L	459.5	506.9	545.0	575.9	567.0	471.8	365.9	478.2	500	2000	IS:3025 (Pt-16)
7	Total Alkalinity (CaCO3)	mg/L	151.6	137.5	254.8	249.5	194.8	213.3	134.4	146.0	200	600	IS:3025 (Pt-23)
8	Total Hardness(CaCO3)	mg/L	252.5	243.9	288.1	336.6	326.1	241.4	230.8	250.2	200	600	IS:3025 (Pt-21)
9	Chloride (Cl)	mg/L	96.4	103.5	135.7	114.6	112.8	129.01	118.1	110.0	250	1000	IS:3025 (Pt-32)
10	Calcium (Ca)	mg/L	52.8	68.0	92.9	48.51	59.1	78.8	44.01	55.1	75	200	IS:3025 (Pt-40)
11	Mineral Oil	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5	No Relaxation	IS:3025 (Pt-39)
12	Sulphate (SO4)	mg/L	42.84	34.9	37.56	40.74	38.9	38.97	39.7	40.5	200	400	IS:3025 (Pt-24)

S.No.	Parameter	Unit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	Drinking Water Standards / Limit (IS:10500 2012)		Test Method
											Desirable	Permissible	
13	Nitrate (NO3)	mg/L	2.42	0.78	0.92	1.34	1.11	1.49	1.41	1.50	45	No Relaxation	IS:3025 (Pt-34)
14	Fluoride (F)	mg/L	0.23	0.36	0.31	0.31	0.31	0.34	0.29	0.26	1	1.5	IS:3025 (Pt-60)
15	Iron (Fe)	mg/L	0.24	0.13	0.20	0.44	0.08	0.12	0.88	1.116	0.3	No Relaxation	IS:3025 (Pt-53)
16	Aluminium (Al)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.2	APHA-3500 (B)
17	Selenium (Se)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No. Relaxation	APHA-3113 (B)
18	Cyanide (Cn)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	No. Relaxation	APHA-4500 (C)
19	Copper(Cu)	mg/L	0.08	0.07	0.12	0.03	0.10	0.15	0.117	0.18	0.05	1.5	APHA-3111(B)
20	Magnesium (Mg)	mg/L	25.1	32.4	29.01	36.86	38.6	41.2	42.12	28.5	30	100	IS:3025 (Pt-45)
21	Manganese(Mn)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.3	APHA-3111(B)
22	Zinc(Zn)	mg/L	0.66	0.55	0.684	0.47	0.45	0.69	0.54	0.59	5	15	APHA-3111 (B)
23	Cadmium(Cd)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	No. Relaxation	APHA-3111 (B)
24	Lead(Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No. Relaxation	APHA-3111 (B)
25	Mercury(Hg)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	No. Relaxation	APHA-3112 (B)
26	Nickel (Ni)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	No. Relaxation	APHA-3111 (B)

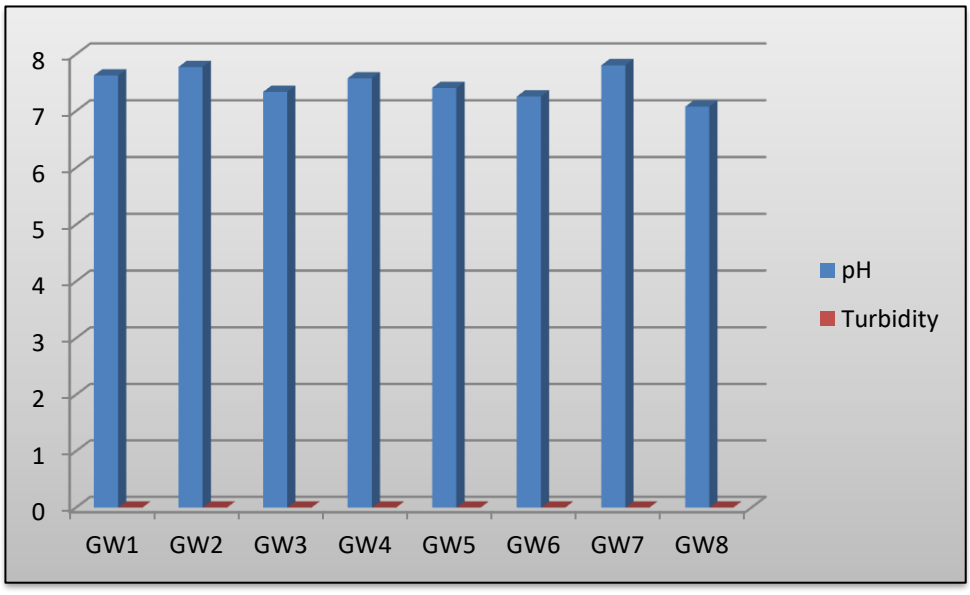
S.No.	Parameter	Unit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	Drinking Water Standards / Limit (IS:10500 2012)		Test Method
											Desirable	Permissible	
27	Arsenic(As)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.05	APHA-3500 (B)
28	Chromium (Cr+6)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	No. Relaxation	APHA-3500 Cr-B
29	Phenolic Compound (C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	APHA-5530
30	Conductivity (25 °C)	mhos/cm	579.4	792.8	753.84	826.5	784.3	896.0	602.01	660.1	Not Specified	Not Specified	APHA-2510
31	E. Coli	Coli/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Shall Not Be Detectable		IS:1622-1981
32	Total Coliform	MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Shall Not Be Detectable		IS:1622-1981
33	Temperature	°C	25.8	24.9	26.3	25.8	24.9	26.7	26.3	24.6	Not Specified	Not Specified	IS:3025 (Pt-9)
34	Sodium (Na)	mg/L	49.3	75.3	49.8	65.1	45.3	47.0	51.7	53.01	Not Specified	Not Specified	APHA-3500 (Na)
35	Fecal Coliform	MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Shall Not Be Detectable		APHA-9221

3.12.11 Interpretation of Ground Water Quality

- All the samples were colourless meeting desirable norms (<5 Hazen).
- All the samples meet the desirable standards (pH ranges from 7.08 to 7.81).
- TDS in samples ranges from 365.9 mg/L to 575.9 mg/L. All the samples meet the permissible limit of 2000 mg/L.
- Total Hardness in the water ranges from 230.8 mg/L to 336.6 mg/L. All the samples meet the permissible limit of 600 mg/L.
- Calcium content in the water ranges from 44.01 mg/L to 92.9 mg/L all the samples meet the permissible limit of 200 mg/L.
- Magnesium content in the water ranges from 25.1 mg/L to 42.12 mg/L. All the samples meet the permissible limit of 100 mg/L.
- Sulphate content in the water ranges from 34.9 mg/L to 42.84 mg/L. The permissible limit of Sulphate is 400 mg/L for drinking water.
- Total alkalinity in the water samples ranges from 134.4 mg/L to 254.8 mg/L. All the samples are within the permissible limit of drinking water (600 mg/L).
- Chloride ranges from 96.4 mg/L to 135.7 mg/L. Which are below permissible limits (1000 mg/L).

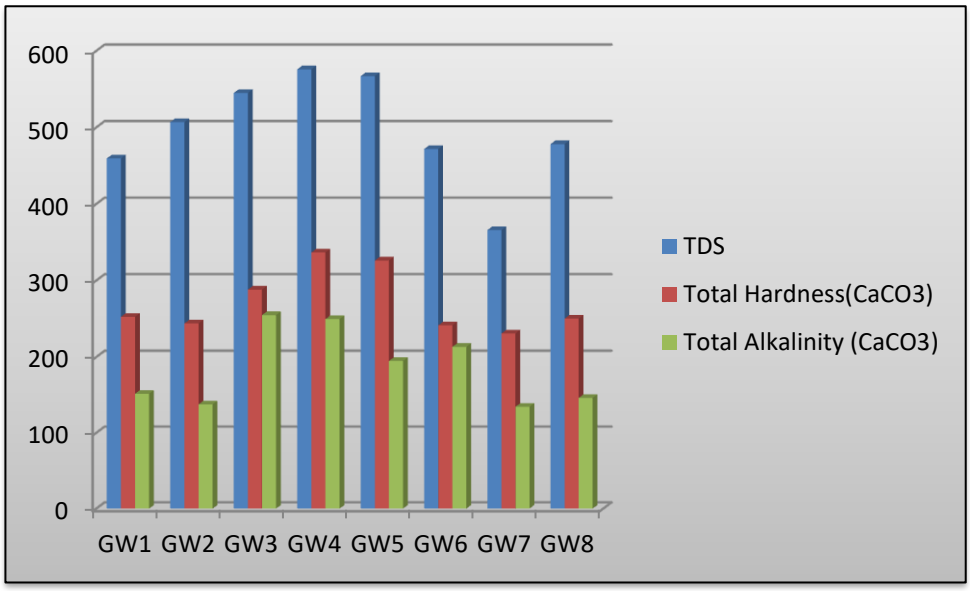
GW Quality in Study Area

Parameters: Turbidity (in NTU) and pH Value



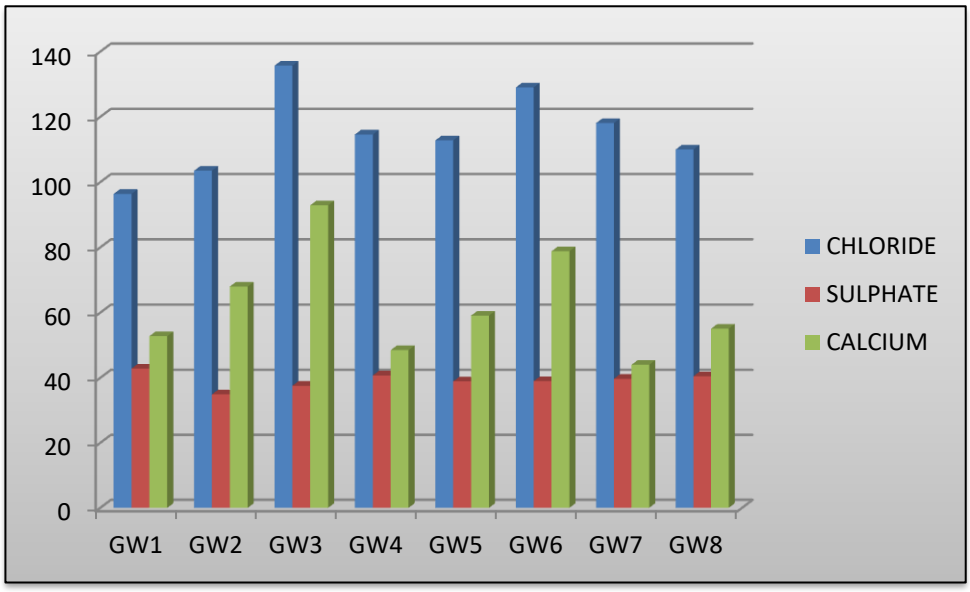
GW Quality in Study Area

Parameters: TDS (in mg/L), TH as CaCO3 (in mg/L) and Alkalinity (in mg/L) as CaCO3 (in mg/L)



GW Quality in Study Area

Parameters: Chloride as Cl (in mg/L), Sulphate as SO4 (in mg/L) and Calcium as Ca (in mg/L)



3.13 Soil Environment

Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality and support human health and habitation. Soil quality reflects how well a soil performs the functions of maintaining biodiversity and productivity, partitioning water and solute flow, filtering and buffering,

nutrient cycling and providing support for plants and other structures. Thus, soil quality plays vital role in any particular geographical phenomenon of ecology as well as physico-chemical environment. Soil quality can indicate the current as well as future issues related with the water, ecology and life in the particular region.

3.13.1 Methodology

The soil samples were collected from **08** selected locations during monitoring season of March to May 2022. The samples collected were homogeneous representative of each sampling location. At random sub-locations were identified at each location and soil samples were collected from 5 to 15 cm below the surface. It was uniformly mixed before homogenizing the soil samples. The samples about 500-gms were packed in polythene bags labelled in the field with location, number and sent to the laboratory for the analysis of physicochemical parameters.

3.13.2 Selection of stations for Sampling

To understand the soil characteristics**, 08** locations in the study area were selected for soil sampling. For selection of soil sampling locations, the following criterion was considered:

- Soil from agricultural land, park open land, and
- Soil from industrial area, where there is possibility of contamination

3.13.3 Analysis of Soil Samples

The soil samples were examined for various physicochemical parameters, to determine the existing soil characteristics of the study area.

TABLE 3-14: SOIL MONITORING LOCATIONS

S.No	Monitoring Location	Distance & Direction	Coordinates
SQ1	Project Site	----	25°30'16.24"N 85°19'46.53"E
SQ2	Agriculture land near Fatuha	2.92 km in West	25°30'20.92"N 85°18'3.08"E
SQ3	Agriculture land near Hazipur	5.65 km in WSW	25°29'15.86"N 85°16'33.62"E
SQ4	Agriculture land near Chotka Nawada	4.30 km in SE	25°29'12.01"N 85°22'6.67"E
SQ5	Agriculture land near Salarpur	7.57 km in South	25°26'6.97"N 85°19'46.90"E
SQ6	Agriculture land near Hajpurwa,	7.97 km in SE	25°32'31.89"N 85°23'45.70"E
SQ7	Agriculture land near Mallikpur	6.64 km in NNW	25°33'46.24"N 85°19'10.99"E
SQ8	Agriculture land near Nathupur	7.50 km in WNW	25°31'1.49"N 85°15'24.14"E

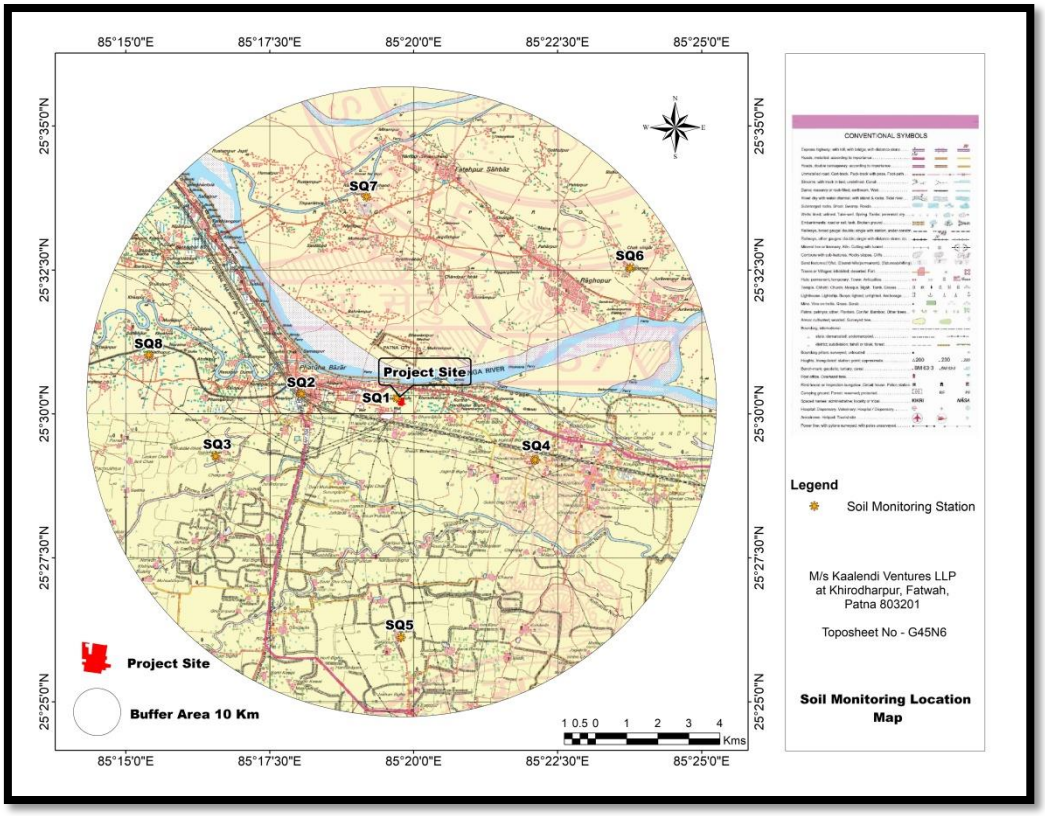


FIGURE 3-18: SOIL MONITORING LOCATION MAP

Analysis results of physical and chemical parameters of soil samples are given in Table 3-16. Chemical classification of soil quality as per Indian Council Agriculture Research (ICAR) is given in Table 3-15.

The details of soil sampling locations & result are given in Table 3-14 & Table 3-16. The soil sampling locations are shown in Figure 3-18. Composite sampling of soil up to root depth (10 - 15 cm) was carried out at each location.

TABLE 3-15: CHEMICAL CLASSIFICATION OF SOIL QUALITY

Sr. No.	Soil Analysis Parameters	Classification
1	pH	4.5 Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.00 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Salinity Electrical Conductivity (mmhos/cm) (1ppm = 640 mmho/cm)	Up to 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)

3	Organic Carbon (%)	Up to 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Up to 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5	Phosphorus (Kg/ha)	Up to 15 very less 16-30 less 31-50 medium 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

TABLE 3-16: PHYSICOCHEMICAL CHARACTERISTICS OF SOIL

S. No.	Test Parameters	Unit	SQ-1	SQ-2	SQ-3	SQ4	SQ5	SQ6	SQ7	SQ8	Test Method
1.	Texture	…	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	IS:2720 (Pt-4)
2.	Sand	%	60.1	65.7	58.0	68.3	62.3	60.9	57.2	64.0	IS:2720 (Pt-4)
3.	Silt	%	25.7	21.2	25.6	20.2	17.2	23.0	25.7	25.5	IS:2720 (Pt-4)
4.	Clay	%	14.2	13.1	16.4	11.5	10.5	16.1	17.1	10.5	IS:2720 (Pt-4)
5.	pH (1:2 Suspension)	..	7.65	7.87	8.0	7.02	7.67	7.14	7.67	7.48	IS:2720 (Pt-26)
6.	Cation Exchange Capacity(CEC)	meq/100	33.2	28.5	34.4	21.5	33.6	34.7	33.6	36.2	IS:2720 (Pt-24)
7.	Electrical Conductivity (1:2)	µmho/cm	362.2	329.4	366.3	317.4	407.3	347.3	407.3	346.5	IS:14767
8.	Water Holding Capacity(WHC)	%	40.5	47.7	35.5	36.2	43.1	34.2	40.4	42.7	IS 2720 (Part-2)
9.	Sodium (Na)	mg/kg	161.2	181.1	151.8	137.1	167.4	130.6	167.3	148.4	APHA-3125B
10.	Calcium (Ca)	mg/kg	1089.4	1143.7	1175.4	1038.7	1042.1	1051.3	1023.2	1131.2	IS 2720 (Part-23)
11.	Magnesium (Mg)	mg/kg	573.2	438	521.8	521.3	557.3	476.6	532.7	576.6	ETS/STP/SOIL-08
12.	Bulk Density	g/cm3	1.86	1.37	1.73	2.10	1.28	1.47	1.64	1.35	IS 2386 (Part-4)
13.	Total Nitrogen (N)	mg/kg	107.3	186.1	213.2	145.1	121.4	163.6	181.2	173.6	APHA, Pt 4500:(N)
14.	Phosphorus (PO4)	mg/kg	47.6	64.6	38.5	42.3	54.3	44.2	54.7	45.7	ETS/STP/SOIL-19
15.	Potassium (K)	mg/kg	241.5	347.2	362.7	252.8	287.1	256.5	292.4	271.6	APHA-3125B
16.	Organic Matter	%	1.17	0.95	1.03	1.10	1.10	1.03	1.16	1.07	IS: 2720 (P-22)
17.	Organic Carbon	%	1.74	1.76	3.43	1.73	1.90	2.16	2.67	2.12	BS 1377 -3)
18.	Sulphate as (SO4)	mg/kg	2.06	1.59	2.07	1.04	1.54	1.72	1.61	2.35	IS:3025(P-24)
19.	Porosity	%	21.43	15.32	14.45	14.18	24.03	18.4	25.03	Sandy Clay Loam	IS 13030

3.13.4 Interpretation of Soil Quality Results

Analysis of result of soil data

Physical characters

The physical characters include Bulk density, grain size distribution (textural analysis), Porosity, Infiltration, Water holding capacity.

Grain size distribution: Texture indicates relative proportion of various sizes of primary soil particles such as sand, silt and clay present in the soil. Based on their quantities present in the soil sample and using the textural classification diagram. The textural classes of eight soil samples are sandy clay loam, i.e coarse to fine texture. Bulk density values confirm the textural class.

Bulk Density: In case of bulk density total soil space (space occupied by solid and pore spaces combined) are taken in to consideration. Thus, Bulk Density is defined as the mass (weight) of a unit volume of a dry soil. This volume would, off course include both solids and pores. Soil texture, soil structure and organic matter content are the factors influencing the bulk density of a soil. Bulk Density, besides being an interesting and significant physical characteristic, is very important as a basis for certain computations. The Bulk density of the eight soil sample under consideration ranges between 1.28 to 2.10 g/cm3, and confirms the texture of the soil samples of the area under study.

Water Holding Capacity (WHC): Water holding capacity of soil is the maximum amount of moisture, a dry soil is capable of holding, under given standard condition. If the moisture content is increased further percolation result WHC is of great value to practical agriculture, since it provides a simple means to determine moisture content. WHC required for good crop growth is 35 to 70%. The WHC of the eight soil samples ranges between 34.2 to 47.7% indicating somewhat frequent water application for growing crops.

Chemical Characters

The parameters considered for chemical analysis are: Soil reaction (pH), Electrical conductivity (EC), Cation Exchange Capacity (CEC)), Sodium Adsorption Ratio, (SAR), ESP, Macro nutrients like Available Nitrogen, Total Organic carbon, organic matter, available phosphorus, available potassium Micro nutrients like Zinc, manganese, copper. Heavy metals like Lead (Pb), Nickel (Ni), Cadmium (Cd), Chromium (Cr), arsenic (As) and PAH.

Soil reaction (pH): The nutritional importance of pH is illustrated, thus hydrogen ion concentration has influence not only on, solubility of nutrients, but also upon facility with which these nutrients are absorbed by plants, even already in soil solution for e.g. Fe, Mn and Zn become less available as pH rises from 4.5 to 7 to 8. At pH 6.5 to7.0 utilization of nitrate and ammonia nitrogen becomes more available. In case of phosphorus, it becomes less available to plant as pH increases above 8.5, due to its fixation in exchange complex of soil. For the eight-soil sample under consideration the pH range between 7.02 to 8.0 indicating soils are slightly alkaline and are almost normal for crop growth.

Electrical conductivity (EC): The salt content of the soils are estimated by EC measurements, and is useful to designate soils as normal or sodic (saline). Electrical conductivity is expressed as µmhos/cm at 250C, µmhos/cm, mmhos/cm or µs/cm. The EC of eight soil samples are between 317.4 to 407.3µmhos/cm and are below the limits to be called as saline and hence the soils are normal for crop growth.

Organic Carbon / Organic matter (%): Although accounting for only a small part of the total soil mass in mineral soils, organic matter influences physical, chemical, and biological activities in the soil. Organic matter in the soil is plant and animal residue which serves as a reserve for many essential nutrients, especially nitrogen. Determination of organic matter helps to estimate the nitrogen which will be released by bacterial activity for the next season depending on the conditions, soil aeration, pH, type of organic material, and other factors. The eight soil samples under consideration contain 1.73% to 3.43% organic carbon calculated from organic carbon estimation. As per crop requirements different soils samples are more than sufficient in organic matter content.

Available Nitrogen (N): Nitrogen is a part of all living cells and is a necessary part of all proteins, enzymes and metabolic processes involved in the synthesis and transfer of energy. Nitrogen is a part of chlorophyll, the green pigment of the plant that is responsible for photosynthesis. Helps plants with rapid growth, increasing seed and fruit production and improving the quality of leaf and forage crops. The available nitrogen in the four samples in question, as per analysis, ranges between 107.3 to 213.2mg/kg showing good available nitrogen content in different samples, for crop growth.

Available Phosphorus (P): Like nitrogen, phosphorus (P) is an essential part of the process of photosynthesis involved in the formation of all oils, sugars, starches, etc. Helps with the transformation of solar energy into chemical energy; proper plant maturation; withstanding stress. Effects rapid growth,

Encourages blooming and root growth. The phosphorus content of soil of four samples ranges between 38.5 to 64.6 mg/kg and falls under medium category for crop growth.

Available Potassium (K): Potassium is absorbed by plants in larger amounts than any other mineral element except nitrogen and in some cases calcium helps in the building of protein, photosynthesis, fruit quality and reduction of diseases. The Potassium content of eight soil samples ranges between 241.5 to 362.7 mg/kg and is average for crop growth.

Available Sodium (Na): Sodium is not a plant nutrient but it does play a role in soil health. High level of sodium indicates salinity problems or sodicity problems such as poor soil structure. Excess sodium can also reduce the uptake of other by plants. For healthy and productive soil, it should aim for a sodium concentration of less 1.0 meq/100g. High sodium levels can be remediated by watering more frequently and applying gypsum. The available sodium in the eight samples in question, as per analysis, ranges between 130.6 to 181.1 mg/kg showing available sodium content in different samples are suitable for crop growth.

Available Calcium (Ca): Calcium up taken as Ca2+, is essential element for the growth of the plants and fruit development, and it is important in the resistance of the plants to diseases due to with base in the protection of the cell wall. Calcium plays important biochemical functions and supports many metabolic processes, in addition to activating several enzymatic systems, thus contributing to the proper development of plants. Calcium plays fundamental role in the stability of the membrane and cell integrity. Among all organs, the leaves contain the highest concentration. The available calcium in the eight samples in question, as per analysis, ranges between 1023.2 to 1175.4 mg/kg showing more available calcium & sufficient for crop growth content in different samples.

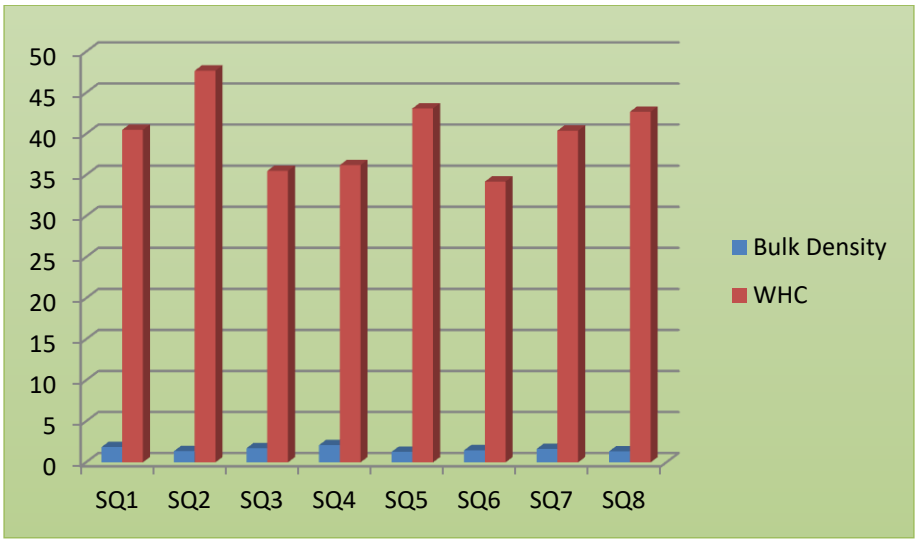
Comments: The interpretation of field data, physical and chemical data it can be concluded that:

As per the physical data soils are coarse to fine texture, imperatively moderate water holding capacity, and moderate to slow permeability. As per physical characters soils are rated as moderately good for agriculture.

As per chemical characters soil reaction (pH) soils are slightly alkaline and normal for crop growth. Organic carbon is more than sufficient. Macro nutrient like nitrogen is better and phosphorus is medium to average potassium. Base saturation is very high.

Soil Quality in Study Area

Parameters – Bulk Density (g/cm^3) WHC (%)

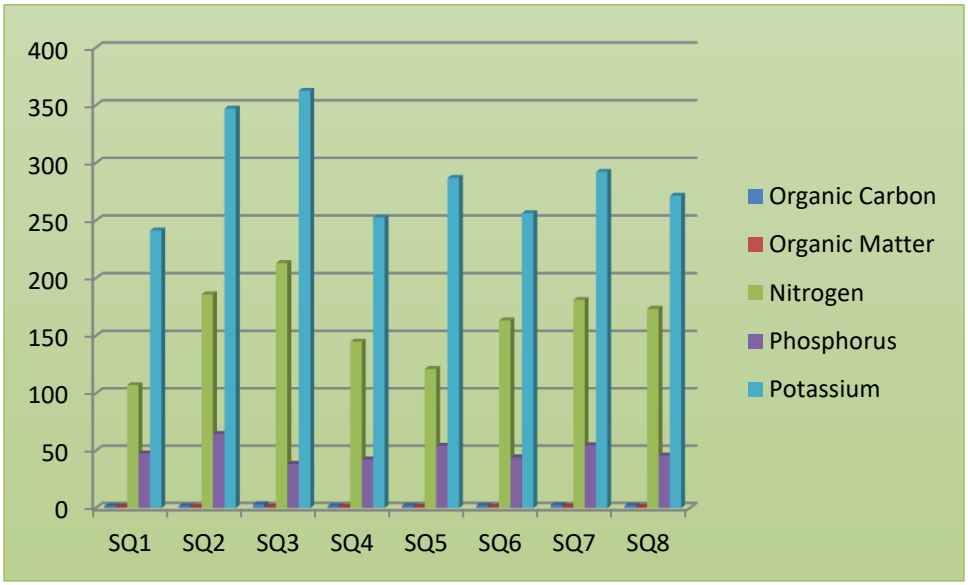


Soil Quality in Study Area

Parameters – pH Value, Electrical Conductivity (in µmho/cm), CEC (in meq/250)

Soil Quality in Study Area

Parameters – Organic Carbon (%), Organic Matter (%), Nitrogen (in mg/kg), Phosphorus (in mg/kg), Potassium (in mg/kg)



3.14 Ecology & Biodiversity:

The environment at any particular geographical location is the sum total of physical (air, water, soil etc.) and biological conditions in the context of given meteorological influences so exerted from within and outside the ecosystem. While the habitat is the natural abode of plants and animals (including human being), the ecosystem includes all the biotic communities with continuous interaction among themselves. Fundamentally, there are two types of ecosystems, viz. the aquatic and terrestrial. The ecosystem further constitutes the marine and fresh water, the two types of subsystems; while the former is confined to oceans, estuaries, lagoons, etc. and the latter consists of rivers, streams (biotic subsystems) and ponds, lake reservoirs, impoundments (lentic subsystem).

The generation/regeneration and existence of any particular type of flora and fauna under any given environment, ecosystem or a place is long drawn process and a complex phenomenon of a continuous interaction between meteorological conditions and the location specific geo-topo-terrestrial/aquatic features, whereas, the aforesaid natural interactions/processes are interwoven and interlinked directly/ indirectly with each other.

There are no wildlife sanctuaries/parks within 10 km of the project site. The area does not record the presence of any critically threatened species. The records of Botanical Survey of India also do not indicate presence of any endemic or vulnerable species in this area.

The ecosystem is defined by the water availability and soil type which are themselves interlinked. The soil of the area in general is fertile which adds to the floristic wealth of the area.

A list of the floral species and fauna present in the study area are tabulated.

3.14.1 Scope and Methodology for Ecological Study

The coverage of the ecological study for the project included a core zone comprising the immediate project area covering the bridge location, approach road locations, and a buffer zone of a 10 km radius surrounding the immediate project primary area. Figure shows the area covered the area covered for the ecological study with delineation of areas where primary and secondary data was collected. The field surveys are carried out by a team of experts from forestry, wildlife, and fisheries fields. Primary data collection was carried out in the immediate project area from March 2022 to May 2022 representing the Pre-Monsoon season. Data collection methods involved:

- Geo-spatial survey through use of GPS;
- Focus group discussions (FGDs) with the local communities; and
- Generation of primary data by undertaking systematic ecological studies in the study area;
- Primary data collection for flora through random sampling method for trees, shrubs and herbs from the selected locations to know the vegetation cover qualitatively.
- To spot the fauna in the study area and also to identify the fauna by secondary indicators such as pugmarks, scats, fecal pallets, calls and other signs.
- For ecological information, the secondary sources such as local officials, villagers and other stakeholders were interviewed.
- Sourcing secondary data with respect to the study area from published literature.

3.14.2 Secondary Literature Review

- Random sampling - plot survey for floral inventory
- Faunal habitat assessment
- Random intensive survey, opportunistic observations
- Diurnal bird observations and bird count

- Active search for reptiles
- Active search for scats and foot prints
- Review of previous studies
- Emphasis has been placed on presence of rare, endemic, migratory and threatened species

Desktop literature review was conducted to identify the representative spectrum of threatened species, population and ecological communities as listed by IUCN, ZSI and BSI and in Indian Wildlife Protection act, 1972. The status of individual species was assessed using the revised IUCN/ SSC category system (14th September, 2012).

Secondary data was collected for information in both the immediate project area as well as the surrounding buffer area of 10 km. This entailed review of literature and having discussions with key experts from local agencies such as the Forestry Department, Patna University, Zoological Survey of India; NGO's active in conservation of wildlife WWF, Dolphin Foundation, CEE. There is a substantial amount of literature note endangered Gangetic Dolphin and the Ganga River and its watershed. There are also a number of agencies implementing various kinds of conservation projects for the Gangetic Dolphin and cleaning of the Ganga River. Some of the documents that were referred to for seeking ecological information for this study are:

- Floral and Faunal diversity of in the lower Ganga published by the Indian Institute of Technology in 2012.
- The Conservation Acton Plan for The Gangatic Dolphin (2010-2020) by National Ganga River Basin Authority, MoEF&CC, Government of India;
- The Gangatic Dolphin and Action Plan for its Conservation in Bihar (2013) prepared by Dr. R.K Sinha for Department of Environment & Forest, Government of Bihar;
- Protection of Endangered Ganges River Dolphin in Brahmaputra River, Assam, India (2009) prepared by Dr. Abdul Wakid, Programme Leader, Gangatic Dolphin Research and Conservation Programme for IUCN.
- Smith, B.D. &Braulik, G.T. 2012 Platanistagangetic. The IUCN Red List of Threatened Species. Version 2015.2www.iucnredlist.org. Downloaded on 28 July 2015.

TABLE 3-17: LIST OF TREE SPECIES PRESENT IN AND AROUND THE CONSTRUCTION SITE OF PATNA AREA DURING STUDY PERIOD

SI. No.	Common Name	Scientific Name	Family
Tree/Plant			
1	Amaltas	*Cassia fistula*	Fabaceae
2	Ambla	*Phyllanthusemblica*	Phyllanthaceae
3	Amra	*Spondiasmombin*	Anacardiaceae
4	Amrud	*Psidiumguajava*	Myrtaceae
5	Anar	*Punicagranatum*	Lythraceae
6	Ashok	*Saracaasoca*	Fabaceae
7	Babool	*Vachellianilotica*	Fabaceae
8	Bael	*Aeglemarrnelos*	Rutaceae
9	Bargad	*Ficusbenghalertsis*	Moraceae
10	Banana	*Musa acuminata*	Musaceae
11	Beetle nut	*Areca catechu*	Arecaceae
12	Bair	*Zizyphus jujube*	Rhamnaceae
13	Coconut	*Coco nucifera*	Arecaceae
14	Christmas Tree	*Araucaria columnaris*	Araucariaceae
15	Curry Tree	*Murrayakoenigii*	Rutaceae
16	Gular	*Ficusglornerata*	Moraceae
17	Gulmohar	*Delonixregia*	Fabaceae
18	Imli	*Tamarindusindica*	Fabaceae
19	Jackfruit /kathal	*Artocarpusheterophyllus*	Moraceae
20	Jalebi	*Pit hecellobiumdulce*	Fabaceae
21	Jamun	*Syzygiumcumini*	Myrtaceae
22	Kachnar	*Bauhinia variegate*	Fabaceae
23	Kadamb	*Anth.ocephaluscadamba*	Rubiaceae
24	Kahua	*Terminaliaarjuna*	Combretaceae
25	Kanel	*CaseabeIathevetia*	Apocynaceae
26	Karunada	*Canssacarandas*	Apocynaceae
27	Khajur	*Phoenix dactylifer*	Arecaceae
28	Kendu	*Diospyrosmelanoxylon*	Ebenaceae
29	Mahua	*Madhucalongifolia*	Sapotaceae
30	Mango	*ManWeraindica*	Anacardiaceae

31	Mehandi	*Lawsoniainermis*	Lythraceae
32	Neem	*Azadirachtaindica*	Meliaceae
33	Nimbu	*Citrus limon*	Rutaceae
34	Pakad	*Ficusuirens*	Moraceae
35	Palash	*Buteamonosperma*	Fabaceae
36	Palm/ Tad	*BorassusflabelVer*	Arecaceae
37	Peepal	*Ficusreligiosa*	Moraceae
38	Putrajeeva	*Putranfivaroxburghti*	Putranjivacea
39	Sahajan	*Moringaolerfera*	Moringaceae
40	Sisham	*Dalbergiasissoo*	Fabaceae
41	Sahtut	*Morus alba*	Moraceae
42	Sakhua/Sal	*Shorearobusta*	Dipterocarpace
43	Saptparni/ Chhatwan	*Alstoniascholaris*	Apocynaceae
44	Semal	*Bombaxceiba*	Malvaceae
45	Shami	*Prosopis cineraria*	Fabaceae
46	Siris	*Albiziaprocera*	Mimosaceae
47	Sitafal	*Annonasquamosa*	Annonaceae
Flowers			
1	Arhul	*Tagetes*	Malvaceae
2	Chandi flower	*Tabernaemontanadivaricata*	Apocynaceae
3	Gulab	*Rosa*	Rosaceae
4	Kaner	*Neriumindica*	Apocynaceae
5	Sadabahar	*Catharanthusroseus*	Apocynaceae
Creeper			
1	Giloy	*Tinosporacordifolia*	Menispermaceae
2	Money Plant	*Epipremnumaureum*	Araceae
Herbs			
1	Mint	*Mentha*	Lamiaceae
2	Rosemary	*Salvia rosmarinus*	Lamiaceae
Shurbs			
1	Boxwood	*Buxussempervirens*	Buxaceae
2	Hetz Midget'	*Thujaoccidentalis*	Cypress
3	Madar	*Calotropisprocera*	Apocynaceae

Grass			
1	Bathu	*Cassia glauca*	Fabaceae
2	Blue Panic grass	*Panicumantidotale*	Poaceae
3	BadiDudhi	*Euphorbia hirta*	Euphorbiaceae
4	Dub	*Cynodondactylon*	Poaceae

3.14.3 Fauna in study area

To study the diversity of fauna, information is collected from secondary sources. Secondary data was collected from the forest department and from previous studies done in the area to establish baseline study for distribution of wild animals in the study area. No wild mammals sighted during the field surveys but local people and secondary data reported some of the animals visiting the project area

The main type habitat in the project area is modified habitat in the area of the approach roads.

However, the area inside the Ganga River is critical habitat.

The Ganga River is critical habitat as it is home of the globally endangered Gangetic Dolphin (*PlantaristaGangetica*).

The Ganga River near Raghopurdiara is critical habitat of some of migratory bird species mostly those of Ganga River basin.

There are five classes of fauna in the project area comprising: mammals, aves (birds), fishes, amphibians, reptiles, insects and zooplanktons. Table below provides a summary of the total numbers of species under each class including the endangered species listed under the IUCN red list and protected species list in the wildlife conservation Act of India.

Table 3-18: List of Endangered Fauna Species in Ganga River Basin

Common Name	Scientific Name	IUCN category (CR, EN, VU)	Wildlife conservation Act Schedule
Painted Stork	*Mycterialeucocephala*	NT	Schedule IV
Black necked Stork	*Ephippiorhynchusasiaticus*	NT	Schedule IV
Lesser Adjutant	*Leptoptilosjavanicus*	VU	-

Greater Adjutant	*Leptoptilosdubius*	EN	Schedule IV
Black-headed ibis	*Threskiornismelanocephalus*	NT	Schedule III
Ferruginous pochard	*Aythyanyraca*	NT	Schedule IV
Greater Spotted Eagle	*Aquila clanga*	VU	-
River Lapwing	*Vanellusduvaucelii*	NT	-
Black-tailed Godwit	*Limosalimosa*	NT	Schedule IV
Mammals			
Gangetic Dophin	P*latanista Gangatica gangetica*	EN	Schedule I

Table 3-19: List of fauna in the study area

S.No	Common Name	Scientific name	Scheduled
Rodent			
1	Rat	*Ratthusratthus*	V
2	Squirrel	*Funambulus pennant*	IV
Mammals			
1	Cow	*Bostaurus*	V
2	Cat	*Feliscatus*	V
3	Dog	*Canis lupus familiaris*	V
4	Goat	*Capra aegagrushircus*	V
5	Murrah Buffalo	*Bubalusbubalis*	V
Amphibians			
1	Common Indian toad	*Bufomelanostictus*	IV
2	Indian skipper frog	*Euphlyctiscyanophlyctis*	IV
3	Indian bull frog	*Hoplobatrachustigerinus*	IV
4	India tree frog	*Polypedates maculates*	IV
Fishes			

S.No	Common Name	Scientific name	Scheduled
1	Bhangan or Bata	*Labiobata*	--
2	Chappera or Palla	*Gudusiachapara*	--
3	Dumra or Dhambra	*Labiorohita*	--
4	Mangur	*Clariasbatrachus*	--
5	Thaila	*Catlacatla*	--
Mollusca			
1	--	*Bellamyabenghalensis*	--
2	--	*Pilaglobosa*	--
3	--	*Brotiacostula*	--
4	--	*Angulyaraoxytropis*	--
5	--	*Lemellidensmarginalis*	--
Reptiles			
1.	Garden lizard	*Calotesversicolor*	IV
2.	House lizard	*Hemidactylussp*	IV

3.15 Socio-economic Environment

Socio-economic survey tools provide a means of improving understanding of local resource management systems, resource use and the relative importance of resources for households and villages.

Data Collection: Following steps were considered for the collection of primary data:

1. Identifying of Study Area
2. Site Visit
3. Analysis of Data Collected

The data on socio-economic aspects in the study area has been carried out through the analysis of the secondary data available for the study area.

3.15.1 Methodology

The methodology adopted in the assessment of socio-economic condition is as given below;

- Evaluation of the parameters defining the socio-economic conditions of the population.
- Analysis of the identification of social attributes like population distribution, sex ratio, occupational structure, available public utilities, etc., through literatures like district census hand book.
- Public opinion for the future development in the study area.

Sociological aspects include human settlements, demographic and socio-economic aspects and infrastructural facilities available in the study area. The economic aspects include agriculture, industry and occupational structure of workers.

The studies carried out are descriptive and exploratory in nature and are done by FAE, Socio-Economic.

TABLE 3-20: METHODOLOGIES & DATA

S. No.	Collection of data	With Effect From
Secondary Sources		
I	Census of India, 2011	Latest Update available from 2012
Primary Sources		Method / Technique
Field observations		Market area survey
Extensive site-specific survey Survey period Type		Non-Probability Random Sampling Target sample of people interviewed of near road side, through Open interview Manner and the order of Sub-round/ per monitoring season Residence Shopkeeper etc.

3.15.2 Demographic structure of the study area

Population in Core Zone

Socio-economic status of the population is an indicator of development of the region. Any developmental project of any magnitude will have a bearing on the living condition and the economic bearing of the population in particular and the region as a whole. The section delineates the overall appraisal of the socially relevant attributes. The data on socio-economic aspects in the study area has been carried out through the analysis of the secondary data available for the study area.

3.15.3 Population in Buffer Zone

Patna ranks 1st in terms of population (58,38,465) and 9th in terms of area (3,202 sq.km.) in the state of Bihar. In terms of population per sq.km. Patna is the 2nd densely populated district in the state with 1,823 persons per sq.km as against the state's1,106. Patna ranks 32th in terms of sex-ratio (897) against the state's 918. Patna ranks 37th in terms of child sex-ratio (909) against state's 935. There are 124 uninhabited villages (out of 1,388 total villages) in the district of Patna.

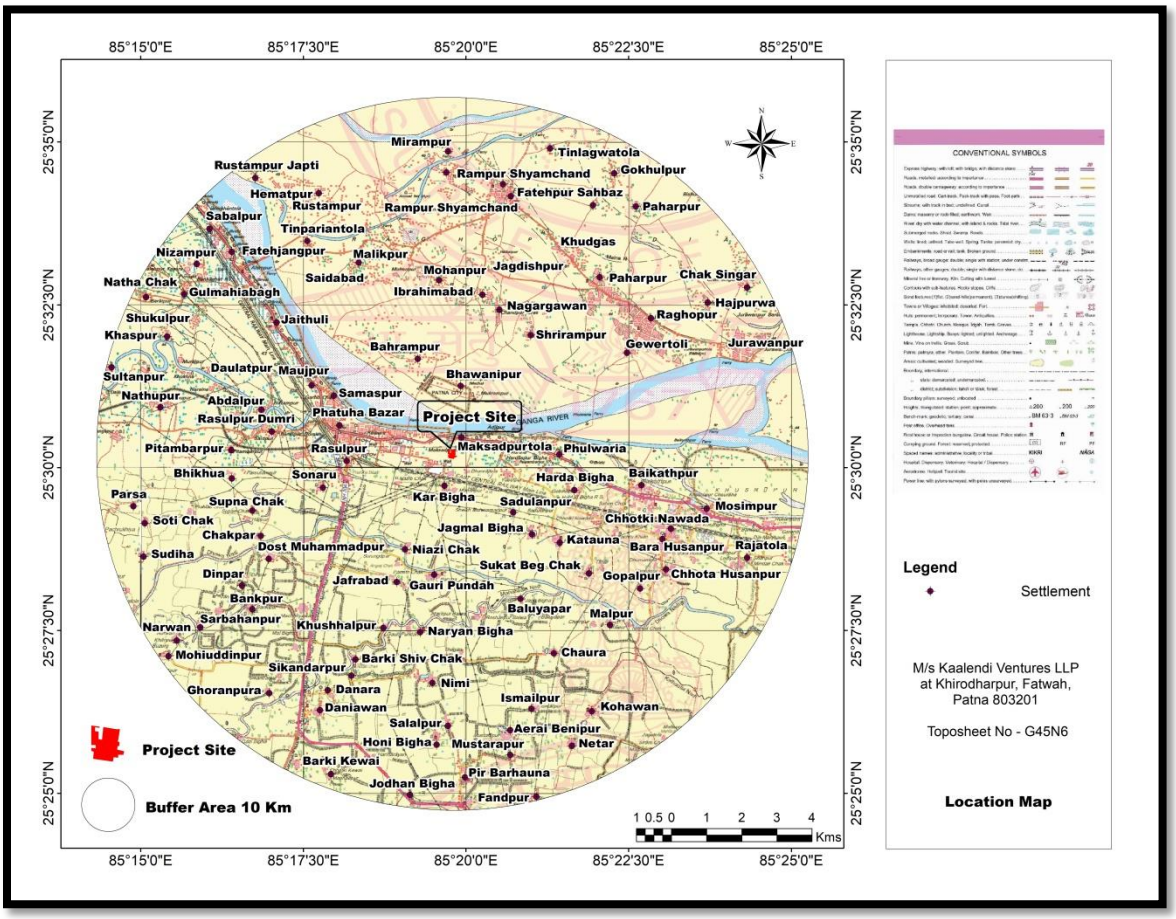


FIGURE 3-19: SETTLEMENT MAP OF THE PROJECT SITE

The Total Population of study area is 8978 individuals and 1527 numbers of households. A comparative assessment has been made for the respective demographic aspects, based on the year 2011 data, which has been discussed in the following sections.

The total population of study area is 8978 the percentages of male & female population are 52% & 48% respectively. Breakup of the population for male and female is given in following **Table: 3.21.**

TABLE 3.21 BREAK-UP OF THE POPULATION FOR MALE AND FEMALE

Particulars	Number
No of households	1527
Total population	8978
Male population	4703
Female population	4275
Average family size	6

(Source: As per Census Data 2011)

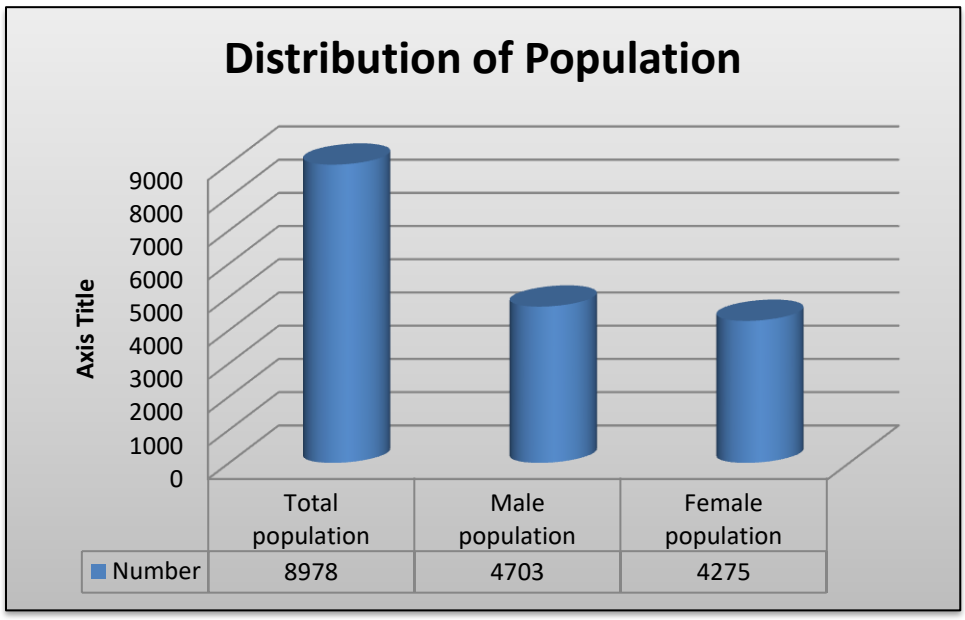


FIGURE 3-20: DISTRIBUTION OF POPULATION IN STUDY AREA

3.15.4 Social structure:

In 2011, about 19.43% of the total population belonged to Scheduled Castes (SC). The distribution of population in the study area by social structure is presented in **Table:**

TABLE 3-22: DISTRIBUTION OF POPULATION BY SOCIAL STRUCTURE IN STUDY AREA

Particulars	Number
Total Scheduled Castes	1745
Scheduled Castes Male	897
Scheduled Castes Female	866

Total Scheduled Tribes	2
Scheduled Tribes Male	2
Scheduled Tribes Female	0

(SOURCE: AS PER CENSUS DATA 2011)

3.15.5 Literacy levels

The literacy rate is in study area 46.44% of the total population in 2011. The male literacy rate was 54.56% (of total male population), whereas corresponding figures for the female literacy rate was 37.52% (of total female population) in 2011.The details are presented in **Table** and represented in the form of a bar chart as given in Figure**.**

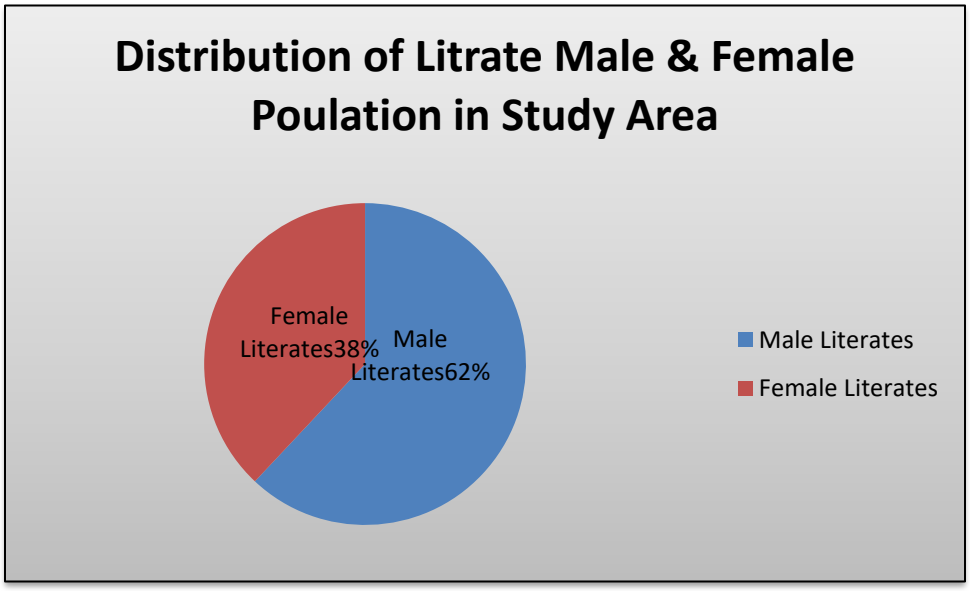


FIGURE 3-21: DISTRIBUTION OF LITERATE MALE & FEMALE POPULATION IN STUDY AREA

Table 3-23 Distribution of Literates in Study Area

Particulars	Number
Total Literates	4170
Male Literates	2566
Female Literates	1604
Total Illiterates	4808
Male	2137
Female	2671

(Source: As per Census Data 2011)

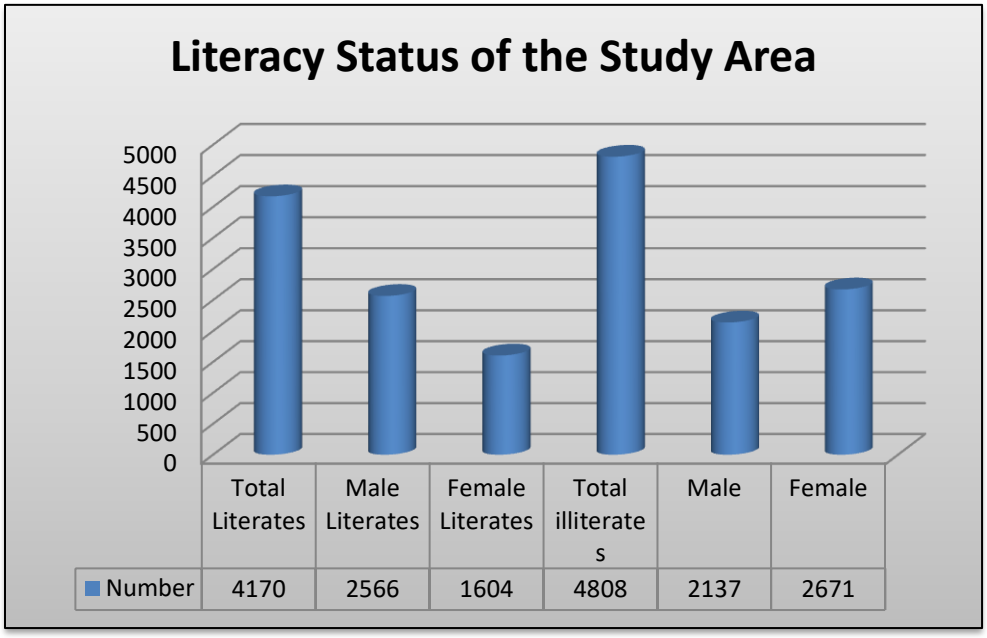


FIGURE 3-22: LITERACY STATUS OF THE STUDY AREA

3.15.6 Occupation Pattern of the study area

The occupational structure of the population in the study area has been studied with reference to the total workers and non-workers. Further total workers grouped into two categories main workers and marginal workers. Main workers have been grouped into four categories namely: Cultivators, agricultural laborers, household workers and other workers.

3.15.7 Total workers:

Work is defined as participation in any economically productive activity with or without compensation, wage. Such participation may be physical and/ or mental in nature. Work involves not only actual work but also include supervision and direction of work. It even includes part time help or unpaid work on farm, family enterprise or its economic activity. All persons engaged in 'work' as defined above are workers.

The number of total workers in the study area is 2718 which are 30.27% of total population. Out of which 80% is male and only 20% is female. Total workers further divided into main workers and marginal workers.

3.15.8 Main workers:

Those workers who had worked for the major part of the reference period (i.e., 6 months or more) are term main workers. Total number of main workers in the study area is 2088 which are 76.82% of total workers and 23.25% of total population.

3.15.9 Marginal Workers

The marginal workers are those workers, who are engaged in some work for a period of less than six months, during the reference year prior to the census survey. Total number of marginal workers in study area is 630 which are approx. 23.17% of the total workers.

3.15.10 Cultivator

A person is classified as cultivator if he or she is engaged in cultivation of land own or from government or held from private persons or institutions for payment in money, kind or share. Cultivation work includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivation process is not treated as cultivator. Similarly, a person working on another person's land for wages in cash or kind or combination of both is not treated as cultivator.

Total cultivators in study area are 655 which are 24.09% of Total workers. The distribution of cultivators is male percentage is 83% and female percentage is 17%.

3.15.11 Agricultural Labourers

A Persons working on the land of others for wages or share in the yield have been treated as agricultural labourers. The total Agriculture workers of this category are about 782 which are 8.71% of the total

population in study area. The distribution of agricultural labours within study area male percentage is 72% and female is 28%.

3.15.12 Household Worker

Household industry relates to production, processing, servicing, repairing or making and selling but not includes professions such as a pleader, Doctor, Musician, Dancer, Waterman, Astrologer, Dhobi, Barber, even if such professions, trade or services are run at home by members of the household. The total Household workers of this category are about 615 (22.62% of total workers) in which 92% are male and 8% are female.

3.15.13 Non-Workers:

The total number of non-workers population is 6260 which are 69.72 % of the total population. Out of which 41% is male and 59% is female.

TABLE 3-24: OCCUPATIONAL PATTERN OF THE STUDY AREA

S. No.	Particulars	Number of Workers in the study area		
		Total	Male	Female
1.	Total Workers	2718	2166	552
2.	Main Workers	2088	1702	386
3.	Marginal Worker	630	464	166
4.	Cultivators	6260	2537	3723
5.	Agricultural Labour	655	543	112
6.	Household Worker	782	564	218
7.	Non-workers	615	563	52

(SOURCE: AS PER CENSUS DATA 2011)

3.15.14 **Impact Assessment & Conclusion**:

The project activity together with inflow of capital, in-migration and employment of local inhabitants will show positive impact on the overall social and economic condition of the people of the area. The project will provide a direct job opportunity to the local persons as both technical and non-technical workers. Literacy may further increase because of better income and awareness amongst the people. The project will provide direct employment opportunity to local people. Indirect employment is being generated in trade and other ancillary services. Employment in these sectors is both permanent and temporary or contractual and involvement of unskilled labour. A major part of this labour force is mainly from nearby

villages who are expected to engage themselves both in agriculture and project activities. This will enhance their income and lead to overall economic growth of the area. The following socio-economic changes may take place due to project activities:

- The project will have a positive employment and income effect, both direct as well as indirect.
- Expected Improvement of infrastructure& transportation.
- The project will have positive impact on consumption behavior by way of raising average consumption and income through multiplier effect.
- The project will bring changes in the pattern of demand from food to non-food items as sufficient income will generate.
- People located in the project area and in close vicinity, enjoying positive changes in life style and better quality of life.

3.15.15 Rehabilitation & Resettlement (R&R) Action Plan

There shall not be any displacement of people due to project as the project is modified in the existing site only. No further land acquisition required for the project; hence no R &R Action plan is required. There is no Land Acquisition.

3.15.16 Social infrastructure nearby project site

Nearest Habitation:- Nearest Habitation is Khirodharpur (0.25 Km towards North) Budhdevchak (0.78 km towards South), Vaibhav Nagar (2.66 km towards WSW) Phulwaria (2.41 km towards East) etc. These Villages are densely populated and Nearest Railway Station is Fatuha Railway Station (2.48 Km towards West), Hardas Bigha Railway Station (2.81 Km towards South-East) and Nearest Airport is Patna Airport (25.93 km towards WNW).

Educational Facilities: -The study area (of 10.0 km) has High School Budhdevchak, Fatuha (0.68 km towards SSW), Navodaya Public School, Fatwah (2.59 km towards West), Govt. Primary School, Patna-Bakhtiyarpur Rd. (1.74 km towards ENE).

Medical Facilities: The study area (of 10.0 km) has PHC, Patna-Bakhtiyarpur Rd. (2.60 km towards West), Block Government Hospital, Fatuha (2.52 km towards West), PHC, Fatuha (2.52 km towards West).

Religious facilities: - Some nearest temple is situated Balnath Temple, Fatuha Station (1.82 km towards West), Shitla Mata Temple, Kewlatal (1.28 km towards North-West).

Post office & Police Station: -Fatwah Post Office approx. 2.67 km towards WNW and Khusrupur Post office approx. 6.11 Km towards SE and Fatuha Police Station, approx. 2.87 km towards WNW.

Social Setup:

The study area is dominated by General caste and other backward community; Agriculture is the predominant occupation however currently there is a wave of change of occupation. There by other worker are increasing in the study area. The immediate surroundings of the projects lack the amenities.

TABLE 3-21: SOCIAL SETUP OF THE STUDY AREA

S.N.	Description	Number	Percentage (%)
1	**Gender wise Total Population of the Study Area**	8978	
	Male	4703	52
	Female	4275	48
	Sex Ratio (No. of females per 1000 males)	909	
2	**Gender wise Total Population (0-6 age group)**	1798	
	Male	954	53
	Female	844	47
	Sex Ratio of 0-6 age group population (No. of females per 1000 males)	885	
3	**Total number of Households**	1527	
	Average Household size in the Study Area as a whole	6	
4	**Total no. of villages in the study area**	77	
5	**Total Population of Schedule Caste Community in the Study Area**	1745	19
	Male	879	50
	Female	866	50
	Sex Ratio of Schedule Caste population in Study Area (No. Of females per 1000 males)	985	
6	**Total Population of Schedule Tribe Community**	2	0
	Male	2	100
	Female	0	0

	Sex Ratio of Schedule Tribe population in Study Area (No. Of females per 1000 males)	0	
7	**Total Literates in the Study Area**	4170	46
	Male	2566	62
	Female	1604	38
	Gender gap in literacy rate (%)		23
8	**Total Illiterates in the Study Area**	4808	54
	Male	2137	44
	Female	2671	56
9	**Total Workers in the Study Area**	2718	30
	Male	2166	80
	Female	552	20
	Gender Gap in work participation rate (%)		59
10	**Total Non- Workers in the Study Area**	6260	70
	Male	2537	41
	Female	3723	59
11	**Total Main Workers in the Study Area**	2088	
	Male	1702	82
	Female	386	18
12	**Total Main Marginal Workers in the Study Area**	630	
	Male	464	74
	Female	166	26
13	**Total Main cultivator Workers in the Study Area**	655	
	Male	543	83
	Female	112	17
14	**Total Main Agriculture Labour Population in the Study Area**	782	
	Male	564	72
	Female	218	28
15	**Total Main Other Worker Population in the Study Area**	615	
	Male	563	92
	Female	52	8

4 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 Introduction

Identification and evaluation of various potential impacts due to the proposed project on the surroundings and the mitigation measures in respect of each of them are presented in this chapter.

Generally, the environmental impacts can be categorized as either adverse or beneficial. Almost all the potential impacts which are temporary and short termed might occur during the construction phase, whereas potential impacts during operation phase might have long term effects. The potential impacts have been identified for the whole of study area (10 km beyond plant boundary as impact zone) with respect to air, noise & vibration, water, soil, biological and socio-economic environment. The mitigation measures which are required to negate the adverse impacts are also discussed in this chapter environmental aspect wise.

The impact identification and prediction process aim to:

- Identify potential source or cause of impact throughout the life of project
- Characterize the potential impacts affecting the social, economic and environmental attributes
- Assess the potential of negative environmental impact due to the project and its mitigation through Environmental Management Plan (EMP)
- Prediction of the impacts due to the development, construction and functional activities encompass the developmental processes to be undertaken during construction and functional phases

In the following sub sections the potential impacts and magnitude of the impacts from the project have been assessed and discussed in detail.

4.2 Impacts on Land Environment

The proposed project is going to take place where there are already so many industrial activity is going on.

4.2.1 Impacts during Construction Phase

Minor site excavation will be envisaged during modification construction of the units. The activities causing no potential impact during construction phase on land use include leveling of site, construction of related structures and installation of equipment and movement of heavy machineries and vehicle. No significant adverse impact on the surrounding land use during the construction period is envisaged. The construction activities will result in top soil displacement to some extent in the plant area. Apart from localized construction impacts at the plant site, no adverse impacts on soil in the surrounding areas are anticipated.

4.2.2 Impacts during Operation Phase

During operation phase, the activities of proposed plant will not change the soil quality. The waste generated from the plant is generally of use on another sites like slag are used in road construction, the iron powder generated due to scratch is generally sold to cement factories.

4.2.3 Mitigation measures

Excavated soil during construction phase will be suitably used for land filling in low lying areas. The top soil will be preserved and used for landscaping purposes and whatever solid wastes get generated will be disposed of as either in recovery of iron or used as sand in road construction or recovery of precious/more valuable metals. Other solid waste is sold to market as low value products.

4.3 Impact on Air environment

4.3.1 Impacts during Construction Phase

During the construction phase, dust (particulate matter) is expected to be emitted due to movement of vehicle on the haul roads and material handling. The land is already developed for industrial work so extensive site formation work is not required. Vehicular emission of SO_2, NO_2, CO will add onto the air pollution. Movement of vehicles on unpaved roads will also add onto the dust emission. Operation of DG sets will generate air pollutants like SO_2, NO_2, CO. Fugitive emissions are envisaged such as dust in construction phase only.

4.3.2 Impacts during operation phase

Raw material will be transported through roads such as sponge iron by trucks and finished product will also be transported trucks. Particulate and fugitive emissions might arise from activities like sizing of

scrap, DG set power use and by the movement of vehicle. During the operation phase, there are four major categories of sources of air pollutants, they are:

- ❖ Emissions from manufacturing processes/furnace
- ❖ Fugitive emissions from material handling
- ❖ Emissions (NOx, CO and PM) from vehicular movement
- ❖ Emissions (NOx, CO and PM) from Diesel Generator Set

4.3.3 Mitigation measure

The impact during construction phase will be reversible, marginal and temporary in nature. Proper maintenance of vehicles and construction equipment will help in controlling the gaseous emissions. Water sprinkling on roads and construction site will prevent fugitive dust. Over loading of the trucks will be avoided. Haulage roads, which are used for transportation of material, will be paved. Utmost care and regular inspection schedule will be made to prevent any fugitive emission of dust during transportation of materials. People working in and around the dust generating area, will be provided with Personal Protective Equipment (PPE) like dust mask to prevent inhalation of dust particles, and use of the same will be strictly enforced during working hours.

During operational phase, paved roads will be laid to prevent dust emission during operational phase of vehicular movement. Adequate greenbelt development along the road side and in the plant premises will help in providing dust suppression. Regular water sprinkling arrangement will be provided at the loading and unloading areas. Due to covid, wearing mask is now in habit of individual same will be promoted among the workers working near the dust generating area. While the major source of emission will be from induction furnace area so air pollution control equipment will be installed. In general, a bag filter along with the spark arrestor used to install to control the air pollution emitted from plant. The working equipment of the bag filter is described as below:

Fume extraction system with bag filter to control the emissions from the process and fugitive emissions at furnace has been installed and the same will be installed in the proposed induction furnace. The fume extraction system of the induction furnace is attached to stack of 30m height. There is the proposal for installation of two nos of additional stack with fume extraction attached to the proposed induction furnace.

Suction Hood: Feeding of raw material is an intermittent process in Induction Furnace and at the time of completion of every heat, molten metal is tapped with tilting platform of furnace. Hence, it requires a Movable Hood System so as to facilitate slag removal, raw material (bulk) feeding and tilting of platform. Hoods are designed based on crucible diameter and optimum clearance of hood from furnace.

Ducts & Bends: Ducts and Bends are required to convey flue gases from point of suction to the chimney and connect various equipment like Hood, Spark Arrestor, Bag House, ID Fan and Chimney. Their sizes are based on flue gases volume & temperature.

Spark Arrestor: It is used for arresting live particles and large hot particles which can damage & burn bags. It also facilitates in settling of large dust particles and works as a pre-cleaner. Its size depends upon gas volume and unit layout.

Primary Spark Arrestor: Its purpose is to remove large size dust particles and removal of livered-hot particles/sparks.

Secondary spark arrestor:

Involute Cyclone isused to remove medium size particles from flue gas stream. This also removes livered-hot particles/sparks from the flue gases which are not trapped by primary spark arrestor. The treated flue gases are discharged from top and dust is collected at the bottom.

Bag Filtration System: It is used for fine filtration of Flue gases to remove dust particulate matter. The dust is retained on one side of Bag and clean gases are received on other side. The combined treated gases from all the bags are collected at top of bag house and are sucked through to ID Fan. The dust collected on other side of bags is de-dusted through pulse air jet mechanism with high pressure air. The dust is collected at bottom of hopper and is discharged through Rotary Air Lock Valve. Pulse jet mechanism is carried out through high pressure air with the help of sequencer and solenoid valve.

Id Fan: ID Fan provides necessary suction to extract flue gases from suction hood, spark arrestor, Bag filter and discharge same though the chimney. As the whole system is under suction no dusting occurs in the surroundings and fugitive emissions are avoided.

Stack (Chimney): Finally, the filtered gases are passed through chimney of suitable height and diameter. The chimney will be provided and to cater total volume of flue gases as per with height as per CPCB recommendations.

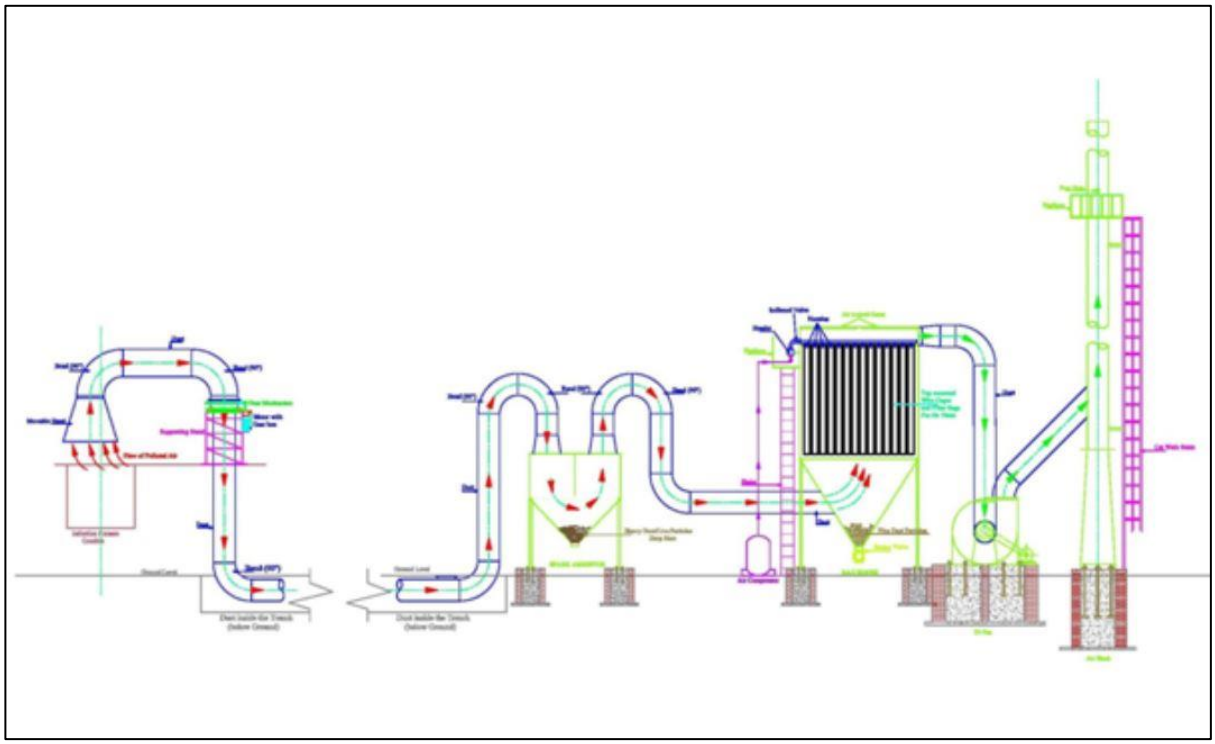


FIGURE 4-1: FLOW DIAGRAM OF BAG FILTER

The proposed APCD will be installed to comply with the applicable emission norms.

- Adequate stack height of 30 m will be provided as per norms.
- APCD system along with hood over the furnace to capture the major emissions will be provided to minimize the emissions and to maintain the emissions within the prescribed limits.
- Regular monitoring of emissions from all stacks and ambient air quality will be carried out as per norms.
- All air pollution control devices shall be well maintained as per their specifications to keep them running efficiently.
- Environmental management cell equipped with adequate manpower and provided with budgetary funds allocation will be entrusted with the responsibility of ensuring the efficient working of all environmental control devices.

4.3.4 Process and Fugitive Emission and Control Measures

The plant will install air pollution control equipment to control particulate matter emissions from process. For this, both primary and secondary emission control system is envisaged. Primary system will consist of water-cooled suction hood on the cover of the furnace, hot duct, gas cooler and the cooled waste gases with temperature not exceeding 150^0C will be taken to a pulse jet bag filter. An induced draft fan will discharge the cleaned gas to atmosphere. For secondary emission arising a hood near tapping will be provided and the gases will be taken to the same bag filter system connected after gas cooler, which is connected to the primary hood. The suction will be controlled by hydraulic dampers to control opening and closing of hoods. The collected dust of bag filter will be used in backfilling and leveling purpose.

Fugitive emissions from the proposed plant would be significant due to activities like material handling, transfer points of materials, loading of product and movement of vehicles. These operations generate large quantity of dust. Specific instances of fugitive dust generation may include dust blown by wind from the raw-materials stockpile, dust caused by vehicular traffic within the factory, dust leakage from conveyors, conveyor transport points, storage hoppers and packers etc., good housekeeping, proper maintenance, wetting of dusty areas, use of enclosed storage wherever feasible etc., would considerably reduce fugitive dust.

For the purpose of effective prevention and control of fugitive emissions, the proposed project shall be implementing the following:

- ✓ Water shall be sprayed on the material prior and during loading & unloading.
- ✓ All transfer points shall be fully enclosed and provided with dust suppression systems.
- ✓ All roads shall be paved on which movement of raw materials or products will take place.
- ✓ Preventive measures shall be employed to minimize dust build up on road.
- ✓ Conveyors shall be provided with conveyor cover.
- ✓ Maintenance of air pollution control equipment shall be done regularly.
- ✓ All the workers shall be provided with disposable dust mask.
- ✓ Green belt will be developed around the plant to arrest the fugitive emissions.
- ✓ The following air control equipment will be installed to control the emission of air pollutants. The gases evolved along with dust from the process of steel making in the Induction Furnaces are collected in the side swiveling hoods and on cooling are cleaned in APCD system having 99.9% efficiency of dust collection. The dust collector will have bag type pulse jet filter of very fine

fabric specifically made to prevent dust emission. The particulate matter in the emitted air will be within the permissible limits of NAAQS, 2009. The dust thus collected in dust collector and will not be wasted; depending upon availability it will be packed in bags and sold for metal recovery. The cleaned gas from the APCD system will be discharged through a chimney of 30 m height.

- ✓ As a control mechanism, it will be strictly ensured that all the vehicles are PUC certified and properly covered during transportation, loading, unloading and other such activities of raw materials and finished products. APCD equipment detail

TABLE 4-1: APCD EQUIPMENT DETAIL

Sr. NO	Item	Specification
1	Bag House (Pulse Jet)	**Containment Unit:** Plan :4638 mm x 2360 mm Vertical Height: 3500 mm H Bottom Pyramidical Hopper, vertical Height: 2000 mm (approx). Total height :6500 mm ***MoC: 2.0 mm Thk:*** MS Sheet: fastening with 65 x 8 MS flat & ISA 65 x 8: Tube sheet out of 5.0 mm Thk. MS Sheet Lug Support out of ISA 100 x 100 Bracing with ISA 40x 5 Base plates: 10.0 mm Thk MS Complete with foundation bolts Catwalk stairs & Working platform Filter Element: Filter Bag 180 Nos., 150 mm Dia. 3.0 m L, Polyester Non-woven, Water resistant, 550 GSM, Top snap Band Type, Top Mounted wire cages, GI 4.0 mm thick wires with spot welding Solenoid values, 1.5" Dia. Double Diaphragm type, Sequential controller Air lock Rotary Valve (1 No.) Screw conveyor with machined rotary valve geared motor (2.0 HP x 1440 RPM), Complete with guard etc.

4.3.5 Impact of the Transportation and Mitigation Measures

The transportation of raw materials and finished product is likely to create impact on surrounding environment. The following point identifies the possible impacts and the mitigation measures to be adopted.

Impact on Air Environment

- ✓ The movement of heavy vehicles due to transportation of raw material causes re- suspension of loose dust particles in air

- ✓ Increase in PM_{10}, SO_2, CO and NO_2 levels due to burning of fossil fuels.

Mitigation Measures:

- ✓ Sprinkling of water to reduce fugitive particulate matter concentration.
- ✓ Vehicle shall be thoroughly covered so as to prevent release of fine particulate in case of accidental leakage.
- ✓ Vehicle used for transportation shall comply with environmental standards and only vehicles having Pollution under Control certificate will be put into use.

Impaction Land Environment:

- ✓ During accidental leakage due to puncture of carry bags, containers, deposition of material on top soil, land is possibility.

Mitigation Measure:

- ✓ Vehicles shall be covered to prevent accidental leakage.
- ✓ The area got contaminated shall be remediated through scrapping or the measures.

Impact and Mitigation on Traffic Density:

- ✓ The movement of vehicles will increase traffic density of the area.
- ✓ However, the proximity of major road will all deviate possible congestion problems.
- ✓ Proper tuning of vehicles shall be maintained to avoid traffic congestion and use of horns shall be restricted in silent zone.

4.3.6 Air Quality Modelling

Objective

Atmospheric modelling is used by air quality managers to make decisions on effective and efficient ways to implement the National Ambient Air Quality Standards (NAAQS) and improve air quality. Air quality modelling is done to estimate the relationship between sources of pollution and their effects on ambient air quality, predict the impacts from potential emission sources, and simulate ambient pollution concentrations under different policy scenarios. They are critical for determining the relative contributions from different sources, monitoring compliance of air quality regulations, and making policy decisions

The Air Quality Model

In order to estimate the ground level concentrations due to the emissions from the proposed project, EPA approved American Meteorological Society/Environmental Protection Agency Regulatory Model -

AERMOD View 10.0.1 dispersion Model has been used. AERMOD View dispersion Model provides option to model emissions from a wide range of sources that are present at a typical industrial source complex. The model considers the sources and receptors in undulated terrain as well as plain terrain and the combination of both. The basis of the model is the steady state Gaussian Plume Equation, with modifications to model simple point source emissions from stacks that experience the effect of aerodynamic down wash due to nearby buildings, isolated vents, multiple vents, storage piles etc. AERMOD View dispersion model with the following options has been used to predict the cumulative ground level concentrations due to the proposed emissions. Area being rural, the rural dispersion parameters are considered as below:

- Predictions have been carried out to estimate concentration values over radial distance of 10 km around the sources.
- Cartesian receptor network has been considered.
- Emission rates from the sources were considered as constant during the entire period.
- The ground level concentrations computed were as in basis without any consideration of decay coefficient.
- Calm winds recorded during the study period were also taken into consideration.
- 24-hour mean meteorological data, extracted from the meteorological data collected during the study period as per guidelines of IMD/CPCB has been used to compute the mean ground level concentrations to study the impact of proposed activity.
- Stability class was evaluated based on wind direction fluctuation.
- The mathematical equations used for the dispersion modelling assumes that the earth surface acts as a perfect reflector of plume and physico-chemical processes such as dry and wet deposition and chemical transformation of pollutants are negligible.
- Washout by rain is not considered.
- Source of emission is continuous and at steady state.

Sources of Pollution/Emission

Point Source:

1. Stack attached to Induction Furnaces
2. Stack Attached to Re-heating Furnace
3. Stack Attached to DG Set 1 x 500 KVA.

Emission Calculation

An emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. The general equation for emissions estimation is:

$$E = A \times EF \times (1 - ER/100)$$

Where;

E = emissions in (gm/sec);

1. A = activity rate (Tonnes/Hr);
2. EF = emission factor (Kg/Tonnes), and
3. ER = Overall emission reduction efficiency, %

4. Emission rate of pollutants from operation of Furnace and DG sets are computed based on research paper of *EPA AP-42* document and *Air quality monitoring, emission inventory and source apportionment study for Indian cities CPCB Report - Non-Vehicular Emission Factors*. It has been considered that the re-heating process in the re-heating furnace will last for 4 hours and one reheating per day will be done. Since, there is no separate emission standards are available for reheating furnace, it has been assumed that the burning of coal in the re-heating furnace will be the major pollution source and the emission will be equivalent to the emission from coal based thermal power plant. As per the emission factors published in the above documents, the emission rate has been computed and is provided below along with other computed parameters:

S.No.	Particulars	Stack 1	Stack 2	Stack 3
1	**Status**	**Proposed**	**Proposed**	**Proposed**
2	Pollutant	PM	PM	PM, SO2, NOx, CO
3	Stack Attached to	Induction Furnace	Re-Heating Furnace	DG Set
4	APCM	Adequate Stack Height + Bag Filter	Adequate Stack Height + Bag Filter	Adequate Stack Height
5	Efficiency of APCM, %	90	90	0
6	Material of Construction	RCC	RCC	MS
7	Stack Height (m)	30	30	15
8	Capacity (MT/day; KVA)	500	500	500

9	Stack Internal Dia (m)	2	2	0.2
10	Temperature (^{0}C)	75	185	100
11	Temperature (K)	348	458	373
12	Fuel	Electricity	Coal	LDO
13	Fuel Quantity [Kg/Hr]; KG/Ton; LDO in L/hr		70	70
14	Flue Gas Exit Velocity (m/s)	15	15	10
15	Flue Gas Flow Rate m3/hr	169646.0	169646.0	1131.0
16	Flue Gas Flow Rate Nm3/hr	146246.6	111121.8	909.6
17	PM Emission Factor, kg/MG of Iron Produced, kg/ton of coal, Kg/KW-Hr	0.05	1.15	0.00133
18	NOx Emission Standard kg/ton of coal, Kg/KW-Hr	0	5.5	0.0188
19	SO2 Emission Standard kg/ton of coal, Kg/KW-Hr	0	9.5	0.00124
20	CO Emission Standard kg/ton of coal, Kg/KW-Hr	0	0.25	0.00406
21	PM Emission rate, kg/day; kg/hr for DG	25	40.25	0.532
22	NOx Emission rate, kg/day, Kg/hr	0	192.5	7.52
23	SO2 Emission rate, Kg/hr	0	332.5	0.496
24	CO Emission rate, kg/day, Kg/hr	0	8.75	1.624
25	PM Emission, rate, g/sec (Uncontrolled)	0.3	2.8	0.1478
26	NOx Emission rate, g/sec (Uncontrolled)	0.0	2.2	2.0889
27	SO2 Emission rate, g/sec (Uncontrolled)	0.0	3.8	0.1378
28	CO Emission rate, g/sec (Uncontrolled)	0.0	0.1	0.4511
29	PM Emission rate, g/sec (Controlled)	0.0289	0.280	0.1478

Quantitative estimation of impacts on air environment

An attempt has been made to predict the incremental rise of various ground level concentrations (GLCs) above the baseline status in respect of air pollution due to Furnaces and DG sets operations. The mathematical model used for predictions in the study is USEPA approved AERMOD View 10.0.1

software which is designed for point source, line source and area sources for the prediction of impacts due to furnaces and DG set operations. For estimation of the GLC in worst case scenario, the furnace and DG Sets operations are assumed to be carried out on the flat terrain. The predicted GLC computed using AERMOD View developed by Lakes Environment model is plotted on isopleths and are shown in Figure given below.

Meteorological Data

The meteorological data recorded continuously during season of **Pre-Monsoon Season (March-May)** on hourly basis for wind speed, wind direction, relative humidity, precipitation and temperature and the same is processed to extract the 24-hour mean meteorological data as per the guidelines of IMD and MoEF for application of AERMOD Version 10.0.1 model. Stability classes computed for the mean hours is based on the guidelines issued by CPCB on modelling. Mixing heights representative of the region have been taken from the available published literature.

Stability Classification

Wind direction fluctuation method (CPCB PROBES/70/1997-1998) is adopted for hourly stability as determined by wind direction fluctuation method as suggested by Slade (1965).

$$\sigma_\Theta = Wdr/6$$

Wdr: the overall wind direction fluctuation or width of the wind direction in degrees, over the averaging period.

σ_Θ : the standard deviation of wind direction fluctuation.

The stability classes is as detailed below:

Table 4.4: Slades Stability Classification based Wind direction fluctuation

Stability Class	σ_Θ (degree)
A (Extremely Unstable)	**>22.5**
B (Moderately Unstable)	**22.4-17.5**
C (Slightly Unstable)	**17.4-12.5**
D (Neutral)	**12.4-7.5**
E (Slightly Stable)	**7.4-3.5**
F (Stable)	**<3.5**

Dispersion Parameters

The area is classified as urban when more than 50% of land inside a circle of **3 km** radius around the source can be considered built up with heady or medium industrial, commercial or residential units. The sites is located in **out of the city**, the area is considered **rural** and dispersion coefficient for rural are used in the modelling.

Table: Brigg`s Dispersion Parameters σ_y (m) and σ_z (m) (100m<x<10000m)

S.No.	Stability Class	σ_y(m)	σ_z(m)
For Rural Conditions			
1	A	$0.22x(1+0.0001x)^{-0.5}$	0.2x
2	B	$0.16x(1+0.0001x)^{-0.5}$	0.12x
3	C	$0.11x(1+0.0001x)^{-0.5}$	$0.08x(1+0.0002x)^{-0.5}$
4	D	$0.08x(1+0.0001x)^{-0.5}$	$0.06x(1+0.0015x)^{-0.5}$
5	E	$0.06x(1+0.0001x)^{-0.5}$	$0.03x(1+0.0003x)^{-1}$
6	F	$0.04x(1+0.0001x)^{-0.5}$	$0.016x(1+0.0003x)^{-1}$
For Urban Conditions			
1	A-B	$0.32x(1+0.0004x)^{-0.5}$	$0.24x(1+0.001x)^{-0.5}$
2	C	$0.22x(1+0.0004x)^{-0.5}$	0.20X
3	D	$0.16x(1+0.0004x)^{-0.5}$	$0.14x(1+0.0003x)^{-0.5}$
4	E-F	$0.11x(1+0.0004x)^{-0.5}$	0.08x(1+0.0015x)

Where x is the downwind distance in meters.

Mixing Height

As site specific mixing height were not available, mixing height based on CPCB publication, "Spatial Distribution of Hourly Mixing Depth over Indian Region", PROBES/88/2002-03 has been considered for model to establish the worst-case scenario.

Monthly Wind Speed and Wind Direction

The weather is one of the main factors affecting the air quality. Weather can help to clear away pollutants from atmosphere to improve air quality, or it can make air pollution extremely worse by helping to form highly polluted regions. The concentration of air pollutants in ambient air is governed by the meteorological parameters such as atmospheric wind speed, wind direction, relative humidity, and temperature. Rainfall can effectively remove atmospheric particulate pollutants, and the removal rate of PM10 is greater than the removal rate of PM2.5. In general wind speed more than 7 m/s can lift dust. Heavier particles will settle near the source area, with the smaller ones settling farther away. The site-specific weather data has been collected by installation of weather monitoring station at site.

Table 4-2 : Weather Monitoring Data of the Site

Months	Relative Humidity, %	Rainfall, mm	Mean Wind Speed, m/sec	Wind Directions (blowing from)	Avrg Temperature (degree Celsius)
March	56	12	3.13	North East	29
April	45	08	3.64	North East	32
May	52	14	3.41	North East	34

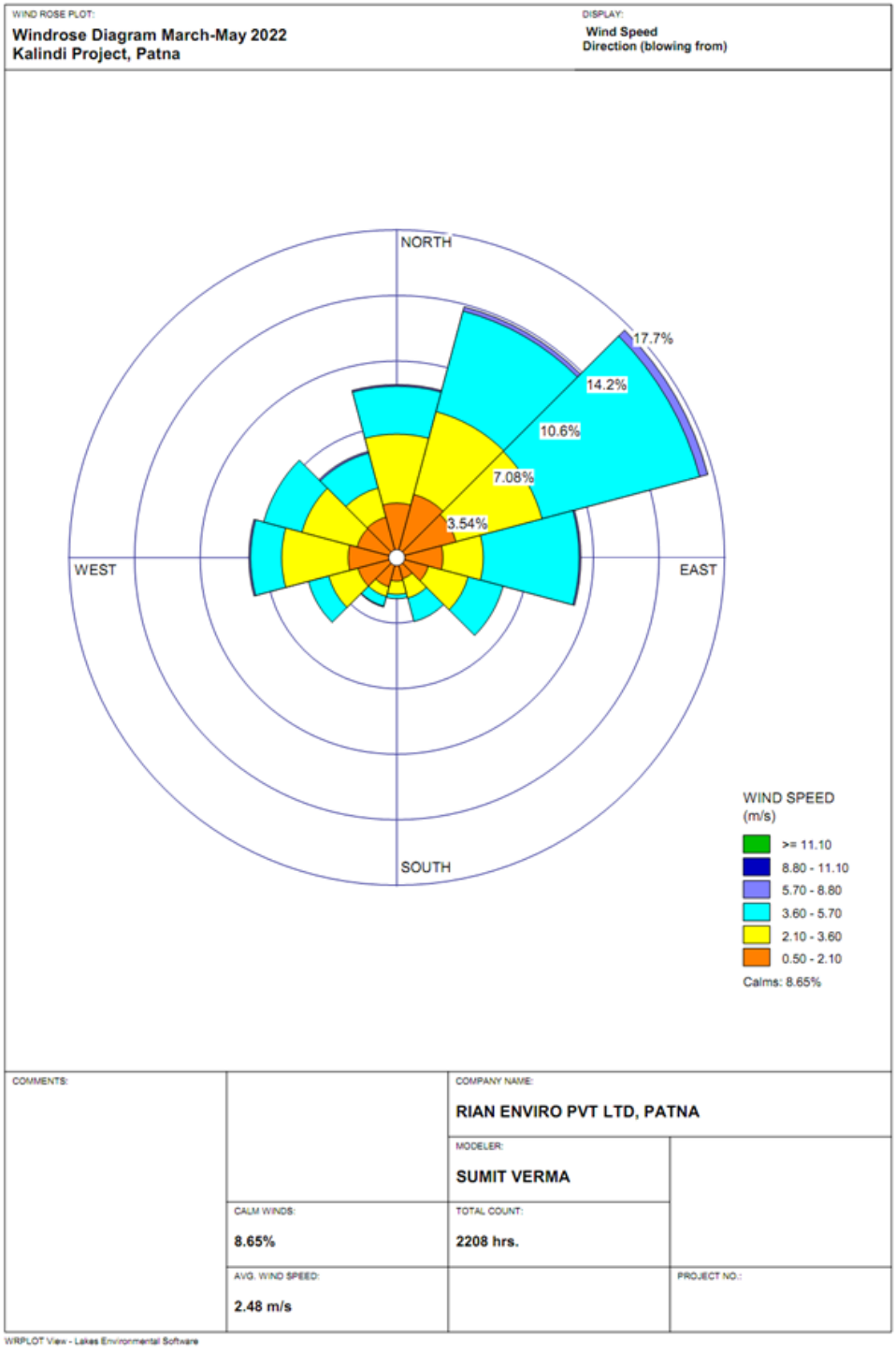


FIGURE 4-2: WIND ROSE DIAGRAM OF THE SITE

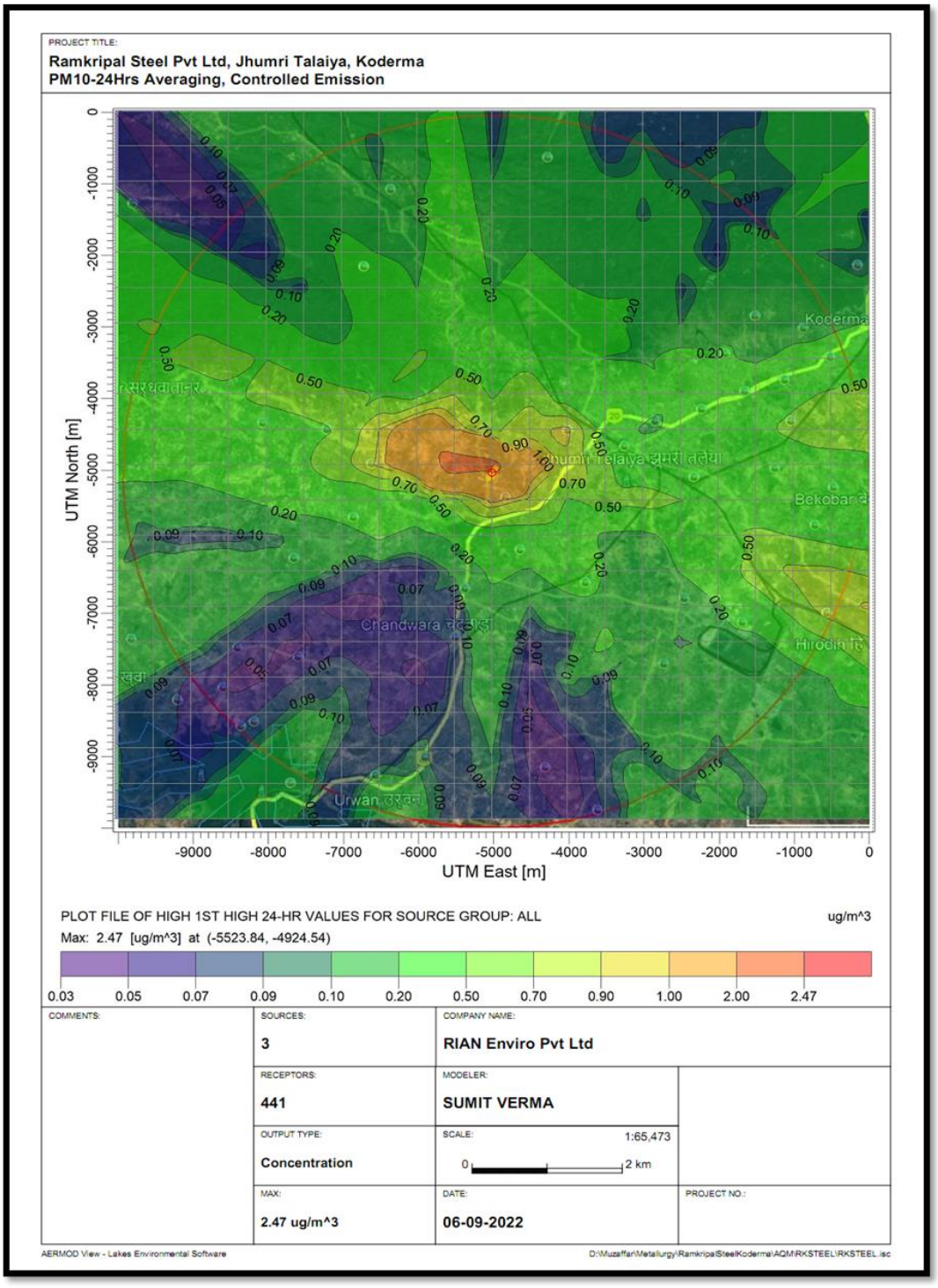


FIGURE 4-3 : ISOPLETH OF PM10 OF CONTROLLED EMISSION (24 HRS)

4.4 Impacts on Noise and Vibration

Noise generated during the construction period from operation of machineries like compressor, compactors, concrete plant, cranes and transportation materials will be of shorter miniature, and it will be controlled by using machines equipped with silencers and regular maintenance of the same. Similarly, the vibration produced during this phase will be of low intensity, shorter man do intermittent nature. This is not expected to cause significant impact on the environment and residents around the site.

Impacts during Operation Phase

Operation of machineries like conveyor, rotating machines during operation and DG sets will result in generation of noise and vibration. The vibration arising out of generator will not have significant impact though it is proposed to shield the generator area with noise and vibration absorbing walls. Movement of vehicles will also contribute to noise though the generated noise will be insignificant.

Mitigation Measures

Heavy machineries and DG sets will be operated during day time only. The machineries to be used will be serviced and maintained to control generation of noise and vibration. Vehicles used for transportation will be serviced regularly and maintained properly to avoid any generation of unwanted noise.

Employees working in noisy environment will be made mandatory to wear ear muffs/ear plugs to avoid any adverse impact of noise on them. Employees exposed to hand vibration while handling/operating heavy machineries will compulsorily wear anti vibration gloves made up of visco-elastic material.

4.5 Impacts on Water Environment

Impacts during Operation Phase

Water requirement is fulfilled through bore well made at the plant area and from the rain water harvesting pond. Overall water requirement for the proposed expansion project will be approx. 51.5 KLD, 45.0 KLD will be makeup water and domestic water requirement will be 6.5. The wastewaters will be treated and entirely reused.

4.6 Impacts on Terrestrial Ecology

- The impact on terrestrial ecology may be due to gaseous pollutants likely to enmities. Particulate matter, Sulphur dioxide (SO_2), Oxides of nitrogen (NOx), etc. Increase in concentration of PM in the

ambient air will cause the deposition of dust on surface of leaves, leading to increase in pH of leaves as well as clothe stomata aperture and reduce thechlorophyll content. The increased concentration levels of particulate matter, SO_2, NOx, in the atmosphere will, lead to decline in the rate of photosynthesis, thus retarding the growth of plant. However, air quality modeling out puts study revealed that, the result ant concentrations of part isolate matter, Sulphur di-oxide and oxides of nitrogen are well within the prescribed limits. The impact due to proposed project would be minimal as project activity will be carried out within the plant boundary limit with proper control measures.

- Terrestrial micro flora and fauna at the site are also affected. However, the adverse effect is reduced by shortening the construction phase period and development of greenery in the site. Further, there are no sensitive locations within the study area. Hence, no significant adverse impacts are expected on biological environment.

There are no endangered flora and fauna species in the project area. Vehicular movement during night will be restricted to avoid adverse sound related impacts to birds and wild animals in the region.

Plantation will be carried out to attenuate the dust pollution in the area. The project activities are restricted to the project site except the transportation of raw material and products. There is no discharge of solid or liquid wastes to the environment. Green belt and greenery will be developed in the premise covering more than 33% of area.

The plantation will comprise of fruiting trees, soil improving and air pollution abatement tress. No rare /endangered species of fauna were observed in the study area. Thus, the impacts on flora and fauna will be insignificant. Water will not be drained outside the premises but will be collected in a settling tank and recycled. Thus, the net consumption of water will be less. Hence, no industrial effluent will be discharged.

Mitigation Measures

The sewage generated during the construction and operation phases will not be drained outside the premises but to be collected in a settling tank and recycled. The water used for cooling the kilns will be collected in tank and passed through cooling tower and will be reused for green belt development.

4.7 Recommended Plants for Green Belt Development

Greenbelts are an effective mode of control of air and noise pollution, where green plants form a surface capable of absorbing air pollutants and forming a sink of pollutants. Leaves with their vast area in a tree crown, absorbs pollutants on their surface, and thus effectively reduce pollutant concentration in the ambient air. Often the adsorbed pollutants are incorporated in the metabolic pathway and the air is

purified. Plants grown to function as pollution sink are collectively referred as greenbelts.

An important aspect of a greenbelt is that the plants are living organism with their varied tolerance limit towards the air pollutants. A green belt is effective as a pollutant sinks only within the tolerance limit of constituent plants. Planting few, known pollutant sensitive species along with the tolerant species within a green belt however, do carry out an important function of indicator species apart from function as pollution sink, greenbelt would provide other benefit like aesthetic improvement of the area and providing suitable habitats for birds and animals.

4.8 Selection of plants for Green Belts

The main limitation for plants to function as scavenger of pollutants are, plant's interaction to air pollutants, sensitivity to pollutants, climatic conditions and soil characteristics. While making choice of plants species for cultivation in green belts, due consideration has to be given to the natural factor of bio-climate. Xerophytes plants are not necessarily good for greenbelts; they with their sunken stomata can withstand pollution by avoidance but are poor absorber of pollutants. Character of plants mainly considered for affecting absorption of pollutant gases and removal of dust particle are as follows.

4.8.1 Plantation along Road Sides:

Automobiles are the source of pollution of gaseous and particulate pollutants. Component of green belt on road side hence should be with both absorbers of gases as well as of dust particles. The choice of plants for roadside should include shrubs of height 1 to 1.5 meter and trees of 3–5-meter height. Medium sized trees, alternating with shrubs are ideal for sorption of particulates and gases.

1. For Absorption of Gases:

- Tolerance towards pollutants in question, at concentration that is not too high to be
- Instantaneously lethal.
- Longer duration of foliage
- Freely exposed foliage
- Adequate height of crown
- Openness of foliage in canopy
- Big leaves (long and broad laminar surface)
- Large number of stomata apertures

2. For Removal of Suspended Particular matter

- Height and spread of crown.
- Leaves supported on firm petiole.
- Abundance of surface on bark and foliage
- Roughness of bark
- Abundance of axillaries hairs.
- Hairs or scales on laminar surface.
- Protected Stomata

4.8.2 Plantation along Road Sides:

Automobiles are the source of pollution of gaseous and particulate pollutants. Component of green belt on road side hence should be with both absorbers of gases as well as of dust particles. The choice of plants for roadside should include shrubs of height 1 to 1.5 meter and trees of 3–5-meter height. Medium sized trees, alternating with shrubs are ideal for sorption of particulates and gases.

TABLE 4-3: RECOMMENDED PLANT SPECIES FOR GREEN BELT DEVELOPMENT

Plant species	Habit	Tolerance limit	Stomatal index	Mode of Regeneration
Acacia auriculiformis	Tree	Tolerant	10.9	Seeds
Azadirachta indica	Tree	T	29.2	Seeds
Bougainvillea	Shrub	T	32.53	Cutting
Delonixregia	Tree	Sensitive	15.38	Seeds /stem
Euphorbia tirucalli	Shrub	T	NA	Cuttings
Hibiscus rosa-sinensis	Small tree	T	23.32	stem cutting
Ixora arborea	Small tree	T	17.3	stem cutting
Ixora rosea Small	Tree	T	20.30	Stem cutting
Lawsonia	Shrub	T	17.0	Seeds /stem
Mangifera indica(Aam)	Tree	T	30.77	Seeds/ grafting/
Melia azadirachta	Tree	T		Seeds/stem
Nerium indicum	Shrub	T	15.7	Cutting
Peltophorum pterocarpu	Tree	T	16.68	Seeds
Polylathia longifolia	Tree	T	22.27	Seeds
Sesbania sesban	Shrub	T	19.2	Seeds
Tamarind usindica	Tree	T	18.5	Seeds
Tectona grandis	Tree	T	23.58	Seeds

4.9 Impact on Socio-Economic Environment

Critically analyzing the existing environmental status of the socio-economic profile and visualizing the scenario with the project, the impacts of the project would be varied and may generate both positive and negative impacts of the proposed project in the region that are stated below.

4.9.1 Positive Impacts

a) No Rehabilitation

The modification of the project is planned to be done within the existing only, no new land has been acquired. Therefore, no rehabilitation or resettlement is required due to the proposed project. Hence, the project operations will not disturb or relocate any village or settlement, no adverse impact is anticipated on any human settlement.

b) Increase in Job Opportunities

As per the survey it has been observed that the population in general do not have opportunities of earning from employment so the project in general will help to provide direct and indirect job opportunities for auxiliary and ancillary works etc.

c) No burden in the existing Infrastructure Facilities

Local work force will be given first preference in the activity due to which influx of the outsiders is not envisaged or it will be very minimal. Thus, there will not be the necessity of provision of housing facility for the local workers and not stressing on the existing civic amenities of the area.

d) Improvement in Infrastructure

The activity will benefit the local people due to provision of more infrastructural facilities such as developments of health facilities, plantation etc.

4.9.2 Adverse Impacts:

a) Impacts on Human Health

The project may have impact due to air pollution on the villages near to the Project site. The impact from the air emissions is controlled efficiently using air pollution control equipment and stacks will be designed in such a manner that in future after the implementation of the project, the air emissions will be well within the prescribed ambient air quality limits set forth by regulatory agencies. The proponents of this facility will adopt effective control systems at all the identified sources of emission.

b) Impacts on Agriculture

Productivity of crops may be deteriorated affecting the agriculture-based livelihood due to the pollution arising out of the project activity, if proper mitigation measures are not implemented

4.9.3 Mitigation Measures of Socio-Economic Environment

- Periodic health checkup camps, blood donation camps shall be organized by project authority for villagers, contract laborers, employees and their family in nearby villages.
- Awareness programs shall be arranged on health, hygiene and sanitation
- Apart from the normal health check-up, emphasis shall also be given to prevent specific diseases originating due to emission of different pollutants such as respiratory ailments, skin problems, water borne diseases, hearing abilities etc.
- Job oriented training courses will be organized through industrial/technical training institutions for educated youth like electrical, tailoring, plumbing, type writing, shorthand and machine repairing, welding fabrication, and other skill developing trades
- Whenever necessary, collaboration between project authority and local bodies will be done on regular basis with an objective to build and maintain a good relationship which is necessary for smooth functioning of the project as well as progress and welfare of the people in the study area
- Awareness programs will be taken to make people aware about the environmental protection, need of water conservation etc.
- At the work place, first aid facilities shall be maintained at a readily accessible place with necessary appliances including sterilized cotton wool etc. Ambulance facility shall also be provided during emergency
- Sufficient supply of water fit for drinking shall be provided at suitable places.
- Sanitary facilities shall be provided at accessible place within the work zone and kept in a good condition.

4.10 Rain Water Harvesting

Depending upon the available contours at detailed engineering stage, the number of drainage outfall and extent of open drains etc. will be designed so as to discharge the water to the rainwater harvesting pond for reuse in dust suppression & greenbelt development. A rainwater harvesting structure of capacity 3000 m^3 will be made to collect rainwater.

- Storm water drainage system to collect surface runoff is separately connected to rain water harvesting tank.
- Dewatering of sludge and appropriate disposal of solids from the settling tank.
- Treated wastewater (such as sewage, industrial wastes, or stored surface runoffs) is being re-

circulated in the process.

- Handling, storing, and disposal of hazardous materials will be done as per hazardous waste management rules.
- Emergency response plan will be strictly followed

4.11 SOLID WASTE GENERATION & MANAGEMENT

A. Hazardous Waste Management

Hazardous waste will include;

a) Waste from air pollution control devices @600 TPA (Category 35.1 of Schedule-I) – the waste will be stored on-site in HDPE bags, inside a lined and covered room before being disposed through the State's common hazardous waste disposal facility.

b) Waste/used oil/lubricant @2-3 kL/annum (Category 5.1 of Schedule-I) – the waste will be stored on-site in a covered room before being disposed through authorized recyclers.

B. Solid Waste

Solid waste will include;

Slag @~9500TPA – reusable as building material (especially in road construction).

End Cuttings & Mill scale @ 13500TPA – the waste has commercial worth and will be sold.

5 ANALYSIS OF ALTERNATIVE TECHNOLOGY AND SITE

5.1 Alternate Technology

No, alternate technology is selected.

5.2 Technology

For the selection of technology, M/s Kaalendi Ventures LLP has considered less environmental polluting, less energy consuming, higher productive and competing cost technology like continuous casting even in such a small plant.

5.3 Alternatives Site

No alternative site envisaged as the proposed project is planned to execute at **M/s Kaalendi Ventures L.L.P** is located at Khirodharpur, Fatuha, Patna - 803201. The site surroundings are already having similar kind of industries. Hence the area is suitable for such industry.

6 ENVIRONMENT MONITORING PLAN

6.1 Introduction

An environmental monitoring plan provides a delivery mechanism to address the adverse environmental impacts of a project during capacity expansion and augmentation with total capacity of MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA) to enhance project benefits and to introduce standards of good practice to be adopted. An environmental monitoring plan is important as it provides useful information and helps to:

- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures.
- Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effective communication of environmental issues among them.
- Define monitoring mechanism and identify monitoring parameters.
- Evaluate the performance and effectiveness of mitigation measures proposed in the
- Environment Management Plan (EMP) and suggest improvements in management plan, if required.

From the monitoring point of view, the important components are soil, water, air, noise and occupational health and safety. The suggested monitoring details are outlined in the following sections. All monitoring will be carried out through Ministry of Environment and Forest (MoEF) approved and/or National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratory.

6.2 Environmental Monitoring

- Soil Quality Monitoring
- Air Quality Monitoring
- Noise Quality Monitoring
- Water Quality Monitoring

6.3 Soil Quality Monitoring

The soil quality monitoring is carried out to assess the soil characteristic. The soil quality will be analyzed as per CPCB norms. The green belt development acts as pollution sink and bio indicators. Afforestation will also check soil erosion, make the ecosystem functionally stable and make the micro climate more conducive. During the operation phase, soil quality will be monitored in the green belt and plant area for pH,

texture, nitrogen, phosphorous, potassium and fluoride. This monitoring shall be done annually except monsoon season and the results shall be shown to competent agriculture expert to assess the need for remedial measures, if required. Condition of the plant species planted shall be recorded once in two years by visual observations with respect to vegetative growth, flowering etc.

6.4 Air Quality Monitoring

In the construction phase, PM10, PM2.5, SO2, NOx will be monitored at three representative locations in the construction area on monthly basis.

In the operation phase, air quality monitoring will be carried out at three strategic locations within 100 – 200 m of the project site, one location each at the production units, in the storage area of the raw material and finished goods and packaging area for finished goods. PM10, PM2.5, SO2, NOx will be the air quality monitoring parameters. The monitoring will be carried out on seasonal basis.

Parameters	**Technique**	**Technical Protocol**
P.M 2.5	Gravimetric method	CPCB Guidelines
PM 10	Gravimetric method	IS 5182 (Part-23)
Sulphur Dioxide (SO2)	Improved West and Geake method	IS-5182 (Part-2)
Nitrogen Dioxides (NO_x)	Modified Jacob & Hochheiser method	IS-5182 (Part-6)
Carbon Monoxide (CO)	CO Analyzer (NDIR technology)	CPCB Guidelines

6.5 Noise Quality Monitoring

In the construction phase, the equivalent noise level will be monitored in the surrounding of the project site for day time and night time. There will be three representative locations in the construction area seasonally.

Similarly, in operation phase, Day time and Night time equivalent noise level will be monitored at three locations i.e. within **100 – 200 m** of the project site, one location at each of the production units and near DG set. Monitoring will be carried out once in a month for a period of **24 hr.** and at an interval of one hour for the given season.

6.6 Water Quality Monitoring

In construction phase ground water quality at three locations in surrounding of the plant area will be monitored every season as per the parameters given in IS 10500: 2012. During operation phase, water quality will be monitored at the following locations - Physico-chemical characteristics of the ground

water (Three locations – two within plant area and nearest well outside plant area) will be monitored once in every season. The parameters are to be monitored as per **IS 10500: 2012** drinking water standards.

6.7 Occupational Health and Safety Monitoring

The health of the employees who will be working in the plant during the operation phase will be monitored through general periodical (half yearly) checkup for both respiratory and auditory ailments. Occupational accidents and diseases including the accident Fatality rates will be recorded.

6.8 Environmental Monitoring Plan

The monitoring and evaluation process will require additional and at times, extensive surveys and primary data collection, either to establish the baseline or to measure changes. The required Environmental Monitoring Plan for the construction phase and operation phase are given in **Table 6.1 and 6.2** respectively.

TABLE 6-1 : ENVIRONMENTAL MONITORING PLAN DURING CONSTRUCTION PHASE

Attribute	Location & Frequency	Parameter
Air	At major construction sites (total 2 stations); Monthly	PM10, PM2.5, SO2 and NO_x
Noise	At major construction site and near generator set; Monthly	Equivalent noise level
Ground Water	Three locations –within plant area and nearest well outside plant area; Seasonal	Parameters as per CPCB standards

TABLE 6-2 : ENVIRONMENTAL MONITORING PLAN DURING OPERATION PHASE

Attribute	Location & Frequency	Parameter
Air	At major construction sites (total 2 stations); Monthly	PM10, PM2.5, SO2 and NOx
Noise	At major construction site and near generator set; Monthly	Equivalent noise level
Ground Water	Three locations –within plant area and nearest well outside plant area; Seasonal	Parameters as per CPCB standards
Soil	Three locations - one location within plant area and two locations around the project site within 200 m distance from the unit; Annually	pH, moisture content, texture, organic matter, chloride, SAR, CEC, nitrogen, phosphorous, fluoride, Sulphur

Storm Water	One location - Once in monsoon season	Parameters as per CPCB standards
Occupational Health	Half yearly	General and respiratory and liver ailments check up

6.9 Environmental Management

Considering the importance of the pollution control and environmental protection, a group of personnel will be identified for the existing plant, which will take care of future requirement also with suitable technical and support staff. Further, to meet the additional requirement, if any, manpower from operations and maintenance wing is engaged. Organization structure of environmental management department for the existing plant is shown in **Fig. 6.1**, which will be suitably augmented by employing relevant subject/discipline experts at an appropriate time.

The company has a full-fledged safety department to look after the safety issues of the plant. The same shall be followed in future expansion also.

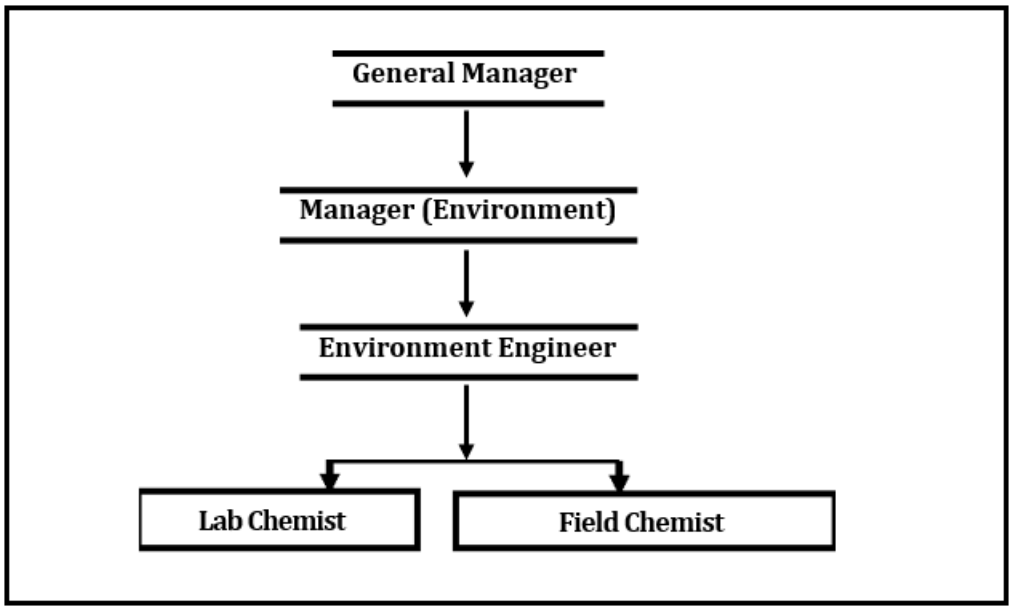


FIGURE 6-1: FIGURE 6-2 : ORGANIZATION STRUCTURE OF ENVIRONMENTAL MANAGEMENT

6.10 Operation and Maintenance of Pollution Control System

Normally persons engaged in production are also entrusted with operation and maintenance of pollution control systems. This may result in neglect of these systems as priority is given to production equipment. In view of this and the requirement of ensuring emission and ambient air and water standards, an officer of the plant shall be made responsible for the effective functioning of all pollution control systems. He will report to the Head of the Maintenance Department. Whenever required, he will draw crew from the main plant maintenance team for maintenance of pollution control system.

6.11 Budgetary Provisions

Appropriate budgetary provisions towards environmental monitoring program for the proposed project will be made. The details of the same are provided in the Chapter 9 Environment Management Plan.

7 ADDTIONAL STUDIES

7.1 Introduction

The outline of the proposed new project, the pre- project of the environmental status and the impact assessment along with proper mitigation measures have been duly addressed in the previous Chapters. This Chapter briefly encompasses the additional aspects that were also dealt upon while conducting EIA study for the proposed new project.

7.2 Corporate Environment Responsibility

The proposed Corporate Environment Responsibility includes the activities based on the need and priorities of the villagers identified during the Social Economic study and issues that may raise in the public hearing.

From discussion with villagers during Socio-Economic Survey

- Health Camp for villagers
- Education facility
- Supply of water to villagers
- Proper pollution control measures for the Units.

Major issues raised during Public Hearing will also be addressed

Employment Opportunity

- Employment to the local people from nearby village during construction and Operation of the plant on the basis of their skills.
- Providing Vocational Training for self-employment.

Community Development

- To reduce the problem of water scarcity, Proper rainwater harvesting shall be constructed at surrounding area

2% of the total project cost has been earmarked for the Corporate Environment Responsibility (CER) to meet expenditures for the development of the surrounding villages. The details of activities to be undertaken and the budget allocated will be decided after public hearing meeting as per the requirements of the stakeholders.

7.3 Risk Assessment

The safety and protection of people, equipment and the environment is a serious concern in the manufacturing industries. Steel Plants have also recognized the significance of safe working environment and are progressively trying to prevent hazardous events, avoid production & manpower losses and other fallouts associated with industrial accidents by conducting risk assessment, onsite &off-site management plan and adopting the safety measures as proposed. This also assists industries to enhance employee knowledge of operations, improve technical procedures, maintain accurate process safety information and increase overall facility productivity. This Chapter, accordingly, gives an outline of the associated environmental and other risk prone hazards, their assessment and remedial measures. It also describes an approach to emergency planning to be adopted by the Plant management.

The objectives of environmental risk assessment are governed by the following which excludes for measure.

- Identifying the potentially hazardous areas so that adequate design safety measures can be adopted to reduce the likelihood of accidental events.
- Identifying the stakeholders and evaluating their risk along with proposing adequate control techniques.
- Identifying the probable areas of environmental disaster which can be prevented by appropriate design of the installation and its controlled operation.
- Managing and emergency situation or a disastrous event if any, during the plant operation. Risk assessment is a systematic approach for identification, evaluation, mitigation and control of hazards that could occur as a result of failures in process, procedures, or equipment. Increasing industrial accidents, loss of life & property, public scrutiny, statutory requirements and intense industrial processes, all contribute to a growing need to ensure that risk management is conducted and implemented.

Managing a disastrous event would require prompt action by deployment of area specific emergency plans by the operators and plant emergency staff using all their existing resources like deployment of firefighting equipment, water sprays etc. Minimizing the immediate consequences of a hazardous event include cordoning off**,** evacuation**,** medical assistance and providing correct information to the families of the affected persons and local public to avoid rumors and panic.

The following terms related to environmental risks are defined before reviewing the environmental risks.

TABLE 7-1: ENVIRONMENTAL RISK

Terms	Environmental Risk
Harm	Damage to person, property or environment
Hazard	Situation that poses a level of threat to life, health property or environment. A hazardous situation that has come to pass is called incident. Hazard and possibility interact together to create risk. An environmental hazard is thus going to be a set of circumstances which leads to direct or indirect degradation of environment and damage to the life and property.
Risk	The probability of harm or likelihood of harmful occurrence and its severity. Environmental risk is a measure of the potential threats to the environment, life and property.
Consequence	Effect due to occurrence of the event which may endanger the environment permanently or temporarily and, or, loss of life and property.
Environmental Disaster	The consequence is so severe that it can extensively damage any one or all the four components of the environments of the environment, namely • Physicochemical, • Biological • Human and • Aesthetic

7.3.1 Identification of Hazards

This is an early check of major hazards, which are of high-risk potential - including the potential for disastrous interactions of the various plant operational activities. The checklist, though not strictly speaking a Hazard and Operability Study (HAZOP) but would facilitate a full-scale HAZOP Study for final drawing up of risk management measures when the 'design-freeze' stage commences. Hazard is the associated term with material, which is a measure or the likely hood of the human working with or studying the material in question. The entire probable potential hazard is classified under different heads.

- Fire hazards
- Toxic gas release hazards
- Explosion hazards
- Corrosion hazards

Fire Hazards

Since the Stone Age term, fire is associated with fear. It is very dangerous if occurs in uncontrolled manner. It should be clearly understood that when a liquid is used having flash point below the normal ambient temperature, it could, in suitable circumstances, liberate a sufficient quantity of vapor to give rise to flammable with air.

Toxic Hazards

Toxic substances affect in three ways by ingestion, adsorption & inhalation which are describe below.

Corrosion Hazards

Corrosion is a chemical reaction-taking place at the surface of metal.

7.3.2 Potential Health Effects

Eye Contact: Airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with large amounts of clinker dust and dry cement powder can cause moderate eye irritation, chemical burns and blindness. Eye contact with large amounts of gypsum can cause moderate eye irritation, redness, and abrasions. Eye exposures require immediate first aid and medical attention to prevent significant damage to the eye.

Skin Contact: Dust of clinker, gypsum and cement may cause dry skin, discomfort, irritation, severe burns and dermatitis. Clinker dust and cement dust are capable of causing dermatitis by irritation. Skin affected by dermatitis may include symptoms such as, redness, itching, rash, scaling and cracking. Irritant dermatitis is caused by the physical properties of clinker dust including alkalinity and abrasion.

Inhalation (chronic)

Risk of injury depends on duration and level of exposure. This product contains crystalline silica. Prolonged or repeated inhalation of respirable crystalline silica from this product can cause silicosis, a seriously disabling and fatal lung disease. Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. Silicosis increases the risk of tuberculosis.

Ingestion

Internal discomfort or ill effects are possible if large quantities are as allowed.

Explosion Hazards

Release of energy in rapid and uncontrolled manner gives rise to explosion.

7.3.3 Risk Evaluation

From environmental hazards point of view, risk analysis (RA) acts as a scrutinizing vehicle for establishing the priority in risk management that concerns human health and environmental quality in general. Though the proposed facilities are not manufacturing, storing or handling any potentially hazardous/toxic chemicals as scheduled in the Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989 and its amendments thereof, the proposed facility would have installations, such as, storage and handling of coal, fuel oil, and fuel gases. An Environmental Qualitative Risk Analysis Flow Chart Procedure is depicted in Fig. below-

The hazards identified for the proposed project activities are presented in Table 7.5 given below

TABLE 7-2: HAZARDS IDENTIFIED FOR THE PROPOSED PROJECT ACTIVITIES

Group	Item	Nature of hazard	Hazard of Potential	Remarks
Raw materials Management	Water treatment chemicals like acids/alkalis	Toxic	Major	Bio-corrosive
	Lube oils/greases	Fire	Moderate	Flammable
Production units				
Agglomeration	Dusts	Respiratory	Moderate	Air pollution
Iron making in BF	Release of untreated wastewater	Toxic	Major	Severe pollution of surface water
	BFG handling	Fire	Major	Fire hazard
	Hot metal & slag Handling	Heath	Major	Fire hazard
Steel making in LD shops	Release of untreated wastewater	Toxic	Major	Severe pollution of surface water
	LD gas handling	Fire	Major	Fire & CO hazard
	Hot liquid steel & slag handling	Heath	Major	Fire hazard
Rolling Mills	Gas firing	Fire	Major	Fire hazard
	Release of untreated Waste water	Toxic	Major	Severe pollution of surface water
Captive Power Plant		Fire	Major	Fire hazard
Utilities				
Fuel gas	Gas leaks	Fire & Toxic	Major	Fire & CO hazard
Electric Power supply	Short circuit	Fire	Major	Fire hazard
Liquid fuel	Fuel handling & storage area	Fire & Toxic	Major	Fire & CO hazard
Hydraulic oil and lubricants	Accidental discharge of hydraulic oil under pressure	Fire & Toxic	Moderate	Fire & personal injury

From the Table, it may be observed that major on-site emergency situation may occur from the organic coal chemicals storage and handling, fuel gas handling, molten metal and slag handling, acids and alkali storage and handling and electrical short-circuit. The off- site environmental disaster may arise if large-scale fire or explosion occurs, the effect of which extends beyond the plant boundary.

TABLE 7-3: POSSIBLE HAZARDOUS & PRECAUTIONARY MEASURES

Sr. No	Operation process Equipment /areas	Possible Hazardous	Precautionary measures	Measures to be taken if any hazard occurs
1.	Electrical Panel	Electrical Shock possible due to short-circuit.	Earth leakage circuit breaker is installed	In an event of electric leakage main supply should be immediately shut off.
2.	Furnaces	Fire hazards caused by flames	1. Emergency kit is kept readily available in store and working place. 2. Hydrant system provided at conspicuous place. 3. Fire-fighting trained man is employed. 4. Periodic inspection done to avoid accident of any kind. 5. Firefighting equipment, powder/foam extinguisher	Fire Extinguisher & Hydrant at suitable location
3.	Electrical transformer	Electrical power	Shock proof insulated PCC Platform.	Immediate Cut off the power supply, treat the injured for electrical shock
		Fire 1	Firefighting equipment: I. Sand buckets. II. Fire extinguisher.	Immediately fightfire with

4.	Diesel Oil/Transformer Oil etc. storage.	Fire hazard may be possible if directly comes in contact.	Fire proof system made available and fighting equipment like Foam, extinguishers and hydrant system, etc., are kept	Proper care is to be taken while storing and keeping the oil drums.
5.	Chemicals Storage area	In case of bottle breakage, causes burns and damage to respirator systems due to inhalation	1. Proper care should be taken while handling the chemicals. 2. First Aid Box should be available at Site with all necessary and required medicines. 3. Firefighting equipment like Extinguishers, sand buckets should be available always	Instruction Boards to be displaced for knowledge of other workers to take care of the situation in the event of occurrence.

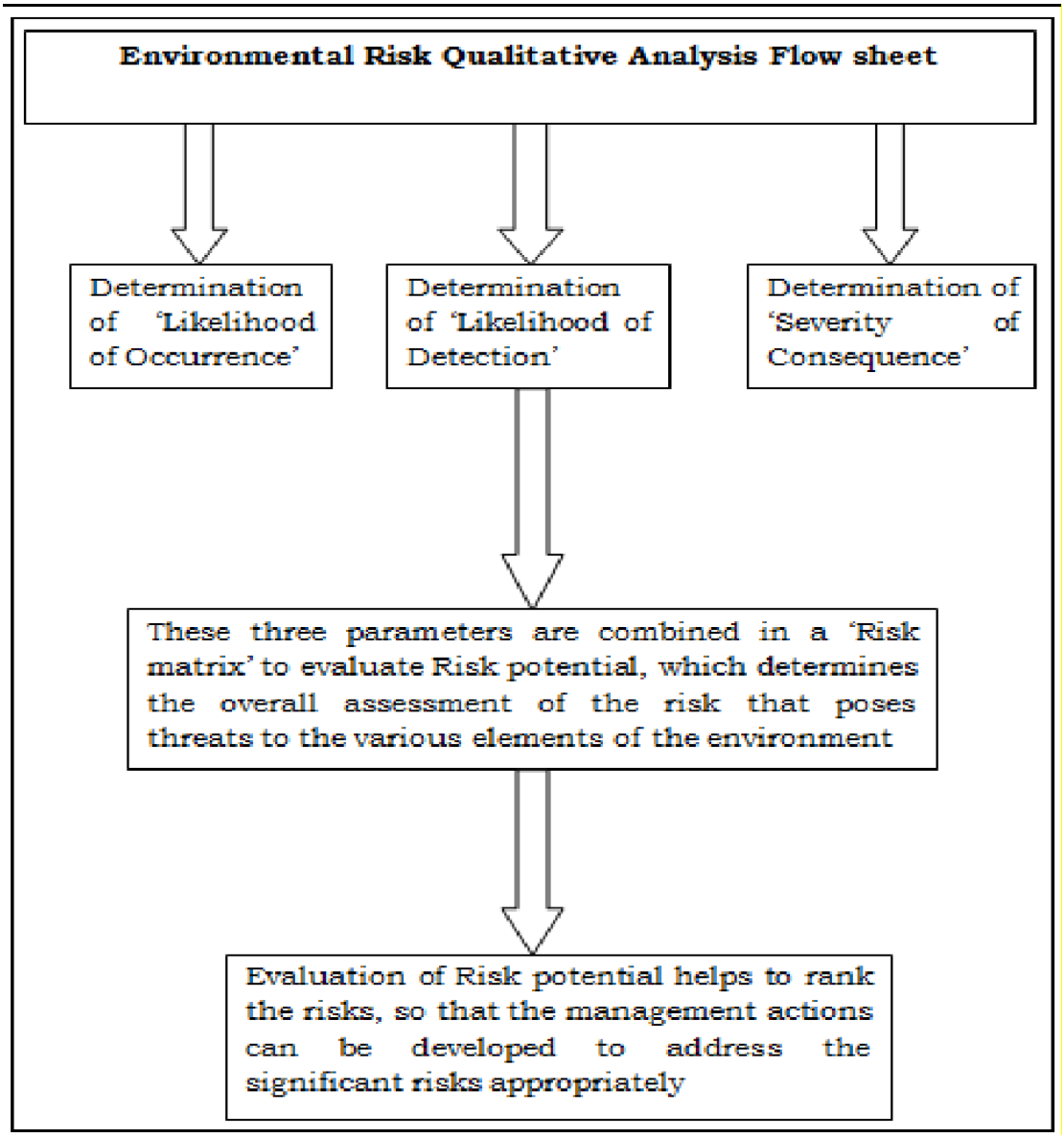


FIGURE 7-1 : ENVIRONMENTAL RISK QUALITATIVE ANALYSIS FLOW SHEET

7.3.4 Risk Management Measures

The risk management measures for the proposed project activities require the adoption of best safety practice at respective construction zones within the Works boundary. In addition, the design and engineering of the proposed facilities will take into consideration proposed protection measures for releases to air, land and water environment as outlined in earlier Chapter.

Electrical Safety: Adequately rated quick-response circuit breakers, aided by reliable, selective digital/microprocessor-based electro-magnetic protective relays would be incorporated in the electrical system design for the proposed Project. The metering instruments would be of proper accuracy class and scale dimensions. Appropriate use of ELCBs shall be ensured for all construction related low voltage work.

Fire Prevention: In addition to the yard fire hydrant system, fire and smoke detection alarm system will be provided along with the portable fire extinguishers. Fire detection system would be interlocked with automated water sprinklers.

Personal Protective Equipment (PPE): Personal Protective equipment kept onsite are made readily available to plant personnel. Table7.4 shows the lists of recommended Personal Protective equipment (PPE) onsite.

	Workplace Hazards	**Suggested PPE**
Eye and face protection	Flying particles, molten metal, gases or vapors, light radiation	Safety glasses with side shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords	Plastic helmets for top and side impact protection
Hearing protection	Noisy Areas	Hearing protectors (ear plugs or ear muffs)
Foot protection	Failing or rolling objects, points objects. Corrosive or hot liquids	Safety shoes and boots for protection against moving and failing objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic Material (Neoprene), leather, steel, insulation materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors	Facemasks with appropriate filters for Dust removal and air purification chemical, mists, vapors and gases).
	Oxygen deficiency	Portable or supplied air (fixed lines). Onsite rescue equipment
Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration	Insulating clothing, body suits, aprons etc. of appropriate materials

7.3.5 On-Site Emergency Plan

Emergency planning is an integral part of the environment and safety management of TSL. Emergencies may arise due to manmade reasons and/or natural causes resulting in fire, explosion, failure of critical control system, etc. It is crucial for effective management of an accident to minimize the losses to the people and property, both in and around the facility, termed as on-site and off-site emergency plan.

Accident Statistics: The safety and ergonomics department deal with emergency records, events of both minor and major accidents, listing all the details such as place, date & time, duration, probable cause, extent of damage, personnel affected, man-hours lost, medical assistance provided etc. to analyze these data for drawing up necessary corrective measures.

Safety Inspections: Monthly safety inspection of all departments is carried out by the respective Department. Additionally, half-yearly Environmental, Health and Safety Audit are performed including all aspects of Environment, Occupational Health & Safety for all the areas.

7.3.6 Off-Site Emergency Planning

The off-site emergency plan is also an integral part of any major hazard control system. This particular plan relates to only those accidental events, which could affect people and the environment outside the plant boundary. Incidents, which would have very severe consequences, yet have a small probability of occurrence, would be in this category.

The emergency preparedness and disaster management plan cover the following:

- Identification of local authorities like civil defense, police, district commissioner, their names, addresses and communication links.
- Details of availability and location of heavy-duty equipment like bull dozers, fire-fighting equipment etc
- Details of specialist agencies, and stakeholders upon whom it may be necessary to call.
- Details of voluntary organization.
- Meteorological information.
- Humanitarian arrangements like transport, evacuation centers, first aid, ambulance, community kitchen etc.
- Public information and communication through media, informing relatives, public address system etc.

7.4 Occupational and Safety Hazards and Preventive Measures

First Aid Measures

Following first aid measures shall be taken:

+ Eye Contact

Rinse eyes thoroughly with water for at least 15 minutes, including under lids, to remove all particles. Seek medical attention for abrasions and burns

+ Skin Contact:

Wash with cool water and a pH neutral soap or a milk skin detergent. Seek medical attention for rash, burns, irritation and dermatitis.

+ Inhalation:

Move person to fresh air. Seek medical attention for discomfort or if coughing or other symptoms.

+ Ingestion:

Do not induce vomiting. If conscious, have person drink plenty of water. Seek medical attention.

7.4.1 Exposure Controls and Personal Protection

Exposure Controls

- Control of dust through implementation of good housekeeping and maintenance;
- Proper fume and dust extraction system to control fume/dust emission in work zone.
- Use of PPE, as appropriate (e.g. masks and respirators)
- Use of mobile vacuum cleaning systems to prevent dust build up on paved areas;

Personal Protective Equipment (PPE)

As a supplementary protection against exposure to hazardous conditions in the production of iron and steel where the safety of workers cannot be ensured by other means, such as eliminating the hazard, controlling the risk at source or minimizing the risk, suitable and sufficient PPE, having regard to the type of work and risks, and in consultation with workers and their representatives, shall be procured and used by the workers and provided and maintained by the employer, without cost to the workers.

- Items of PPE provided shall comply with the relevant BIS standards and criteria approved or recognized by the competent authority. Where BIS standards are not available, PPEs meeting international standards may be procured.
- Those responsible for the management and operation of the personal protection programme shall be trained in the selection of the proper equipment, in assuring that it is correctly fitted to the people who use it, in the nature of the hazards the equipment is intended to protect against, and provide adequate comfort, and in the consequences of poor performance or equipment failure.
- PPE shall be selected considering the characteristics of the wearer and additional physiological load or other harmful effects caused by the PPE. It shall be used, maintained, stored and replaced in accordance with the standards or guidance for each hazard identified at the facility and according to the information given by the manufacturer.
- PPE shall be examined periodically to ensure that it is in good condition
- Different PPE & their components shall be compatible with each other when worn together
- It shall be ensured that the procured PPEs are ergonomically designed and, to the extent practicable, should not restrict the user's mobility or field of vision, hearing or other sensory functions.
- Employers shall ensure that the workers who are required to wear PPE are fully informed of the requirements and of the reasons for them, and are given adequate training in the selection, wearing, maintenance and storage of this equipment
- When workers have been informed accordingly, they shall use the equipment provided throughout the time they may be exposed to the risk that requires the use of PPE for protection.

  Items of special PPE for use in proximity to molten metal shall be so procured that they should protect the wearer from heat and should withstand splashes of molten metal. It should be possible to remove these items easily if molten matter gets between the body and the protective clothing.
- The PPE shall not be used for longer than the time indicated by the manufacturer.
- Workers shall make proper use of the PPE provided, and maintain it in good condition, consistent with their training and be provided with the proper means for doing so.
- Respiratory Protection: When the dust level is beyond exposure limits or when dust causes irritation or discomfort use Respirator.

- Eye Protection: Wear Safety goggles to avoid dust contact with the eyes. Contact lenses should not be worn when handling the materials.
- Skin Protection: Wear impervious abrasion and alkali resistant gloves, boots, long sleeved shirt, long pants or other protective clothing to prevent skin contact.

Fire Fighting Facilities

Keeping in view the nature of fire and vulnerability of the equipment and the premises, following fire protection facilities have been envisaged for the plant-

Other Safety Measures

- ❖ Safety training to the workers will be given.
- ❖ PPE will be provided to the workers.
- ❖ The maintenance and cleaning of bag filters will be carried out regularly.
- ❖ The dust removal efficiency of bag filters will be check regularly.
- ❖ Work place environment monitoring will be carried out regularly and records will be maintained. The monitoring of dust in the work place will be carried out.
- ❖ Good housekeeping will be implemented in the plant.
- ❖ First aid box will be provided.
- ❖ The industry will provide adequate lighting facility inside the plant premises.
- ❖ General dilution ventilation will be provided to control dust levels below applicable exposure limits.
- ❖ Fire extinguishers will be provided to withstand the fire or explosion condition.
- ❖ Pre-employment and periodical medical examination of workers will be done by government approved medical practitioners and the details will be recorded as per the Regulations.
- ❖ The industry will prepare on-site emergency plan.
- ❖ In case any emergency, arrangement of ambulance van will be done from nearest Hospital.
- ❖ Two main gates will be provided for entry and exit of the workers.

7.4.2 Occupational Health& Safety

M/s Kaalendi Ventures LLP. believes in Safety First and is concerned with protecting safety, health & welfare of the people engaged in work or employment.

The following safety measures for the employees shall be implemented:

- ❖ Safety training is provided to the employees.
- ❖ Manual call bell in case of emergency is provided.
- ❖ Fire alarms are provided.

- First aid facility and trainings are provided.
- Personal protective gears and equipment's are provided to the employees.
- Health checkups are organized at regular intervals and records are maintained.
- Fire Protection System by means of providing Fire hydrants, Fire Extinguisher at vulnerable points within the plant has been envisaged.
- Cleanliness facilities, rest room, plenty Plant Lightning is also envisaged for the proposed project.

7.4.3 Major Hazards

Induction Furnace:

- Cooling water coming in contact with molten metal or slag causing explosion.
- Moist scrap being charged causing explosion.
- Radioactive scrap being charged spreading radio activity.
- Scraps having explosive materials like abandoned bombs being charged causing explosions.

Continuous Casting Machines:

- Strand is hardened only superficially and is still liquid inside.
- Spillage of molten metal can occur with damage by radiant heat to mechanical and civil structures, electric cables and hydraulic equipments etc.

7.4.4 Preventing Fires & Explosions

- Fires & explosions in induction furnaces most often result from water coming into contact with molten metal. The water may be present in scrap material, damp moulds, from leaks in the furnace cooling systems or leaks in the building.
- Fires & explosions in can also result from the ignition of volatile materials and fuels. The most hazardous procedures are during the firing- up and shutting-down procedures.
- Operators shall be trained in safe systems of work. The building shall be designed to be noncombustible, with automatic fire suppression engineered or designed into the process where appropriate.
- Risk assessments shall be carried out to consider the potential dispersal of toxic chemicals from non-furnace processes & combustion products, and the potential impact of an explosion on the surrounding areas

- ❖ Regular safety audits shall be undertaken to ensure that hazards are clearly identified and risk-control measures maintained at an optimum level
- ❖ Refractory's (e.g. crucibles, troughs, ladles) and tools shall be preheated and dried before use to minimize the risk of explosion Refractory linings should be regularly inspected for wear.
- ❖ Furnaces shall not be operated

7.5 Disaster Management Plan (DMP)

7.5.1 Need of the Disaster Management Plan

Several Government agencies, both at the Central and State levels, are entrusted with the responsibility of ensuring safety and management of hazardous chemicals under Acts and Rules made for the purpose. Despite these measures, the possibility of accidents cannot be ruled out. Operations at plants are carried out as per International and good Industry practice. Despite these measures, the possibility of accidents can't be ruled out. In order to be ready to face risk of accidents during processing, a disaster management plan is prepared to mitigate the impact.

7.5.2 Objectives

The purpose of this DMP is to give an approach to detail organizational responsibilities, actions, reporting requirements and support resources available to ensure effective and timely management of emergencies associated to production operations in the site. The overall objectives of DMP are to:

- ❖ Ensure safety of people, protect the environment and safeguard commercial considerations.
- ❖ Immediate response to emergency scene with effective communication network and organized procedures.
- ❖ Effective rescue and medical treatment of casualties.
- ❖ Minimize damage to property and the environment.
- ❖ Initially contain and ultimately bring the incident under control.
- ❖ Identify any dead.
- ❖ Provide for the needs of relatives.
- ❖ Provide authoritative information to the news media
- ❖ Secure the safe rehabilitation of affected area
- ❖ Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

In effect, DMP helps to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

The following hazards for disaster management have been considered:

- Fire
- Explosion & Toxic release
- Oil spillage/liquid metal spillage
- Electrocution
- Accident

These hazards and potential causes have already been discussed in the preceding sections. A selective disaster management measures to prevent disaster due to the above-mentioned hazards are as follows:

- Design, manufacture, operation and maintenance of all plant machineries/structures as per applicable national and international standards as laid down by statutory authority.
- Intelligent formulation of layout to provide 'Assembly Point' and safe access way for personnel in case of a hazardous event/disaster, as can be inferred from Risk & Consequence analysis.
- Proper emergency (both on site & off-site) preparedness plan, emergency response team, emergency communication, emergency responsibilities, emergency facilities, and emergency actions shall be developed.
- Proper Alarm system and training the personnel for appropriate response during disastrous situation.
- Complete fire protection coverage for the entire plant as per regulatory stipulations.
- . Creation and maintenance of Disaster Management cell with adequately trained personnel who can handle all sorts of emergency situation.
- . Provision of funds for prevention of disaster, mitigation, capacity-building and preparedness.
- Objectives
- Objectives of the disaster control/management plan for the proposed plant are:
- To identify type of major disasters this may occur in the plant.
- To collect data on type of disasters which has already happened in other iron & steel plants
- An action plan to handle disaster.

7.5.3 Identification of Hazardous Process/Area

Induction Furnace/ Ladle Refining Furnace: Hot metal spillage, steam explosion, Fire & Electrocution

- Continuous Casting Plant: Hot metal spillage
- Re-heating Furnace: Fire and explosion
- Rolling Mills: Hot metal spillage
- Fuel Oil tanks: Fire & Spillage
- Electrical Rooms: Fire & Electrocution
- Transformer area: Fire & Electrocution

Level of Accidents

If there is any disaster in any part of the plant/work place due to any reason, the area which may be affected can be classified in the following four classes-

Level I - **Operator level**

Level II - **Local/community level**

Level III- **Regional/ national level**

Level IV- **International level**

Level I, II and III class of accidents have been considered for the plant.

Level I

Under this level, disasters may happen due to fire, explosion, oil spillage and spontaneous ignition of inflammable materials. This level has probability of occurrence affecting persons inside the plant. The various shops, which have been mentioned as potential hazard areas, will be affected during this level of accident.

Level II

In case of sabotage/complete failure of all automatic control/warning systems; fuel oil storage area (the oil kept in tanks and covered by tank bund) which may leak out. However, the probability of this is very low due to adequate instrumentation, security and training of persons of the plant operating such system.

Level III

In case of sabotage/complete failure of all automatic control/warning systems, undetected leakage from the furnace; the resultant leakage of the flammable gases is a potential threat that can affect the region. However, with the proposed instrumentation, gas detection and alarm system, security and training of persons such a situation is unlikely.

7.6 Resettlement & Rehabilitation (R&R)

The proposed project is going to be developed in the existing campus of Kaalendi Ventures LLP and no land acquisition took place for the expansion of the project. Hence no Resettlement or Rehabilitation is required for the project.

7.7 Social Impact Assessment

Separate Studies of Social Impact Assessment is not required as per ToR issued by MoEF&CC. However, Socio-Economic studies were carried out during the baseline period and the same is presented in Chapter 3 and 4.

8 PROJECT BENEFITS

8.1 Physical Infrastructure

The beneficial impact of the proposed project on the civic amenities will be substantial after the commencement of the project activities. The basic requirement of the community needs will be strengthened by extending healthcare facilities to the community, building/strengthening of existing roads and drinking water facility in the area which will help in uplifting the living standards of local communities.

8.2 Employment Opportunities

The project will create extra opportunities of direct and indirect employment for which skilled and unskilled manpower will be needed. Secondary jobs are day-to-day needs and services to the work force. This will also increase the demand for essential daily utilities in the local market.

8.3 Indirect Employment

Due to the proposed modernization project indirect employments will be generated. Indirect employments like; Primary requirements, Grocery Shops, Residential Requirements, Garments Requirements, Transportation Facilities, Health Care Facilities, etc. These kinds of requirements will increase the prevailing scenario, which will generate the indirect employment.

Local villagers of the project will get its benefits more by giving preference to them in relation to direct employment associated with the various project activities. Construction and operation phase of the proposed project will involve a certain number of laborers, contractors and construction workers. There is every possibility that local people will be engaged more for this purpose. There is a possibility that local people will get involved for this purpose to the extent possible and hence it will improve the existing employment scenario of the region

8.4 Industries

The industries will require raw materials, skilled and unskilled laborers. It will be available from the local area. Due to increasing industrial activities, it will boost the commercial and economical status of the locality, to some positive extent. In brief it can be concluded that, the proposed activities will not produce adverse impact on sanitation, communication and community health, as sufficient measures have been proposed to be taken under the EMP. The proposed project is not expected to make significant change in the existing status of the socio - economic environment of this region for the better.

8.5 Social Infrastructure

With the implementation of the proposed expansion plant, the increasing industrial activity will boost up the commercial and economic status of the locality, to some extent the socio-economic status of the local people will improve substantially.

The required skilled and unskilled laborers will be utilized maximum from the local area. In brief it can be concluded that, the proposed activities will not produce adverse impact on sanitation, communication and community health, as sufficient measures have been proposed to be taken under the Environmental Management Plan.

Due to proposed project, the surrounding environment will not face any problems related to the pollution because all kind of wastes will be handled properly and No alteration in transport routes will be required.

The land rates in the area will improve in the nearby areas due to the proposed activity. This will help in upliftment of the social status of the people in the area.

Educational institutions will also come-up and will lead to improvement of educational status of the people in the area. Primary health the medical facilities will improve due to the proposed project.

8.6 Conclusion

The proposed project will provide direct employment to the people of the area and thousands will get business opportunity to feed the demand of project and the people working for the project. Small market will get developed to feed daily demand of the people working for the proposed project.. People will get medical, education and business opportunities. Proposed project will make need-based survey in the area under supervision of local panchayat and district administration. The needy person will be supported as per requirement. This will improve economic status of the people living in the area. Other project proponent will take mutual advantage of developed infrastructure of the area to set up industry which will further improve infrastructure and economy of the area. The project will contribute in meeting the steel demand of the country which would further boost buildings, bridges and road construction of the country and raise economic benefits all around.

9 ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th September, 2006 as amended from time to time; the chapter on "Environmental Cost Benefit Analysis" is applicable only, if the same is recommended at the Scoping Stage.

As per the ToR points issued by MoEF&CC, vide letter no. J-11011/350/2017-IA II (I) dated 19th September, 2017 for proposed expansion, the Environmental Cost Benefit Analysis is not required.

10 ENVIRONMENTAL MANAGEMENT PLAN

10.1 Introduction

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The desired results from the environmental mitigation measures proposed in the project may not be obtained without a management plan to assure its proper implementation & function. The EMP envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. This chapter includes following aspects:

- Pollution control/mitigation measures for abatement of the undesirable impacts caused during the construction and operation phase.
- Details of management plans (Greenbelt development plan, Waste management plan etc.)
- Institutional set up identified/recommended for implementation of the EMP.
- Post project environmental monitoring programme to be undertaken.
- Pursuing for funds allocation and expending the same for EMP

10.2 Proposed Environmental Mitigation Measures

The environmental impact due to the project activity are Air, Noise & Vibration, Water, Land, Biological (Flora & Fauna), Socio Economic and Occupational Health & Safety. The major impacts due to different project activities and their mitigation measures for construction and operation phases are given in Table 10-1 below-

TABLE 10-1 : PROPOSED ENVIRONMENTAL MITIGATION MEASURES

S. No	Component	Impact	Mitigation Measures
Construction Phase			
1.	Air	Generation of Dust, CO2, NO2, SO2	❖ Haulage roads will be sprinkled with water at regular intervals for which water tankers with sprinkler arrangement are deployed. ❖ Trucks carrying raw materials will be covered with tarpaulin to prevent spillage and spreading of dust during transportation.

			❖ Greenbelt and greenery development around storage yards, around plants, either side of roads and around the periphery of the industry. ❖ Water spray and sprinkling will be practiced at unloading locations. ❖ All internal roads in the premises will be paved/tarred ❖ Speed limit will be enforced for vehicles in the plant premises to prevent road dust emission.
2.	Noise and Vibration	Increase in the noise levels due to movement of vehicle and construction activities. Vibration due to movement of vehicles and construction activities. Noise due to working of machineries, soil compactors, use of vibrators for concrete setting, cranes and transportation materials	Proper service and maintenance of vehicles to control noise. Only PUC certified vehicles are permitted for the movement. Personal protective equipment (PPE) for labourers. Construction activity will be carried out in day time only. Proposed project being inside existing plant, hence no impact on general public.
3.	Water	Water pollution due to disposal of untreated sewage. No change in land use pattern as project site is inside the existing industrial complex	Proper sanitation facilities in the construction site. Sewage waste is handled in septic tank followed by soak pits. And outflow water will be used for greenbelt development
4.	Land	Land is already developed for industrial use. Pollution of land due to discharge of untreated sewage and solid wastes.	Sanitation facilities in the construction site as well as labour camps. Dug up top soil will be preserved for green belt development and rest of soil will be used for filling low lying area.
5.	Biological Flora, Fauna	Land is already developed for industrial use. Pollution of land due to discharge of untreated sewage and solid wastes.	Green Belt development and its proper care would be done. Major construction work will be carried out in day time
6.	Socio Economic	Employment of construction of workers.	People from the study area will be employed as far as possible.

7.	Occupational Health & Safety	Auditory ailment due to noise. Respiratory ailment due to dust emission.	The use of personal protective equipment will be made stringent. Water sprinkling system for dust generating areas. Periodic health checkups will be conducted
Operational phase			
1.	Air	Increase in the air pollutant concentration due to particulate emission, SO2, NO2 and CO emissions from Induction Furnaces during process of scrap/DRI charging and melting, as well as during metal extraction from slag generated. Lower visibility.	Use of dry cyclones and pulse jet type bag filters to limit dust emission to comply with the limits of PSPCB regulations and discharging emissions in a stack of 30m height for wider dispersion. Personal protective equipment for employees. Regular monitoring of emissions. For fugitive emissions: Dust suppression measures by sprinkling water on fugitive dust generation points, limiting the speed of trucks within plant boundary and using metaled and paved roads.
2.	Noise and Vibration	Increase in the noise levels and Vibration due to operation of Equipment.	Equipment with low noise level only will be used. Periodic servicing and regular maintenance of machines will reduce noise. Personal Protective equipment for employees like anti vibration gloves and ear plug/ear muffs. Vibration isolators for Centrifugal fans, Centrifugal fans which will be provided with vibration isolators at its base as well as its suction and delivery sides. Acoustic Chamber for DG set, avoiding continuous exposure of employees to high noise. Project site is inside industrial complex. No impact on general public.

3.	Water	Impact on ground water due to abstraction will be minimum as ground water will either be used for domestic purposes or for process cooling. No industrial effluent will be discharged, which makes this production process a Zero Liquid Discharge Production Process.	Fresh ground water used in the cooling water recirculation system is the minimum requirement, which is used for recirculation through cooling tower. The blow-down water from cooling tower is allowed to settle in pond, decanted water is used in greenbelt development or dust suppression. The waste water from quenching to produce TMT bar is collected in tanks and utilized for reuse Sewage waste is led to septic tank followed by soak pits. The outflow of which will be used for greenbelt development. This ensures ZLD
4.	Land	Pollution due to discharge of sewage waste. Raw material will be transported in lump from by trucks with covered tarpaulin and finished product will be transported in recycled HDPE bag	Domestic sewage effluent generated will flow into septic tank followed by soak pit. Both sewage solid and liquid wastes will be used for green belt development. Process solid wastes generated are completely such as slag is first subjected to metal recovery and then used as sand in pebbles making or road construction. reused for ancillary activities. APCD dust may be first subjected to Zinc recovery and then sent to TSDF or straight to TSDF.
5.	Biological Flora, Fauna	Disturbance due to increase in noise.	Operational activities of heavy machineries and transportation only in daytime. As far as possible the machines deployed will be low noise not exceeding 80 dB except centrifugal fans which will be provided with vibration isolators at its base as well as its suction and delivery sides. Settling of dust on plant leaves will be minimum because dust emission from chimney is only 50mg/Nm3 and the total predicted impact of particulate Matters on the topography is insignificant.
6.	Socio Economic	Employment to local people	Preference to People from the local area will be given for employment as far as possible.

7.	Occupational Health & Safety	Auditory ailment due to noise generated from the production unit. Accidents due to handling/storage/transportation of hazardous materials	Equipment with low noise level will be used. Wearing of personal protective equipment like gas masks, ear muffs etc. will be strictly enforced. Training/awareness program about the handling / storage / transportation of hazardous materials. First aid training for chemical/fire hazard related accidents. The heat radiating zone will be provided with aerators equipped with water atomizing sprinklers

10.3 Details of Management Plan

10.3.1 Air Environment

The major pollutants emitted from the plants are Particulate Matter (PM10/PM2.5), Sulphur dioxide (SO2), Nitrogen dioxide (NO2), Carbon Monoxide (CO) and Hydrocarbons (HC). The major sources of pollutants are vehicular movement and the dust emission from induction furnace operation.

During the ambient air quality monitoring, it is observed that the baseline concentration of air pollutants, namely PM10, PM2.5, NO2, SO2, CO and HC is well below the National Ambient Air Quality Standards (NAAQS), 2009. It is anticipated that the plant activity will not cause any adverse effect on the existing baseline status. Fugitive emissions will be controlled with the following recommended measures:

- Development of green belt in the plant area.
- Use of water sprinkling system in haulage roads for dust suppression.
- Over loading shall be avoided during crushing and grinding of Scrap.
- Proper maintenance of haulage roads, which are being used for transportation of material.

In addition to the above, the following additional measures are also recommended:

- Dust mask will be provided to all workers working in dust generating area.
- Spread of dust from grinding mill will be controlled with the help of enclosures and dust collectors.
- Overloading of trucks will be avoided.
- Utmost care and regular inspection schedule will be carried out to prevent any fugitive emission of dust during manufacturing process and transportation of material from one place to another.

10.3.2 Air Pollution Control Equipment

The following air control equipment will be installed to control the emission of air pollutants. The gases evolved along with dust from the process of steel making in the Induction Furnaces are collected in the side swiveling hoods and on cooling are cleaned in APCD system having 99.9% efficiency of dust collection. The dust collector will have bag type pulse jet filter of very fine fabric specifically made to prevent dust emission. The particulate matter in the emitted air will be within the permissible limits of NAAQS, 2009. The dust thus collected in dust collector and will not be wasted; depending upon availability it will be packed in bags and sold for metal recovery. The cleaned gas from the APCD system will be discharged through a chimney of 30 m height.

As a control mechanism, it will be strictly ensured that all the vehicles are PUC certified and properly covered during transportation, loading, unloading and other such activities of raw materials and finished products. APCD equipment detail

TABLE 10-2: APCD EQUIPMENT DETAIL

Sr. NO	Item	Specification
1	Bag House (Pulse Jet)	**Containment Unit:** Plan :4638 mm x 2360 mm Vertical Height: 3500 mm H Bottom Pyramidical Hopper, vertical Height: 2000 mm (approx). Total height :6500 mm ***MoC: 2.0 mm Thk:*** MS Sheet: fastening with 65 x 8 MS flat & ISA 65 x 8: Tube sheet out of 5.0 mm Thk. MS Sheet Lug Support out of ISA 100 x 100 Bracing with ISA 40x 5 Base plates: 10.0 mm Thk MS Complete with foundation bolts Catwalk stairs & Working platform Filter Element: Filter Bag 180 Nos., 150 mm Dia. 3.0 m L, Polyester Non-woven, Water resistant, 550 GSM, Top snap Band Type, Top Mounted wire cages, GI 4.0 mm thick wires with spot welding Solenoid values, 1.5" Dia. Double Diaphragm type, Sequential controller Air lock Rotary Valve (1 No.) Screw conveyor with machined rotary valve geared motor (2.0 HP x 1440 RPM), Complete with guard etc.

10.3.3 Noise Environment

Noise exposure level will be maintained within not more than 85 dB (A) in the work zone (for 8 hours exposure). The main sources of noise in plant activity are sizing of scrap to charging size in in induction furnace. Acoustic chamber is provided to DG set. The following precautionary measures will be taken to control noise pollution:

- Ear muffs, ear plugs, etc. will be provided to workers when the noise levels exceed 85 dB (A).
- The silencers and enclosures are incorporated for equipment and machineries, which emit high noise levels.
- Regular maintenance will be carried out for equipment and various machines.
- Plantation will be carried out.
- Sufficient green belt is proposed to control noise level.
- PUC certified vehicles will only be used

10.4 Water Environment

Water is mainly used in induction furnace for cooling of electric coils, for cooling of molten metal in copper mould of CCM for skin formation and direct cooling of billets being withdrawn for billet core solidification in CCM and in quenching purposes for producing TMT bars in Rolling mills and also for domestic purposes.

10.4.1 Water Pollution Control System

Water for industrial and domestic purpose will be drawn from bore-well after receiving proper NOC from CGWA. About 51.5 KLD of fresh water will be drawn daily, out of which 6.5 KLD will be required for domestic purposes and 45.0 KLD will be used as make up water for cooling water recirculation system through cooling tower. No waste water will be disposed to the ground. Waste water of cooling tower blow-down and from domestic sewage water soak pits will be used for greenbelt development or for dust suppression on haul road.

10.4.2 Rain Water Harvesting Structures and Facilities

Depending upon the available contours at detailed engineering stage, the number of drainage outfall and extent of open drains etc. will be designed so as to discharge the water to the rainwater harvesting pond for reuse in dust suppression & greenbelt development. A rainwater harvesting structure of capacity 3000 m^3 will be made to collect rainwater.

10.5 Greenbelt Development

Development of a greenbelt around the proposed facility mitigates to a certain extent the potential negative impact on the environment due to dust, air emissions, fugitive emission and noise. A green cover itself acts as containment for dust. Presence of a green belt, will lead to micro-climate and soil quality balancing, by retaining soil moisture, recharge of ground water as well as self-control of micro- climate of that area. It also improves the aesthetic value of the area. Later on, it becomes the natural habitat of various bird species. Development of a green belt around the proposed project site will also help to contain noise generated during construction and operational phases.

There are two types of approaches recognized for development of green belts i.e. Source oriented approach and Receptor oriented approach. Both source and receptor-oriented approaches are similar i.e. it requires development of green belt. The only difference is the manner in which the plantation is being done. In source-oriented approach green belt is located around the pollution source whereas in receptor-oriented approach the receptor is protected against pollution by development of green belt nearer to the receptor. In this project the plantation will be source oriented, i.e., the plant site will be covered at the boundary with green belt.

The general considerations involved while developing the green belt are:

- Generally local/native fast-growing trees should be planted.
- Planting of trees should be undertaken in appropriate encircling rows around the project site.

10.6 Health and Safety

The Health and Safety of the employees shall be given first priority during the plant operation. Provision of rest shelters for workers with amenities like drinking water, fans etc. First aid facility shall be provided at project site. Training programme organized on First Aid. Periodical medical checkup camp shall be organized for worker and staff. Workers subjected to heat radiations shall be protected by showering tower ventilation where water is sprinkled through atomisers in the stream of air from the Aerators (Air Circulators). Heat being released in from the cooling of hot products will be taken care of by natural ventilation in the structural building design.

10.7 Anticipated occupational Health impacts of the project construction

The occupational health problems envisaged at this stage can mainly be due to accidents during construction activities and noise. To overcome these hazards, in addition to arrangements to reduce it

within Threshold Limiting Values (TLV), required digging foundations giving them the proper slope, deploying skilled workers for skillful jobs, using safety belts for working at high altitudes, personal protective equipment (PPE) like helmet, gum boots, anti-vibration gloves, dust masks, ear muffs etc. will also be supplied to workers.

10.7.1 Operation and Maintenance

Noise is the major occupational hazard during operation stage apart from chemical and accidental hazards. Suitable personnel protective equipment will be given to employees. The working personnel shall be given the following appropriate personal protective equipments.

Industrial safety helmet.

- Welders' equipment for eye and face protection.
- Cylindrical type earplug.
- Ear muffs.
- Safety belt/line man's safety belt.
- Leather hand gloves.
- Asbestos hand gloves.
- Canvas cum leather hand gloves with leather palm.
- Electrical resistance hand gloves.
- Industrial safety shoes with steel toe.
- Electrical safety shoes without steel toe and gum boots.

First aid facility will be made available round the clock for attending to emergency in case of any accident, if any. All working personnel shall be medically examined at least once in every six months and at the end of his term of employment.

10.7.2 Health and Safety Monitoring Plan

All the potential occupational hazardous work places will be monitored regularly. The health of employees working in these areas will be monitored once in six months for early detection of any ailment.

- A medical care center will be established with the following responsibilities:
- Examination of worker's health in relation to work.
- Surveillance of working environments.
- Identification and evaluation of environmental factors which may affect the workers health.
- Assessment of conditions of occupational worker's health.

- Observance of safety norms and reduce/eliminate exposure to hazardous environment.
- Company will take up monitoring activities periodically to assess hazards due to gases, dusts, etc.

10.8 Implementation of EMP and Monitoring

A large part of the sampling and measurement activities will be concerned with long term monitoring aimed at providing an early warning of any undesirable changes or trends in the natural environment that can be associated with beneficiation and associated activities. In particular, monitoring strategy is required to ensure that all environmental resources, which may be subjected to contamination, are kept under review. Monitoring of the individual elements of the environment is necessary. To meet the above objective an Environment Management Cell shall be formed under supervision of consultant and involve Pollution Control Board for their valuable suggestion and guidance. The following items will be considered under the monitoring schedule:

- Re- Vegetation & Green Belt development
- Air Quality Monitoring
- Water Quality Monitoring
- Occupational Health
- Socio-Economic Development.

The monitoring and disaster management plans as given in the previous chapter-7 will be followed.

10.8.1 EMP Implementation Program

Any industrial development is associated with certain positive impacts as well as some negative impacts on the environment. However, the negative or adverse impacts cannot possibly rule out scientific development. At the same time adverse impacts cannot be neglected. An Environmental Management Plan shall be formulated for mitigation of the adverse impacts and is based on the present environmental conditions and the environmental impact appraisal. This plan helps in formulation, implementation and monitoring of the environmental parameters during and after commissioning of the project. The Environmental Management Plan describes in brief, the management plan for proper and adequate implementation of treatment and control system for air and liquid pollutants and for maintaining the environment. It also includes the development of green belts in and around the plant, proper safety of the workers, noise control, fire protection systems and measures.

Purpose of Environmental Management Plan

The environment management plan is prepared with a view to facilitate effective environment management of the project, in general and implementation of the mitigation measures in particular. The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be adopted for all project works. For each stage of the program, the EMP lists all the requirements to ensure effective mitigation of every potential biophysical and socio-economic impact identified in the EIA. For each operation, which could otherwise give rise to impact, the following information is presented:

- To treat and dispose-off all the pollutants viz. liquid, gaseous and solid waste so as to meet statutory requirements (Relevant Pollution Control Acts) with appropriate technology.
- To support and implement work to achieve environmental standards and to improve the methods of environmental management.
- To promote green-belt development.
- To encourage good working conditions for employees.
- To reduce fire and accident hazards.
- Budgeting and allocation of funds for environment management system
- To adopt cleaner production technology and waste minimization program.

10.9 Environment Management Policy & Environment Committee

The Company is very much aware of its responsibility in protecting the Environment. Thus, various mitigation measures as given in the report shall be taken-up and effort will be made to nullify the effect of the Project, on the Environment, if any. Any action or effort remains incomplete, if it is not monitored properly at regular intervals and corrective measures taken, wherever necessary. Regular monitoring has thus, been provided. The Company has a well-defined policy to keep the Environment clean. The management has decided that all effective steps shall be taken to prevent deterioration of the existing

Environment. They have formed an Environment Committee committed for this cause. The Committee will consist of following persons as given in figure No 9.1

Committee SOP in case of any Violation is observed

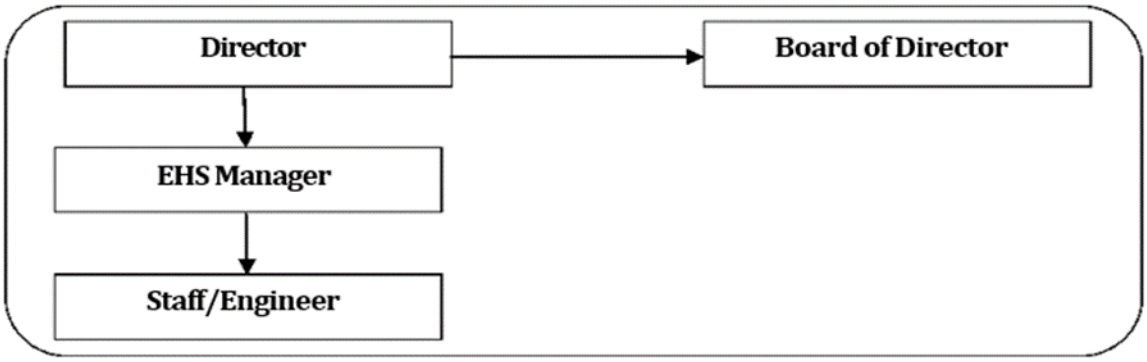


FIGURE 10-1: ENVIRONMENT COMMITTEE

- The cases of violations/non-compliances of Environment or Forest Laws, if any, shall be reported to the Board of Directors through EHS Manager and shall identify designate responsible person for ensuring compliance with the Environmental Laws and Regulations.
- Comply with all relevant environmental laws and regulations to minimize risks to health, safety and the environment.
- Work with local government, regulatory authorities and communities to ensure safe handling, use and disposal of all materials, resources and products.

The main aims under the said policy are:

- Effectively manage, monitor, improve and communicate the environmental performance.
- Take all reasonable steps to prevent pollution.
- Set realistic and measurable objectives and targets for continual improvement of the environmental performance.
- Ensure that all employees and contractors are trained to understand their environmental responsibilities and create an environment that adheres to the Company's Policies, procedures and applicable regulations.
- Hold leadership accountable for good environment performance of our operations and projects. Inherent in that accountability will be the commitment of management to provide resources and successfully create an appropriate environment.
- Comply fully with all relevant legal requirements, codes of practice and regulations.
- Reduce, recycle and reuse natural resources.
- Minimize waste and increase recycling within the framework of waste management procedures.

- Identify and manage environmental risks and hazards.
- The project proponent shall regularly review this policy and ensure that corrective and preventative actions are taken in order to ensure continual improvement.
- To treat all the pollutants viz. liquid and gaseous, which contribute to the degradation of the environment, with appropriate technologies.
- To comply with all regulations stipulated by the Central / State Pollution Control Boards related to air emissions and liquid effluent discharge as per air and water pollution control laws.
- To handle hazardous wastes as per the Hazardous Waste, Hazardous & Other Wastes Rules, 2016 under the Environment (Protection) Act, 1986
- To encourage support and conduct developmental work for the purpose of achieving environmental standards and to improve the methods of environmental management.
- The system of reporting of Non-conformances/ violation of any Environmental Law/Policy will be as per the management system.
- To comply with the submission of compliance to EC report to the Authorities.

10.9.1 Environmental Monitoring Cost

The monitoring and evaluation process will require additional and at times, extensive surveys and primary data collection, either to establish the baseline or to measure changes. In order to respond to evolving management needs, a contingency budget will be required. The cost required for the Environmental Monitoring Plan for the proposed expansion is given in below table:

This is environment Management Plan budget; monitoring budget will be much lower. Pl include continuous online monitoring of stack.

TABLE 10-3 : BUDGET FOR ENVIRONMENTAL MONITORING PLAN

S.No	Title	Capital Cost Rs. Lacs	Recurring Cost Rs. Lacs (Annum)
1	Air Pollution Control	60.0	7.0
2.	Water Pollution Control/sewage Treatment Plant	5.0	1.5
3.	Noise Pollution Control (Including cost of Landscaping, Green Belt)	5.0	3.0
4.	Solid Waste Management	10.0	1.0
5.	Environment Monitoring and Management (Including Establishment of Laboratory)	15.0	2.0
6.	RWH & Drainage	10.0	2.00
7.	Miscellaneous (Appointment of Consultants, occupational health & safety measure)	1.0	2.0
	Total	106	18.5

11 SUMMARY AND CONCLUSIONS

11.1 Summary

M/s Kaalendi Ventures LLP. is located at Khirodharpur, Fatuha, Patna - 803201. The proposed plant has capacity of producing MS pipe (Tube)- 20,000 TPA, Shutter profile- 2,000 TPA, TMT Bar – 68,000 TPA, MS Billet- 90,000 TPA).

The proposed project planning needs "Environmental Clearance" from the MoEF&CC as per the EIA Notification, 2006. The project is classified under Category B as Metallurgical Industries (Secondary metallurgical processing), listed as Item **3(a)** of the schedule of the EIA Notification.

Water for construction and domestic purpose will be drawn from **bore well after receiving proper NoC from CGWA.** Approximately **51.5 KLD** water will be used for industrial and domestic purposes. Total Power loads around **12.4 MVA** to run the additional plant & machinery during Construction and Operational Phase. Expected source of power is SBPDCL. Total Plot Area is around ***9.196*** **Acre.**

Domestic waste water will be generated as liquid effluent which will be further sent to the septic tank followed by **Soak Pit.** About 10-15 % of the total raw material used will get converted into **slag**. Dust from APCD are hazardous materials generated on site, which will be managed as per Hazardous Waste Management Handling and Transboundary Movement Rules**, 2008** & amended thereof. The generated **APCD dust** will be disposed off in the authorized TSDF site. Total Project Cost will be **Rs. 38.3 Cr.**

11.2 Conclusion

Certain levels of impacts are predicted in the proposed project. These impacts are reduced by mitigative measures implemented in the project area. Apart from these impacts certain beneficial effects in terms of providing employment opportunities and development of surrounding plant area is foreseen. This will produce multiple effects on the life and economy of the local people.

The project activities involved in the construction and operation phase are identified. For identification of impacts, the interaction between the project activities and different components of environment were detailed and are classified phase wise.

In the constructional phase, the transportation of construction material could have an impact, especially on air, noise, vibration. However, since the proposed project is surrounded with industries and well-maintained infrastructure facilities, even this impact is minimal and temporary. The noxious emission

arising out of the various systems will be taken care by a bag filters and waste water generated if any will be recycled in the manufacturing process.

During the operational phase, there could be minor change in air quality. Transportation of raw material, storage and handling of material and the production process could cause a disturbance to environment variables which will be prevented with the proposed mitigation measures. The noxious emission arising out of the various systems will be taken care by APCD system and waste water generated if any will be recycled in the manufacturing process. The evolved gases with dust from the Induction Furnaces will be cleaned in high efficiency Pulse jet type bag filters and the collected dust will again be used for recovery of minerals before finally disposing of to the TSDF. Similarly, metal will be extracted from the slag generated before sending the slag for filling low lying areas or using the same as sand in road metaling or pebbles making. There is no waste water/ liquid discharges and the plant will follow ZLD.

With respect to occupational health, minimal impacts are anticipated on the health of the employees during operation phase. The project site is already established there are no issues related to Resettlement and Rehabilitation. The company has proposed to create green belt inside the project area premises along with development of rainwater harvesting system inside the plant premises.

The project will generate employment opportunities among the local peoples which will provide a handsome support in improving the living standard.

Thus, it can be concluded that with the judicious and proper implementation of the pollution control and mitigation measures, and it is very pertinent that with the judicious implementation of the Environment Management Plan the proposed project will be beneficial to the society and will help reduce the demand-supply gap of steel and will contribute to the economic development of the region in particular and country in general.

12 DISCLOSURE OF CONSULTANTS

Declaration by Experts contributing to the Draft EIA/EMP report Expansion of M/s Kaalendi Ventures L.L.P

The one season baseline data used in the report was collected in Pre-Monsoon (1st March 2022 to 31st May 2022) by our empanelled lab Enviro Tech Services.

12.1 Brief profile of REPL is as given below

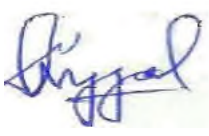
Director	Mr. Manish Kumar
Name of the Consultant	Rian Enviro Pvt. Ltd.
Address	Mangal Market Patna -800014

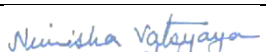
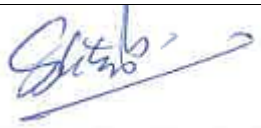
12.2 Personnel involved in the preparation of Final EIA/EMP report are stated below

Accreditation Certificate of the Consultant Engaged:

EIA coordinator:	**Assistant EIA coordinator:**	**Date**
Name: - Kailash Nath Sharma	Name: Bhuwan Bhaskar	**07-02-2023**
		

Functional Area Experts:

S. No.	Functional Area	Name of the experts	Involvement Period and Task	Signature
1.	WP	Bhuwan Bhaskar (WP)	Estimating water requirements based on population, suggesting wastewater treatment/disposal schemes and developed the plan for rain water harvesting.	
2.	AP	Muzaffar Ahmad	Collected the ambient air data through secondary sources and suggested Air pollution control measures during both phases of project.	
3.	LU	Debarati Ghosh	Development of landuse maps of study area using GIS / related tools, site visit for ground reality survey, finalization of landuse maps, and contribution to EIA documentation.	
4.	Geo	Mohan ShriramBhagwat	Collection of secondary data as well as drafting of report with respect to Geological Aspect.	
5.	HG		Collection of secondary data as well as drafting of report with respect to Hydro-geological condition in around the study.	
6.	SW	SumitVerma	Inventory of Municipal Solid Waste, suggesting treatment options viz; organic waste convertor technology.	
7.	AP and AQ	Vishal Duggal (AQ)	Collected the meteorological data and AAQ data through secondary sources, predicted impacts on air quality using suitable AQ model and suggested air pollution control measures	

S. No.	Functional Area	Name of the experts	Involvement Period and Task	Signature
8.	SC	Mrs. NimishaVatsyayan	Proposing the soil management practices during construction and operation phase of project.	
9.	EB	Dr Shatrunjay Singh	Generating the ground truthing ecological assessment with secondary data from different departments, earmarking rare and endangered species.	
10.	SE	Manish Kumar	Collected the primary and Secondary data, livestock inventory/ impacts, identified village-wise amenities/ needs.	
11.	RH	KailashNath Sharma	Identification of hazards materials, Fire accidents from Diesel storage and lethality damages, DMP and EPP for onsite & offsite were provided	
12.	HW	KailashNath Sharma	Identification of waste generated from the industry, studying adequacy of mitigation measures for management of hazardous waste.	
13.	NV (Team Member)	Bhuwan Bhaskar	Collected the ambient noise data through secondary sources and suggested Noise pollution control measures during both phases of project	

Quality Council of India

National Accreditation Board for Education & Training

Certificate of Accreditation

Rian Enviro Private Limited

202 & 402, Mangal Market, Raza Bazar,
Sheikhpura, Patna, Bihar- 800014

Accredited as Category – 'B' organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA/EMP reports in the following sectors:

Sl. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals - opencast mining only	1	1 (a) (i)	A
2.	Thermal power plants	4	1 (d)	B
3.	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	B
4.	Synthetic organic chemicals industry	21	5 (f)	B
5.	Distilleries	22	5 (g)	A
6.	Building and construction projects	38	8 (a)	B
7.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in IA AC Minutes dated June 11, 2021.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/21/1792 dated July 6, 2021. The accreditation needs to be renewed before the expiry date by Rian Enviro Private Limited, Patna following due process of assessment.

Sr. Director, NABET	*Certificate No.*	*Valid till*
Dated: July 6, 2021	**NABET/EIA/2124/IA0079**	**March 10, 2024**

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

EXECUTIVE SUMMARY

M/s KAALENDI VENTURES L.L.P. MAUZA: - KHIRODHARPUR, TEHSIL: - FATUHA, DISTRICT: -PATNA, STATE: - BIHAR

ENVIRONMENTAL CONSULTANT
Rian Enviro Private Limited,
H/O- 202 & 402, Mangal Market, Raza Bazar, Sheikhpura, Patna

EXECUTIVE SUMMARY

1. INTRODUCTION

M/s Kaalendi Ventures L.L.P. is an existing steel based industrial unit at Khirodharpur, Fatuha, District-Patna, State- Bihar. The Company owns a total leased land of 9.196 Acre (Existing area 3.715 Acre + Proposed- 5.482 Acre. The proposed capacity of MS pipe (Tube)- 20,000 MTPA, Shutter profile- 2,000 MTPA, TMT Bar – 68,000 MTPA, MS Billet- 90,000 MTPA).

1.1 Project Description

The proposed project planning needs "Environmental Clearance" from the MoEF&CC, as per the EIA Notification, 2006. The project is classified under Category B due to note in "General Conditions" (secondary metallurgical processing industrial units, those projects involving operation of furnace such as induction furnace having capacity of more than 30,000 TPA) as Metallurgical Industries (secondary metallurgical processing), listed as Item 3(a) of the schedule of the EIA Notification.

The brief description of the project is given below:

- **Identification of project:** Project falls under Metallurgical Industries (secondary metallurgical Processing) Item 3(a)
- **Brief description of nature of the project:** The Proposed capacity of the unit is ~ MS pipe (Tube)- 20,000 MTPA, Shutter profile- 2,000 MTPA, TMT Bar – 68,000 MTPA, MS Billet- 90,000 MTPA).
- **Total Plot Area:** 9.196Acre. (Existing area-3.715 Acre + Proposed- 5.482 Acre
- **Location:** Khirodharpur, Fatuha, District-Patna, State- Bihar.
- **Water requirement:** Water will be drawn from Bore well (after getting proper permission from CGWA) total process water requirement 51.5 KLD while 45 KLD will be recirculated used as make up water and 6.5 KLD for domestic uses during operational phase.
- **Wastewater:** Domestic waste water generated will be sent to septic tank followed by soak pit, hence no generation of sewage. 45 KLD of water quantity shall be recirculated for cooling purpose in project activity. The water makes up water used for cooling purposes in coils shall be used after softening.
- **Man Power:** Around 100 people.
- **Electricity/Power requirement:** Total Power loads ~12400 kVA to run the additional plant & machinery during Construction and Operational Phase. In case of Power failure 1 DG set of 500 KVA Capacity would be used.
- **Project cost:** The estimated cost of the Project is approximately Rs. 38.3 Crore.

1.2 Technology and Process Description

M.S. Billets are manufactured by melting of Sponge Iron and M.S scraps in induction Furnaces and casted in cast iron moulds to get Billets. The raw materials required for the manufacture of M.S Billets are M.S scrap obtained from the open market. Required quantities of M.S scraps from the stock yard are transported through trucks into the furnace yard by the electro magnet and crane fed into furnace. A minimum manual shoveling is required.

1.3 Solid Waste

Solid waste will include;

a) Slag @~9500 TPA – reusable as building material (especially in road construction).
b) Mill scale @13500 TPA – the waste has commercial worth and will be sold.

Hazardous waste

Hazardous waste will include;

a) Device air pollution control devices @600 TPA (Category 35.1 of Schedule-I) – the waste will be stored on-site in HDPE bags, inside a lined and covered room before being disposed through the State's common hazardous waste disposal facility.
b) Waste/used oil/lubricant @ approx. 02-0.3 KL/Year (Category 5.1 of Schedule-I) – the waste will be stored on-site in a covered room before being disposed through authorized recyclers.

2 DESCRIPTION OF ENVIRONMENT

Environmental Baseline Data Collection: Baseline data for the proposed project was collected during pre-monsoon period (March 2022 to May 2022) to assess the present scenario of the area.

2.1 Soil Environment

Eight locations in the study area were selected for soil sampling.

The interpretation of field data, physical and chemical data it can be concluded that:
As per the physical data soils are coarse to fine texture, imperatively moderate water holding capacity, and moderate to slow permeability. As per physical characters soils are rated as moderately good for agriculture.

As per chemical characters soil reaction (pH) soils are slightly alkaline and normal for crop growth. Organic carbon is more than sufficient. Macro nutrient like nitrogen is good and phosphorus is medium to average potassium. Base saturation is very high.

2.2 Water Environment

2.2.1 Surface Water

Surface water samples were collected from 08 locations during the study period of March 2022 to May 2022 and analyzed for a number of physico-chemical parameters.

Observation on Surface water Quality (March 2022 to May 2022)

- pH was observed in the range of 7.4 – 8.12 with minimum at Pond (SW8) and maximum at (SW1) Ganga River(Upstream).
- TDS was observed in the range of 218.2 -664.8 mg/L with minimum at Pond (SW8) and maximum at Pond No 7.
- COD was in the range of 15.5-32.6 mg/L with minimum at Pond (SW7) and maximum at Falgu River (SW4).
- BOD was in the range of 3.19-5.40 mg/L with minimum at River (SW5) and maximum at Punpun River (SW3).

2.2.2 Ground Water

Ground water samples were collected from 08 locations during the study period of March 2022 to May 2022.

Interpretation of Ground Water Quality (15th March 2022 to 15th June 2022)

- All the samples were colourless meeting desirable norms (<5 Hazen).
- All the samples meet the desirable standards (pH ranges from 7.08 to 7.81).
- TDS in samples ranges from 365.9 mg/L to 575.9 mg/L. All the samples meet the permissible limit of 2000 mg/L.
- Total Hardness in the water ranges from 230.8 mg/L to 336.6 mg/L. All the samples meet the permissible limit of 600 mg/L.
- Calcium content in the water ranges from 44.01 mg/L to 92.9 mg/L all the samples meet the permissible limit of 200 mg/L.
- Magnesium content in the water ranges from 25.1 mg/L to 42.12 mg/L. All the samples meet the permissible limit of 100 mg/L.
- Sulphate content in the water ranges from 34.9 mg/L to 42.84 mg/L. The permissible limit of Sulphate is 400 mg/L for drinking water.
- Total alkalinity in the water samples ranges from 134.4 mg/L to 254.8 mg/L. All the samples are within the permissible limit of drinking water (600 mg/L).
- Chloride ranges from 96.4 mg/L to 135.7 mg/L. Which are below permissible limits (1000 mg/L).

The results of ground water samples were compared with Indian Standard Specification of drinking water IS: 10500:2012. Some of analysed parameters in ground water samples meet acceptable limit however all the analyzed parameters are meeting permissible limit in the absence of alternate source as per Indian Standard Specification of drinking water IS: 10500:2012. The ground water resources in the study area were found fit for drinking purpose.

2.3 AIR ENVIRONMENT

08 AAQM stations were selected during the study period of March 2022 to May 2022..

Observation of Ambient Air Quality (March 2022 to May 2022.)

Particulate Matter (PM10)

The maximum and minimum concentrations for PM10 were recorded as 198.74µg/m3 and 125.76µg/m3, respectively. The maximum concentration of PM10 was recorded at the (AAQ1) Project Site and minimum concentration was observed at (AAQ8) Middle School, Katauna. The average concentrations range between 148.25µg/m3 to 171.82µg/m3. 98th percentile values for PM10 during study period range between 172.74µg/m3 to 198.45µg/m3.

Fine Particulate Matter (PM2.5)

The maximum and minimum concentrations for PM2.5 were recorded as 127.89µg/m3 and 70.63µg/m3, respectively. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ5) Daffodils School. The average concentrations range between 79.18µg/m3 to 96.84µg/m3 was recorded. 98th percentile values for PM2.5 during study period range between 93.79µg/m3 to 126.25µg/m3.

Nitrogen Oxide (NO2)

The maximum and minimum NO2 concentrations were recorded as 45.90µg/m3 and 21.76µg/m3. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ6) Baikathpur. The average values for NO2 were observed in the range between 24.25µg/m3 to 39.01µg/m3. 98th percentile values for NO2 during study period range between 27.22µg/m3 to 45.39µg/m3.

Sulphur Dioxide (SO2)

The maximum and minimum SO2 concentrations were recorded as 18.50µg/m3 and 9.40µg/m3. The maximum concentration was recorded at (AAQ4) Middle School, Jafrabad and the minimum concentration was recorded at (AAQ3) High School, Chandpura. The average values for SO2 were observed in the range between 11.73µg/m3 to 14.49µg/m3. 98th percentile values for SO2 during

study period range between 14.21µg/m3 to 17.78µg/m3.

Carbon Monoxide (CO)

The maximum and minimum CO concentrations were recorded as 5.12mg/m3 and 0.85mg/m3. The maximum concentration was recorded at (AAQ8) Middle School, Katauna and the minimum concentration was recorded at (AAQ7) Rasulpur, Kurtha. The average values for CO were observed in the range between 1.53mg/m3 to 2.74mg/m3. 98th percentile values for CO during study period range between 3.06mg/m3 to 4.34 mg/m3.

2.4 Noise Environment: Noise samples were collected from 8 locations during the study period of March 2022 to May 2022.

Observations

- **Day Time:** The noise levels varied in the study area during day time from 44.1dB (A) Leq to 68.5dB (A) Leq. The maximum concentration was recorded at (NQ1) Project Site and the minimum concentration was recorded at (NQ3) High School, Chandpura. The day time noise level in the study area is within the noise Limit.
- **Night Time:** The night time noise level in the study area is in the range of 36.1dB (A) Leq to 57.3dB (A) Leq. The maximum concentration was recorded at (NQ1) Project Site and the minimum concentration was recorded at (NQ7) Rasulpur, Kurtha. The night time noise was also within stipulated standards of CPCB.

Ecology & Biodiversity

Primary data collection was carried out in the immediate project area from March 2022 to May 2022 representing the Pre- Monsoon season.

There are no wildlife sanctuaries/parks within 10 km of the project site. The area does not record the presence of any critically threatened species. The records of Botanical Survey of India also do not indicate presence of any endemic or vulnerable species in this area.

Tree species present in and around the project site are Amrud, Bargad, Gulmohar, Curry Tree, Mango, mahua, amla, jamun, Ashok, Banana etc.

Fauna in study area are such as leopard, Rat, Cow, Dog, Goat, Buffalo, squirrel etc.

2.5 Socio-Economic Environment

Patna ranks 1st in terms of population (58,38,465) and 9th in terms of area (3,202 sq.km.) in the state of Bihar. In terms of population per sq.km. Patna is the 2nd densely populated district in the state with 1,823 persons per sq.km as against the state's1,106. Patna ranks 32th in terms of sex-ratio (897) against the state's 918. Patna ranks 37th in terms of child sex-ratio (909) against state's 935. There are

124 uninhabited villages (out of 1,388 total villages) in the district of Patna. The comparative study of the respective census survey is as below:

The total population of the study area is 8978, where the percentage of the male and female is respectively 52% and 48%. The literate population of the study area is 4170 where 2566 are male and 1604 are female. In 2011, 19.43% of the population was from SC category .

3 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

The impact identification and prediction process aim to:

- Identify potential source or cause of impact throughout the life of project
- Characterize the potential impacts affecting the social, economic and environmental attributes
- Assess the potential of negative environmental impact due to the project and its mitigation through Environmental Management Plan (EMP)
- Prediction of the impacts due to the development, construction and functional activities encompass the developmental processes to be undertaken during construction and functional phases.

3.1 Impacts on Land Environment

During Construction Phase: Minor site excavation will be envisaged during modification construction of the units. The activities causing no potential impact during construction phase on land use include leveling of site, construction of related structures and installation of equipment and movement of heavy machineries and vehicle.

During Operation Phase: During operation phase, the activities of proposed plant will not change the soil quality. The waste generated from the plant is generally of use on another sites like slag are used in land fill depressed sites, the iron powder generated due to scratch is generally sold to cement factories.

Mitigation measures: Excavated soil during construction phase will be suitably used for land filling in low lying areas. The top soil will be preserved and used for landscaping purposes and whatever solid wastes get generated will be disposed of as either in recovery of iron or used as sand in road construction or recovery of precious/more valuable metals. Other solid waste is sold to market as low value products.

3.2 Impact on Air environment

During Construction Phase: During the construction phase, dust (particulate matter) is expected to be emitted due to movement of vehicle on the haul roads and material handling. Vehicular emission of SO2, NO2, CO will add onto the air pollution. Operation of DG sets will generate air pollutants like SO2, NO2, CO.

During operation phase: During the operation phase, there are four major categories of sources of air pollutants, they are:

❖ Emissions from manufacturing processes/furnace

- ❖ Fugitive emissions from material handling
- ❖ Emissions (NOx, CO and PM) from vehicular movement
- ❖ Emissions (NOx, CO and PM) from Diesel Generator Set

Mitigation measure:

- Proper maintenance of vehicles and construction equipment will help in controlling the gaseous emissions.
- Water sprinkling on roads and construction site will prevent fugitive dust.
- Over loading of the trucks will be avoided.
- Haulage roads, which are used for transportation of material, will be paved.
- People working in and around the dust generating area, will be provided with Personal Protective Equipment (PPE) like dust mask to prevent inhalation of dust particles, and use of the same will be strictly enforced during working hours.
- Adequate greenbelt development along the road side and in the plant premises will help in providing dust suppression.
- While the major source of emission will be from induction furnace area so an air pollution control equipment will be installed.
- A bag filter along with the spark arrestor used to install to control the air pollution emitted from plant.

3.3 Impact of the Transportation and Mitigation Measures

Impact on Air Environment

- ✓ The movement of heavy vehicles due to transportation of raw material causes re- suspension of loose dust particles in air
- ✓ Increase in PM_{10}, SO_2, CO and NO_2 levels due to burning of fossil fuels.

Mitigation Measures:

- ✓ Sprinkling of water to reduce fugitive particulate matter concentration.
- ✓ Vehicle shall be thoroughly covered so as to prevent release of fine particulate in case of accidental leakage.
- ✓ Vehicle used for transportation shall comply with environmental standards and only vehicles having Pollution under Control certificate will be put into use.

Impact on Land Environment:

During accidental leakage due to puncture of carry bags, containers, deposition of material on top soil, land is possibility.

Mitigation Measure:

- ✓ Vehicles shall be covered to prevent accidental leakage.
- ✓ The area got contaminated shall be remediated through scrapping or the measures.

Impact and Mitigation on Traffic Density:

- ✓ The movement of vehicles will increase traffic density of the area.
- ✓ However, the proximity of major road will alleviate possible congestion problems.

3.4 Impacts on Noise and Vibration

Operation of machineries like conveyor, rotating machines during operation and DG sets will result in generation of noise and vibration. Movement of vehicles will also contribute to noise though the generated noise will be insignificant.

Mitigation Measures

- Heavy machineries and DG sets will be operated during day time only.
- The machineries to be used will be serviced and maintained to control generation of noise and vibration.
- Vehicles used for transportation will be serviced regularly and maintained properly to avoid any generation of unwanted noise.
- Employees working in noisy environment will be made mandatory to wear ear muffs/ear plugs.

3.5 Impacts on Water Environment

Total 51.5 KLD water will be used, in which 45 KLD will be used for the industrial purpose and 6.5 KLD water will be used as daily fresh water for domestic purposes. Domestic waste water will be generated and send to septic tank followed by soak pit.

Mitigation Measures

The sewage generated during the construction and operation phases will not be drained outside the premises but to be collected in a settling tank and recycled. The water used for cooling the kilns will be collected in tank and passed through cooling tower and will be reused for green belt development.

3.6 Impacts on Biological Environment

Construction activities at the site involving human and vehicular movement will disturb aril and wild animals in the area. The impact on terrestrial ecology may be due to gaseous pollutants likely to emit i.e. particulate matter, Sulphur dioxide (SO_2), Oxides of nitrogen (NOx), etc.

Mitigation measures:

- Vehicular movement during night will be restricted to avoid adverse sound related impacts to birds and wild animals in the region.
- Plantation is carried out to attenuate the dust pollution in the area. Green belt and greenery will be developed in the premise covering more than 33% of area.
- The project activities are restricted to the project site except the transportation of raw material and products.
- There is no discharge of solid or liquid wastes to the environment.

3.7 Impact on Socio-Economic Environment

Positive Impact:

- No Rehabilitation
- Increase in Job Opportunities
- No burden in the existing Infrastructure Facilities
- Improvement in Infrastructure

Adverse Impacts:

- Impacts on Human Health
- Impacts on Agriculture

Mitigation Measures of Socio-Economic Environment

- Periodic health checkup camps, blood donation camps shall be organized by project authority for villagers, contract laborers, employees and their family in nearby villages.
- Awareness programs shall be arranged on health, hygiene and sanitation.
- Apart from the normal health check-up, emphasis shall also be given to prevent specific diseases originating due to emission of different pollutants such as respiratory ailments, skin problems, water borne diseases, hearing abilities etc.
- Job oriented training courses will be organized through industrial/technical training institutions for educated youth like electrical, tailoring, plumbing, type writing, shorthand and machine repairing, welding fabrication, and other skill developing trades.
- Whenever necessary, collaboration between project authority and local bodies will be done on regular basis with an objective to build and maintain a good relationship which is necessary for smooth functioning of the project as well as progress and welfare of the people in the study area
- Awareness programs will be taken to make people aware about the environmental protection, need of water conservation etc.
- At the work place, first aid facilities shall be maintained at a readily accessible place with necessary appliances including sterilized cotton wool etc. Ambulance facility shall also be provided during emergency
- Sufficient supply of water fit for drinking shall be provided at suitable places.
- Sanitary facilities shall be provided at accessible place within the work zone and kept in a good condition.

3.8 Rain Water Harvesting

Depending upon the available contours at detailed engineering stage, the number of drainage outfall and extent of open drains etc. will be designed so as to discharge the water to the rainwater harvesting pond for reuse in dust suppression & greenbelt development. A rainwater harvesting pond of capacity 150 m^3 will be made to collect rainwater.

4 ENVIRONMENT MONITORING PLAN

The following will be monitored on a regular basis during operation phase to ensure that a high level of environmental performance is maintained:

- Ambient air monitoring of PM2.5, PM10, SO2, NOx, CO will be carried out during the operational phase within site premises and nearby villages, location of downwind direction, and once every season.
- Groundwater sample from site or nearby location once every season.
- Post project sampling and effect on baseline data generated during construction and operation;
- The general effectiveness of pollution control measures shall also be monitored.

Environmental Monitoring Plan during Construction Phase

Attribute	Location & Frequency	Parameter
Air	At major construction sites (total 2stations); Monthly	PM10, PM2.5, SO2 and NOx
Noise	At major construction site and near generator set; Monthly	Equivalent noise level
Ground Water	Three locations –within plant area and nearest well outside plant area; Seasonal	Parameters as per CPCB standards

Environmental Monitoring Plan during Operation Phase

Attribute	Location & Frequency	Parameter
Air	Ambient air at work zone area and at entrance (total 2stations); Monthly	PM10, PM2.5, SO2 and NOx
	Stack monitoring	SPM & RSPM
Noise	At work zone area and at entrance (total 2 stations); Monthly	Equivalent noise level
GroundWater	Three locations –within plant area and nearest well outside plant area; Seasonally	Parameters as per CPCB standards
Soil	Three locations - one location within plant area and two locations around the project site within 200 m distance from the unit; Annually	pH, moisture content, texture, organic matter, chloride, SAR, CEC, nitrogen, phosphorous, fluoride, sulphur
Storm Water	One location per season – Once in monsoon	Parameters as per CPCB standards
Occupational Health	Half yearly	General and respiratory and liver ailments check up

5 ADDTIONAL STUDIES

5.1 Risk Assessment

The objectives of environmental risk assessment are governed by the following which excludes

for measure.

- Identifying the potentially hazardous areas so that adequate design safety measures can be adopted to reduce the likelihood of accidental events.
- Identifying the stakeholders and evaluating their risk along with proposing adequate control techniques.
- Identifying the probable areas of environmental disaster which can be prevented by appropriate design of the installation and its controlled operation.
- Managing and emergency situation or a disastrous event if any, during the plant operation.

Hazard Identification of the Steel Plant

Group	**Item**	**Nature of hazard**	**Hazard of Potential**	**Remarks**
Raw materials Management	Water treatment chemicals like acids/alkalis	Toxic	Major	Bio-corrosive
	Lube oils/greases	Fire	Moderate	Flammable
Production units				
Agglomeration	Dusts	Respiratory	Moderate	Air pollution
Iron making in BF	Release of untreated wastewater	Toxic	Major	Severe pollution of surface water
	BFG handling	Fire	Major	Fire hazard
	Hot metal & slag Handling	Heath	Major	Fire hazard
Steel making in LD shops	Release of untreated wastewater	Toxic	Major	Severe pollution of surface water
	LD gas handling	Fire	Major	Fire & CO hazard
	Hot liquid steel & slag handling	Heath	Major	Fire hazard
Rolling Mills	Gas firing	Fire	Major	Fire hazard
	Release of untreated Waste water	Toxic	Major	Severe pollution of surface water
Captive Power Plant		Fire	Major	Fire hazard
Utilities				
Fuel gas	Gas leaks	Fire & Toxic	Major	Fire & CO hazard
Electric Power supply	Short circuit	Fire	Major	Fire hazard
Liquid fuel	Fuel handling & storage area	Fire & Toxic	Major	Fire & CO hazard
Hydraulic oil and lubricants	Accidental discharge of hydraulic oil under pressure	Fire & Toxic	Moderate	Fire & personal injury

Hazard Identification and Precautionary Measures

Sr. No	Operation process Equipment /areas	Possible Hazardous	Precautionary measures	Measures to be taken if any hazard occurs
1.	Electrical Panel	Electrical Shock possible due to short-circuit.	Earth leakage circuit breaker is installed	In an event of electric leakage main supply should be immediately shut off.
2.	Furnaces	Fire hazards caused by flames	1. Emergency kit is kept readily available in storeand working place. 2. Fire-fighting equipment powder/Foam type extinguishers are kept readily available. 3. Hydrant system provided at conspicuous place. 4. Fire-fighting trained man is employed. 5. Periodic inspection done to avoid accident ofany kind.	Fire Extinguisher & Hydrant at suitable location
3.	Electrical transformer	Electrical power	Shock proof insulated PCC Platform.	Immediate Cut off the power supply, treat the injured for electrical shock
		Fire 1	Firefighting equipment: I. Sand buckets. II. Fire extinguisher.	Immediately fight fire with available resources, summon outside help if necessary
4.	Diesel Oil/ Transformer Oil etc.storage.	Fire hazard may be possible if directly omes in contact.	Fire proof system made available and fighting equipment like Foam, extinguishers and hydrant system, etc., are kept	Proper care is to be takenwhile storing and keeping the oil drums.
5.	Chemicals Storage area	In case of bottle breakage, causes burns and damage to respirator systems due to inhalation	1. Proper care should be taken while handling thechemicals. 2. First Aid Box should be available at Site with all necessary and required medicines. 3. Firefighting equipment like Extinguishers, sand buckets should be available always	Instruction Boards to be displaced for knowledge of other workers to take care of the situation in the event of occurrence.

Summary of Recommended Personal ProtectiveEquipment According to Hazard

	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, gases or vapors, light radiation	Safety glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords	Hard plastic helmets for top and side impact protection
Hearing protection	Noisy Areas	Hearing protectors (ear plugs or earmuffs)
Foot protection	Failing or rolling objects, pointsobjects. Corrosive or hot liquids	Safety shoes and boots for protection against moving and failing objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic material (Neoprene), leather, steel, insulation materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors	Facemasks with appropriate filters for dust removal and air purification (chemical, mists, vapors and gases). Single or multi-gas personal monitors, if available
	Oxygen deficiency	Portable or supplied air (fixed lines). Onsite rescue equipment
Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration	Insulating clothing, body suits, aprons etc. of appropriate materials

Occupational Health& Safety

M/s Kaalendi Ventures LLP believes in Safety First and is concerned with protecting safety, health & welfare of the people engaged in work or employment.

The following safety measures for the employees shall be implemented:

- Safety training is provided to the employees.
- Manual call bell in case of emergency is provided.
- Fire alarms are provided.
- First aid facility and trainings are provided.
- Personal protective gears and equipment's are provided to the employees.
- Health checkups are organized at regular intervals and records are maintained.
- Fire Protection System by means of providing Fire hydrants, Fire Extinguisher at vulnerable points within the plant has been envisaged.

- Cleanliness facilities, rest room, plenty Plant Lightning is also envisaged for the proposed project

6 PROJECT BENEFITS

- Physical Infrastructure

- Employment Opportunities
- Indirect employment
- Social Infrastructure

7 ENVIRONMENTAL MANAGEMENT PLAN

- Pollution control/mitigation measures for abatement of the undesirable impacts caused during the construction and operation phase.
- Details of management plans (Greenbelt development plan, Waste management plan etc.)
- Institutional set up identified/recommended for implementation of the EMP.
- Post project environmental monitoring programme to be undertaken.
- Pursuing for funds allocation and expending the same for EMP.

Environmental Monitoring Cost

S.No	Title	Capital Cost Rs. Lacs	Recurring Cost Rs. Lacs (Annum)
1	Air Pollution Control	60.0	7.0
2.	Water Pollution Control/sewage Treatment Plant	5.0	1.5
3.	Noise Pollution Control (Including cost of Landscaping, Green Belt)	5.0	3.0
4.	Solid Waste Management	10.0	1.0
5.	Environment Monitoring and Management (Including Establishment of Laboratory)	15.0	2.0
6.	RWH & Drainage	10.0	2.00
7.	Miscellaneous (Appointment of Consultants, occupational health & safety measure)	1.0	2.0
	Total	106	18.5

Conclusion

Certain levels of impacts are predicted in the proposed project. These impacts are reduced by mitigative measures implemented in the project area. Apart from these impacts' certain beneficial effects in terms of providing employment opportunities and development of surrounding plant area is foreseen. This will produce multiple effects on the life and economy of the local people.

The project activities involved in the construction and operation phase are identified. For identification of impacts, the interaction between the project activities and different components of environment were detailed and are classified phase wise.

In the constructional phase, the transportation of construction material could have an impact, especially on air, noise, vibration. However, since the proposed project is surrounded with industries and well-maintained infrastructure facilities, even this impact is minimal and temporary. The noxious emission arising out of the various systems will be taken care by a bag filters and waste water generated if any will be recycled in the manufacturing process.

During the operational phase, there could be minor change in air quality. Transportation of raw material, storage and handling of material and the production process could cause a disturbance to environment variables which will be prevented with the proposed mitigation measures. The noxious emission arising out of the various systems will be taken care by APCD system and waste water generated if any will be recycled in the manufacturing process. The evolved gases with dust from the Induction Furnaces will be cleaned in high efficiency Pulse jet type bag filters and the collected dust will again be used for recovery of Zinc before finally disposing of to the TSDF. Similarly, metal will be extracted from the slag generated before sending the slag for filling low lying areas or using the same as sand in road metaling or pebbles making. There is no waste water/ liquid discharges and the plant will follow ZLD.

With respect to occupational health, minimal impacts are anticipated on the health of the employees during operation phase. The project site is already established there are no issues related to Resettlement and Rehabilitation. The company has proposed to create green belt inside the project area premises along with development of rainwater harvesting system inside the plant premises.

The project will generate employment opportunities among the local peoples which will provide a handsome support in improving the living standard.

Thus, it can be concluded that with the judicious and proper implementation of the pollution control and mitigation measures, and it is very pertinent that with the judicious implementation of the Environment Management Plan the proposed project will be beneficial to the society and will help reduce the demand-supply gap of steel and will contribute to the economic development of the region in particular and country in general.

कार्यकारी सारांश

मेसर्स कालिंदी वेंचर्स एल.एल.पी. मौजा – खिरोधारपुर, तहसिल - फतुहा,

जिला – पटना, राज्य - बिहार।

पर्यावरण सलाहकार
रियान एनवायरो प्राइवेट लिमिटेड,
एच/ओ- 202 और 402, मंगल मार्केट, राजा बाजार, शेखपुरा, पटना।

मेसर्स कालिंदी वेंचर्स एल.एल.पी. की ड्राफ्ट ईआईए रिपोर्ट। एमएस बिलेट की प्रस्तावित क्षमता (90,000 MTPA), M.S पाईप (ट्यूब) (20,000 MTPA), सटर प्रोफाईल (2000 MTPA) और TMT Bar – 68,000 MTPA	ड्राफ्ट ईआईए रिपोर्ट

कार्यकारी सारांश

1. परिचय

मेसर्स कालिंदी वेंचर्स एल.एल.पी. एक मौजूदा स्टील आधारित औद्योगिक इकाई है, जिसका पंजीकृत कार्यालय मौजा – खिरोधारपुर, फतुहा, जिला – पटना, राज्य – बिहार में है । कंपनी के पास 9.196 एकड़ की कुल पट्टे वाली भूमि है । M.S बिलेट की प्रस्तावित क्षमता (90,000 MTPA), M.S पाईप (ट्यूब) (20,000 MTPA), सटर प्रोफाईल (2000 MTPA) और TMT Bar – 68,000 MTPA.

परियोजना विवरण

EIA अधिसूचना, 2006 के अनुसार प्रस्तावित परियोजना, योजना को MoEF & CC, से "पर्यावरण मंजूरी" की आवश्यकता है । परियोजना को "सामान्य स्थितियों" (द्वितीयक धातुकर्म प्रसंस्करण औद्योगिक इकाइयों, भट्ठी के संचालन के कारण श्रेणी बी के तहत वर्गीकृत किया गया है । 30,000 TPA से अधिक की क्षमता वाले इंडक्शन फर्नेस के रूप में इसे EIA अधिसूचना की अनुसूची के मद 3 (ए) के रूप में सूचीबद्ध है।

परियोजना का संक्षिप्त विवरण नीचे दिया गया है :

- **परियोजना की पहचान :** परियोजना धातुकर्म उद्योग (द्वितीयक धातुकर्म प्रसंस्करण) मद 3 (ए) के अंतर्गत आती है।

परियोजना की प्रकृति का संक्षिप्त विवरण : यूनिट की प्रस्तावित क्षमता (90,000 MTPA) M.S बिलेट, M.S पाईप (ट्यूब) (20,000 MTPA), सटर प्रोफाईल (2000 MTPA) और TMT Bar – 68,000 MTPA.

- **कुल प्लॉट क्षेत्र :** 9.196 एकड़ ।
- **स्थान :** मौजा – खिरोधारपुर, तहसिल – फतुहा, जिला – पटना, राज्य – बिहार ।
- **पानी की आवश्यकता :** प्रस्तावित परियोजना हेतु बोरवेल से पानी लिया जाएगा (CGWA से अनुमति मिलने के उपरांत) कुल प्रक्रिया में पानी की आवश्यकता 51.5 KLD जबकि 45 KLD पानी औद्योगिक उद्येश्य के रूप में और 6.5 KLD घरेलू उपयोग के लिए किया जाएगा।
- **अपशिष्ट जल:** उत्पन्न अपशिष्ट जल को सेप्टिक टैंक में भेजा जाएगा और उसके बाद सोक पिट में भेजा जाएगा, इसलिए सीवेज का कोई उपयोग नहीं होगा । परियोजना गतिविधि में ठंडा करने के उद्देश्य से 45 KLD पानी की मात्रा को पुन: परिचालित किया जाएगा । कॉइल को ठंडा करने के लिए उपयोग किए जाने वाले पानी को ठंढा करने के बाद उपयोग किया जाएगा ।
- **मैन पावर :** लगभग 100 लोग।

- **बिजली / बिजली की आवश्यकता :** निर्माण और परिचालन चरण के दौरान अतिरिक्त संयंत्र और मशीनरी को चलाने के लिए कुल बिजली लोड 12400 KVA बिजली की विफलता के मामले में 500 KVA क्षमता के 1 DG सेट का उपयोग किया जाएगा।
- **परियोजना की लागत :** परियोजना की अनुमानित लागत लगभग रु. 38.3 करोड़ ।

1.1 प्रौद्योगिकी और प्रक्रिया विवरण

MS बिलेट्स का निर्माण स्पंज आयरन और MS स्क्रैप को इंडक्शन फर्नेस में पिघलाकर किया जाता है और बिलेट प्राप्त करने के लिए कास्ट आयरन मोल्ड्स में डाला जाता है । MS बिलेट्स के निर्माण के लिए आवश्यक कच्चे माल खुले बाजार से प्राप्त होते हैं । स्टॉक यार्ड से आवश्यक मात्रा में MS स्क्रैप को ट्रकों के माध्यम से फर्नेस यार्ड में इलेक्ट्रो मैग्नेट और क्रेन द्वारा फर्नेस में फीड किया जाता है।

1.2 ठोस अपशिष्ट

ठोस कचरे में शामिल होंगे ;

a) **स्लैग @~9500 TPA - भवन निर्माण सामग्री के रूप में पुन: प्रयोज्य (विशेषकर सड़क निर्माण में) ।**
b) **मिल स्केल @13500 TPA - कचरे का वाणिज्यिक मूल्य है और इसे अधिकृत रिसाइकलरो (Recyclers) को बेचा जाएगा ।**

खतरनाक अपशिष्ट

खतरनाक कचरे में शामिल होंगे;

a) **डिवाइस वायु प्रदूषण नियंत्रण उपकरण @ 600 TPA (अनुसूची - I 35.1 की श्रेणी) कचरे को राज्य की आम खतरनाक अपशिष्ट निपटान सुविधा के माध्यम से निपटाने से पहले HDPE बैग में संग्रहीत किया जाएगा।**
b) **अपशिष्ट / प्रयुक्त तेल / स्नेहक @ 02-0.3 KL/Year (अनुसूची - I की श्रेणी 5.1) authorized recyclers के माध्यम से निपटाने से पहले कचरे को एक बंद कमरे में संग्रहीत किया जाएगा ।**

2 पर्यावरण का विवरण

पर्यावरण आधारभूत डेटा संग्रह : क्षेत्र के वर्तमान परिदृश्य का आकलन करने के लिए प्री मानसून के मौसम (मार्च 2022 से मई 2022) के दौरान प्रस्तावित परियोजना के लिए आधारभूत डेटा एकत्र किया गया था ।

2.1 मृदा पर्यावरण

मिट्टी के नमूने के लिए अध्ययन क्षेत्र में आठ स्थानों का चयन किया गया था।

फील्ड डेटा, भौतिक और रासायनिक डेटा की व्याख्या से यह निष्कर्ष निकाला जा सकता है कि :

भौतिक आंकड़ों के अनुसार मिट्टी की संरचना मोटी से महीन बनावट है, अनिवार्य रूप से मध्यम जल धारण क्षमता वाले है । भौतिक लक्षणों के अनुसार मिट्टी को कृषि के लिए मध्यम रूप से अच्छा माना जाता है । रासायनिक लक्षणों के अनुसार मिट्टी की pH थोड़ी क्षारीय है और फसल की वृद्धि के लिए सामान्य होती है । जैव कार्बन पर्याप्त से अधिक है । नाइट्रोजन जैसे मैक्रो पोषक तत्व कम होते हैं ।

2.2 जल पर्यावरण

2.2.1 ऊपरी तह का पानी

मार्च 2022 से मई 2022 की अध्ययन अवधि के दौरान 08 स्थानों से सतही जल के नमूने एकत्र किए गए और कई भौतिक-रासायनिक मापदंडों का विश्लेषण किया गया।

सतही जल की गुणवत्ता की व्याख्या

- pH 7.4-8.12 की सीमा में देखा गया, जिसमें न्यूनतम तालाब (SW8) और अधिकतम (SW1) गंगा नदी (डाउनस्ट्रीम) में था ।
- TDS 218.2-664.8 mg/L की सीमा में देखा गया, जिसमें न्यूनतम तालाब (SW8) और अधिकतम तालाब संख्या 7 पर था।
- COD 15.5-32.6 mg/L की सीमा में था जिसमें न्यूनतम तालाब (SW7) (अपस्ट्रीम) और अधिकतम फाल्गू नदी (SW4) में था।
- BOD 3.19-5.40 mg/L की सीमा में था जिसमें न्यूनतम नदी (SW5) और अधिकतम पुनपुन नदी (अपस्ट्रीम) (SW3) में था।

2.2.2 भूजल

मार्च 2022 से मई 2022 की अध्ययन अवधि के दौरान 08 स्थानों से भूजल के नमूने एकत्र किए गए ।

भूजल गुणवत्ता की व्याख्या

- सभी नमूने रंगहीन है जो वांछनीय मानदंडों को पूरा करते है (<5 हेज़ेन)
- सभी नमूने के (pH 7.08 से 7.81) तक है जो कि वांछनीय मानक को पूरा करता है
- TDS नमूनों में S 365.9mg/L से 575.9mg/L तक है, सभी नमूने 2000 mg/L की अनुमेय सीमा को पूरा करते हैं
- पानी में कठोरता 230.8mg/L से 336.6mg/L तक पाई गई, सभी नमूने 600 mg/L की अनुमेय सीमा के अंतर्गत हैं
- पानी में कैल्शियम की मात्रा 44.01mg/L से लेकर 92.9mg/L तक पाई गई, सभी नमूने 200 mg/L की अनुमेय सीमा के अंतर्गत हैं
- पानी में Magnesium की मात्रा 25.1mg/L से लेकर 42.12mg/L तक पाई गई, सभी नमूने 100mg/L की अनुमेय सीमा के अंतर्गत हैं
- पानी में Sulphate की मात्रा 34.9mg/L से 42.84mg/L तक पाई गई, पीने के पानी के लिए सल्फेट की अनुमेय सीमा 400 mg/L है
- पानी के नमूनों में अल क्षारीयता 134.4mg/L से 254.8mg/L अनुमेय सीमा को पूरा करते हैं, सभी नमूने पीने के पानी (600 mg/L) की अनुमेय सीमा के भीतर हैं
- क्लोराइड 96.4mg/L से 135.7mg/L तक पाई गई, जो अनुमेय सीमा से नीचे हैं (1000 mg/L).

भूजल के नमूनों के परिणामों की तुलना पेयजल के भारतीय मानक विनिर्देश IS:10500:2012. से की गई, भूजल के नमूनों में कुछ विश्लेषण किए गए पैरामीटर स्वीकार्य सीमा को पूरा करते हैं, अध्ययन क्षेत्र में भूजल संसाधनों को पीने के लिए उपयुक्त पाया गया

2.3 वायु पर्यावरण

मार्च 2022 से मई 2022 की अध्ययन अवधि में अध्ययन हेतु 08 AQM स्टेशनों का चयन किया गया था ।

परिवेशी वायु गुणवत्ता का अवलोकन

फाइन पार्टिकुलेट मैटर (PM10)

PM10 की अधिकतम और न्यूनतम सांद्रता क्रमशः 198.74µg/m3 और 125.76µg/m3 दर्ज की गई । अधिकतम एकाग्रता (AAQ1) परियोजना स्थल पर दर्ज की गई और न्यूनतम एकाग्रता (AAQ8) मध्य विधालय, कटौना में दर्ज की गई । औसत सांद्रता 148.25µg/m3 से 171.82µg/m3 के बीच दर्ज की गई थी । अध्ययन अवधि के दौरान PM10 के लिए अनुमेय मानक के अंतर्गत है। 98वां प्रतिशतक मान 172.74µg/m3 से 198.45µg/m3 के बीच है ।

फाइन पार्टिकुलेट मैटर (PM2.5)

PM2.5 की अधिकतम और न्यूनतम सांद्रता क्रमशः 127.89µg/m3 और 125.76µg/m3 दर्ज की गई । अधिकतम एकाग्रता (AAQ8) परियोजना स्थल मध्य विधालय, कटौना में दर्ज की गई और न्यूनतम एकाग्रता (AAQ5) डैफोडिल स्कूल, में दर्ज की गई । औसत सांद्रता 79.18µg/m3 से 96.84µg/m3 के बीच दर्ज की गई । अध्ययन अवधि के दौरान PM2.5 के लिए 98वां प्रतिशतक मान 93.79µg/m3 से 126.25µg/m3 के बीच है ।

नाइट्रोजन ऑक्साइड (NO2)

अधिकतम और न्यूनतम NO2 सांद्रता 45.90µg/m3 and 21.76µg/m3 के रूप में दर्ज की गई है । अधिकतम सांद्रता (AAQ8) परियोजना स्थल मध्य विधालय कटौना में दर्ज की गई और न्यूनतम सांद्रता (AAQ6) बैकठपुर में दर्ज की गई । NO2 का औसत मान 24.25µg/m3 से 39.01µg/m3 के बीच की सीमा में देखा गया । अध्ययन अवधि के दौरान NO2 के लिए 98वां प्रतिशतक मान 27.22µg/m3 से 45.39µg/m3 के बीच होता है ।

सल्फर डाइऑक्साइड (SO2)

अधिकतम और न्यूनतम SO2 सांद्रता 18.50µg/m3 और 9.40µg/m3 के रूप में दर्ज की गई । अधिकतम सांद्रता (AAQ4) मध्य विधालय जाफराबाद में दर्ज की गई और न्यूनतम सांद्रता (AAQ3) उच्च विधालय चांदपुरा में दर्ज की गई । SO2 का औसत मान 11.73µg/m3 से 14.49µg/m3 के बीच की सीमा में देखा गया । अध्ययन अवधि के दौरान SO2 के लिए 98वां प्रतिशतक मान 14.21µg/m3 से 17.78µg/m3 के बीच होता है ।

कार्बन मोनोऑक्साइड (CO)

अधिकतम और न्यूनतम CO सांद्रता 5.12mg/m3 और 0.85mg/m3 के रूप में दर्ज की गई है । अधिकतम सांद्रता (AAQ8) मध्य विधालय कटौना में दर्ज की गई और न्यूनतम सांद्रता (AAQ7) परियोजना स्थल रसूलपुर कुर्था में दर्ज की गई । CO का औसत मान 1.53mg/m3 से 2.74mg/m3 की सीमा में देखा गया । अध्ययन अवधि के दौरान CO के लिए 98 वाँ शतमक मान 3.06 mg/m3 से 4.34mg/m3 के बीच होता है ।

2.4 ध्वनि पर्यावरण : मार्च 2022 से मई 2022 की अध्ययन अवधि के दौरान 8 स्थानों से ध्वनि के नमूने एकत्र किए गए थे।

टिप्पणियों

- **दिन का समय :** दिन के समय अध्ययन क्षेत्र में ध्वनि का स्तर 44.1dB (A) Leq से 68.5dB (A) Leq के मध्य पाया गया । अधिकतम सांद्रता (NQ1) परियोजना स्थल दर्ज की गई और न्यूनतम सांद्रता (NQ1) उच्च विधालय चांदपुरा में दर्ज की गई । अध्ययन क्षेत्र में दिन के समय ध्वनि स्तर ध्वनि सीमा के भीतर है ।
- **रात का समय :** अध्ययन क्षेत्र में रात के समय ध्वनि स्तर 36.1dB (A) Leq से 57.3dB (A) Leq के बीच है । अधिकतम सांद्रता (NQ1) परियोजना स्थल पर दर्ज की गई और न्यूनतम सांद्रता (NQ7) रसूलपुर कुर्था में दर्ज की गई । रात का ध्वनि भी CPCB के निर्धारित मानकों के भीतर था ।

2.5 पारिस्थितिकी और जैव विविधता

सर्दियों के मौसम का प्रतिनिधित्व करते हुए मार्च 2022 से मई 2022 तक तत्काल परियोजना क्षेत्र में प्राथमिक डेटा संग्रह किया गया था ।

वन्यजीव अभ्यारण्य/पार्क परियोजना स्थल के 10 Km के भीतर हैं । परियोजना स्थल और उसके आसपास मौजूद पेड़ प्रजातियां अमरूद, बरगद, गुलमोहर, करी पेंड़, आम, महुआ, आंवला, जामुन, अशोक, केला आदि हैं ।

अध्ययन क्षेत्र में जीव जैसे तेंदुआ, चूहा, गाय, कुता, बकरी, भैस, गिलहरी आदि हैं।

2.6 सामाजिक-आर्थिक वातावरण

बिहार राज्य में जनसंख्या (58,38,465) के मामले में पटना प्रथम और क्षेत्रफल (3,202 वर्ग कि.मी.) के मामले में 9वें स्थान पर है। जनसंख्या के हिसाब से प्रति वर्ग किमी. राज्य के 1,106 के मुकाबले 1,823 व्यक्ति प्रति वर्ग किमी के साथ पटना राज्य का दूसरा घनी आबादी वाला जिला है। राज्य के 918 के मुकाबले पटना लिंगानुपात (897) के मामले में 32वें स्थान पर है। पटना राज्य के 935 के

मुकाबले बाल लिंगानुपात (909) के मामले में 37वें स्थान पर है। संबंधित जनगणना सर्वेक्षण का तुलनात्मक अध्ययन इस प्रकार है :

अध्ययन क्षेत्र की कुल जनसंख्या 8978 है, जहां पुरुष और महिला का प्रतिशत क्रमशः 52% और 48% है । अध्ययन क्षेत्र की साक्षर जनसंख्या 4170 है जिसमें 2566 पुरुष और 1604 महिलाएँ साक्षर हैं । 2011 में 19.43% जनसंख्या अनुसूचित जाति वर्ग से थी ।

3 प्रत्याशित पर्यावरणीय प्रभाव और शमन उपाय

प्रभाव पहचान और भविष्यवाणी प्रक्रिया का उद्देश्य है:

- परियोजना के पूरे अवधि में संभावित स्रोत या प्रभाव के कारण की पहचान करना।
- सामाजिक, आर्थिक और पर्यावरणीय विशेषताओं को प्रभावित करने वाले संभावित प्रभावों को चिह्नित करें।
- पर्यावरण प्रबंधन योजना (EMP) के माध्यम से परियोजना और इसके शमन के कारण नकारात्मक।
- पर्यावरणीय प्रभाव की संभावना का आकलन करें ।
- विकास, निर्माण और कार्यात्मक गतिविधियों के कारण होने वाले प्रभावों की भविष्यवाणी में निर्माण और कार्यात्मक चरणों के दौरान की जाने वाली विकासात्मक प्रक्रियाएं शामिल हैं ।

3.1 भूमि पर्यावरण पर प्रभाव

निर्माण चरण के दौरान भूमि उपयोग पर कोई संभावित प्रभाव नहीं डालने वाली गतिविधियों में साइट को समतल करना, संबंधित संरचनाओं का निर्माण और उपकरणों की स्थापना और भारी मशीनरी और वाहन की आवाजाही शामिल है ।

संचालन चरण के दौरान : संचालन चरण के दौरान, प्रस्तावित संयंत्र की गतिविधियों से मिट्टी की गुणवत्ता में कोई प्रभाव नही पड़ेगा । संयंत्र से उत्पन्न अपशिष्ट आमतौर पर अन्य साइटों पर उपयोग किया जाता है जैसे स्लैग का उपयोग लैंड फिल में किया जाता है, scratch के उपरांत जो लौह के पाउडर उत्पन्न होता है उसे सीमेंट कारखानों को बेचा जाता है ।

शमन उपाय : निर्माण चरण के दौरान खुदाई की गई मिट्टी का उपयोग निचले इलाकों में भूमि भरने के लिए किया जाएगा । ऊपरी मिट्टी को संरक्षित किया जाएगा जो भी ठोस अपशिष्ट उत्पन्न होगा उसे कम मूल्य के उत्पादों के रूप में बाजार में बेचा जाएगा ।

3.2 वायु पर्यावरण पर प्रभाव

निर्माण चरण के दौरान : निर्माण चरण के दौरान, हॉल सड़कों पर वाहन की आवाजाही और सामग्री के संचालन के कारण धूल (पार्टिकुलेट मैटर) उत्सर्जित होने की आशंका है । SO2, NO2, CO का वाहनों से उत्सर्जन वायु प्रदूषण में वृद्धि करेगा । डीजी सेट के संचालन से SO2, NO2, CO जैसे वायु प्रदूषक उत्पन्न होंगे।

संचालन चरण के दौरान: संचालन चरण के दौरान, वायु प्रदूषकों के स्रोतों की चार प्रमुख श्रेणियां हैं, वे हैं:

- विनिर्माण प्रक्रियाओं / भट्ठी से उत्सर्जन।
- माल / समान ढुलाई के समय होने वाले उत्सर्जन।
- वाहनों की आवाजाही से उत्सर्जन (NOx, CO and PM) ।
- डीजल जेनरेटर सेट से उत्सर्जन (NOx, CO and PM) ।

शमन उपाय:

- वाहनों और निर्माण उपकरणों के उचित रखरखाव से गैसीय उत्सर्जन को नियंत्रित करने में मदद मिलेगी।
- सड़कों और निर्माण स्थल पर पानी का छिड़काव करने से धूल को उड़ने से रोका जा सकेगा ।
- ट्रकों की ओवर लोडिंग से बचा जा सकेगा ।
- सामग्री के परिवहन के लिए उपयोग की जाने वाली ढुलाई सड़कों को पक्का किया जाएगा ।
- धूल पैदा करने वाले क्षेत्र में और उसके आसपास काम करने वाले लोगों को धूल के कणों से बचाव के लिए व्यक्तिगत सुरक्षा उपकरण (PPE) जैसे डस्ट मास्क प्रदान किए जाएंगे और काम के घंटों के दौरान इसका सख्ती से उपयोग किया जाएगा ।
- सड़क के किनारे और संयंत्र परिसर में पर्याप्त हरित पट्टी विकास धूल दमन प्रदान करने में मदद करेगा ।
- जबकि उत्सर्जन का प्रमुख स्रोत इंडक्शन फर्नेस क्षेत्र से होगा, इसलिए वायु प्रदूषण नियंत्रण उपकरण स्थापित किए जाएंगे ।
- प्लांट से निकलने वाले वायु प्रदूषण को नियंत्रित करने के लिए स्पार्क अरेस्टर के साथ एक फिल्टर लगाया जाएगा ।

3.3 परिवहन और शमन उपायों का प्रभाव

वायु पर्यावरण पर प्रभाव

- ✓ कच्चे माल के परिवहन के कारण भारी वाहनों की आवाजाही के कारण हवा में धूल के छोटे कणों का पुन: विलय हो जाता है।
- ✓ जीवाश्म ईंधन के जलने से PM10, SO2, CO और NO2 के स्तर में वृद्धि ।

शमन के उपाय:

- ✓ उत्सर्जित पार्टिकुलेट मैटर की सांद्रता को कम करने के लिए पानी का छिड़काव।
- ✓ वाहन को पूरी तरह से कवर किया जाना चाहिए ताकि आकस्मिक रिसाव की स्थिति में सूक्ष्म कणों को निकलने से रोका जा सके।
- ✓ परिवहन के लिए उपयोग किया जाने वाला वाहन पर्यावरण मानकों का पालन करेगा और केवल प्रदूषण नियंत्रण प्रमाण पत्र धारक वाले वाहनों को ही उपयोग में लाया जाएगा।

भूमि पर्यावरण पर प्रभाव:

कैरी बैग, कंटेनर के पंचर होने के कारण आकस्मिक रिसाव के दौरान, ऊपर की मिट्टी पर सामग्री जमा होने की संभावना है।

शमन उपाय:

- ✓ आकस्मिक रिसाव को रोकने के लिए वाहनों को कवर किया जाना चाहिए।
- ✓ दूषित क्षेत्र को स्क्रैपिंग या उपायों के माध्यम से ठीक किया जाएगा ।

यातायात घनत्व पर प्रभाव और शमन:

- ✓ वाहनों की आवाजाही से क्षेत्र का यातायात घनत्व बढ़ जाएगा ।
- ✓ हालांकि, प्रमुख सड़क की निकटता संभावित भीड़-भाड़ की समस्या को कम करेगी ।

3.4 शोर और कंपन पर प्रभाव

कन्वेयर जैसी मशीनरी के संचालन, के दौरान घूमने वाली मशीनें और DG सेट के परिणामस्वरूप शोर और कंपन उत्पन्न होगा । वाहनों की आवाजाही से भी शोर होगा।

शमन के उपाय

- भारी मशीनरी और DG सेट केवल दिन के समय ही संचालित किए जाएंगे ।
- उपयोग की जाने वाली मशीनरी को शोर और कंपन को नियंत्रित करने के लिए उचित रखरखाव किया जाएगा ।
- परिवहन के लिए उपयोग किए जाने वाले वाहनों को नियमित रूप से serviced किया जाएगा।
- शोरगुल वाले वातावरण में काम करने वाले कर्मचारियों को muffs ear / ear प्लग पहनना अनिवार्य किया जाएगा ।

3.5 जल पर्यावरण पर प्रभाव

कुल 51.5 KLD पानी का उपयोग किया जाएगा, जिसमें 45 KLD का उपयोग औद्योगिक उद्देश्य के लिए किया जाएगा और घरेलू उद्देश्यों के लिए दैनिक ताजे 6.5 KLD पानी के रूप में उपयोग किया जाएगा ।

घरेलू अपशिष्ट जल सेप्टिक टैंक के बाद सोक पिट में भेजा जाएगा ।

शमन के उपाय

निर्माण और संचालन चरणों के दौरान उत्पन्न को परिसर के बाहर नहीं निकाला जाएगा बल्कि एक सेटलिंग टैंक में एकत्र किया जाएगा और पुनर्नवीनीकरण किया जाएगा । भट्ठों को ठंडा करने के लिए उपयोग किए जाने वाले पानी को टैंक में एकत्र किया जाएगा और कूलिंग टॉवर से गुजारा जाएगा और हरित पट्टी के विकास के लिए पुन: उपयोग किया जाएगा ।

3.6 जैविक पर्यावरण पर प्रभाव

मानव और वाहनों की आवाजाही वाली साइट पर निर्माण गतिविधियों से क्षेत्र में जंगली और जंगली जानवर परेशान होंगे । स्थलीय पारिस्थिति की पर प्रभाव गैसीय प्रदूषकों के उत्सर्जन के कारण हो सकता है जैसे कि कण पदार्थ, सल्फर डाइऑक्साइड (SO2), नाइट्रोजन के ऑक्साइड (NOx), आदि।

शमन के उपाय:

- क्षेत्र में पक्षियों और जंगली जानवरों पर प्रतिकूल ध्वनि संबंधी प्रभावों से बचने के लिए रात के दौरान वाहनों की आवाजाही प्रतिबंधित रहेगी ।
- क्षेत्र में धूल प्रदूषण को कम करने के लिए वृक्षारोपण किया जाता है । परिसर में 33 प्रतिशत से अधिक क्षेत्र में हरित पट्टी और हरियाली विकसित की जाएगी ।
- परियोजना गतिविधियां कच्चे माल और उत्पादों के परिवहन को छोड़कर परियोजना स्थल तक ही सीमित हैं ।
- पर्यावरण के लिए ठोस या तरल कचरे का निर्वहन नहीं होता है ।

3.7 सामाजिक-आर्थिक पर्यावरण पर प्रभाव

सकारात्मक प्रभाव :

- कोई पुनर्वास नहीं।
- नौकरी के अवसरों में वृद्धि।
- मौजूदा बुनियादी सुविधाओं पर कोई बोझ नहीं।
- बुनियादी ढांचे में सुधार।

प्रतिकूल प्रभाव:

- मानव स्वास्थ्य पर प्रभाव।
- कृषि पर प्रभाव।

सामाजिक-आर्थिक पर्यावरण के शमन उपाय

- परियोजना प्राधिकरण द्वारा आसपास के गांवों में ग्रामीणों, ठेका मजदूरों, कर्मचारियों और उनके परिवार के लिए समय-समय पर स्वास्थ्य जांच शिविर, रक्तदान शिविर आयोजित किए जाएंगे ।
- स्वास्थ्य, स्वच्छता और स्वच्छता पर जागरूकता कार्यक्रम आयोजित किए जाएंगे ।
- सामान्य स्वास्थ्य जांच के अलावा, विभिन्न प्रदूषकों जैसे श्वसन रोग, त्वचा की समस्याएं, जल जनित रोग, सुनने की क्षमता आदि के उत्सर्जन के कारण उत्पन्न होने वाली विशिष्ट बीमारियों को रोकने पर भी जोर दिया जाएगा ।
- शिक्षित युवाओं जैसे इलेक्ट्रिकल, टेलरिंग, प्लंबिंग, टाइप राइटिंग, शॉर्टहैंड एंड मशीन रिपेयरिंग, वेल्डिंग फेब्रिकेशन और अन्य स्किल डेवलपिंग ट्रेडों के लिए औद्योगिक / तकनीकी प्रशिक्षण संस्थानों के माध्यम से नौकरी उन्मुख प्रशिक्षण पाठ्यक्रम आयोजित किए जाएंगे ।
- जब भी आवश्यक हो, परियोजना प्राधिकरण और स्थानीय निकायों के बीच सहयोग नियमित आधार पर किया जाएगा ताकि एक अच्छे संबंध का निर्माण किया जा सके जो परियोजना के सुचारू संचालन के साथ-साथ अध्ययन क्षेत्र में लोगों की प्रगति और कल्याण के लिए आवश्यक है ।
- पर्यावरण संरक्षण, जल संरक्षण की आवश्यकता आदि के प्रति लोगों को जागरूक करने

के लिए जागरूकता कार्यक्रम चलाए जाएंगे ।

- कार्य स्थल पर प्राथमिक उपचार की सुविधाओं को आसानी से सुलभ स्थान पर बनाए रखा जाएगा, जिसमें आवश्यक उपकरणों के साथ कीटाणुरहित रूई आदि शामिल होंगे। आपात स्थिति के दौरान एम्बुलेंस की सुविधा भी प्रदान की जाएगी ।
- पीने योग्य पानी की पर्याप्त आपूर्ति उपयुक्त स्थानों पर उपलब्ध कराई जाएगी ।
- कार्य क्षेत्र के भीतर सुलभ स्थान पर स्वच्छता सुविधाएं प्रदान की जाएंगी और उन्हें अच्छी स्थिति में रखा जाएगा ।

3.8 जल छाजन

इंजीनियरिंग स्तर पर उपलब्ध रूपरेखाओं के आधार पर, जल निकासी की संख्या को डिजाइन किया जाएगा ताकि धूल दमन और हरित पट्टी विकास में पुन: उपयोग के लिए वर्षा जल संचयन किया जा सके । वर्षा जल संग्रहण के लिए 150 घन मीटर क्षमता का वर्षा जल संचयन तालाब बनाया जाएगा ।

4 पर्यावरण निगरानी योजना

यह सुनिश्चित करने के लिए कि उच्च स्तर का पर्यावरणीय प्रदर्शन बना रहे, संचालन चरण के दौरान नियमित आधार पर निम्नलिखित की निगरानी की जाएगी :

- **PM2.5, PM10, SO2, NOx, CO** की परिवेशी वायु निगरानी परिचालन चरण के दौरान साइट परिसर और आसपास के गांवों, डाउनविंड दिशा के स्थान और हर मौसम में एक बार की जाएगी ।
- हर मौसम में एक बार साइट या आस-पास के स्थान से भूजल का नमूना एकत्र किया जाएगा।
- पोस्ट प्रोजेक्ट सैंपलिंग और निर्माण और संचालन के दौरान उत्पन्न बेसलाइन डेटा पर प्रभाव;
- प्रदूषण नियंत्रण उपायों की सामान्य प्रभावशीलता की भी निगरानी की जाएगी ।

निर्माण चरण के दौरान पर्यावरण निगरानी योजना

विशेषता	स्थान और आवृत्ति	पैरामीटर
हवा	प्रमुख निर्माण स्थलों पर (कुल 2 स्टेशन); महीने के	PM10, PM2.5, SO2 और NOx

शोर	प्रमुख निर्माण स्थल पर और जनरेटर सेट के पास; महीने के	समतुल्य शोर स्तर
भूजल	तीन स्थान-संयंत्र क्षेत्र के भीतर और निकटतम कुएं के बाहर संयंत्र क्षेत्र; मौसमी	CPCB मानकों के अनुसार पैरामीटर्स

प्रचालन चरण के दौरान पर्यावरण निगरानी योजना

विशेषता	स्थान और आवृत्ति	पैरामीटर
हवा	कार्य क्षेत्र क्षेत्र और प्रवेश द्वार पर परिवेशी वायु (कुल 2 स्टेशन); महीने के	PM10, PM2.5, SO2 और NOx
	स्टैक मॉनिटरिंग	SPM & RSPM
शोर	कार्य क्षेत्र क्षेत्र और प्रवेश द्वार पर (कुल 2 स्टेशन); महीने के	समतुल्य शोर स्तर
भूजल	तीन स्थान – संयंत्र क्षेत्र के भीतर और निकटतम कुएं के बाहर संयंत्र क्षेत्र; मौसम के अनुसार	CPCB मानकों के अनुसार पैरामीटर्स
धरती	तीन स्थान – संयंत्र क्षेत्र के भीतर एक स्थान और इकाई से 200 मीटर की दूरी के भीतर परियोजना स्थल के आसपास दो स्थान; हर साल	pH, नमी सामग्री, बनावट, कार्बनिक पदार्थ, क्लोराइड, SAR, CEC नाइट्रोजन, फॉस्फोरस, फ्लोराइड, सल्फर
तूफान का पानी	प्रति मौसम एक स्थान – मानसून में एक बार	CPCB मानकों के अनुसार पैरामीटर्स
व्यावसायिक स्वास्थ्य	अर्धवार्षिक	**सामान्य और श्वसन और जिगर की बीमारियों की जांच**

5 अतिरिक्त अध्ययन

5.1 जोखिम आकलन

पर्यावरणीय जोखिम मूल्यांकन के उद्देश्य निम्नलिखित द्वारा शासित होते हैं जिनमें माप को शामिल नहीं किया जाता है ।

- संभावित खतरनाक क्षेत्रों की पहचान करना ताकि आकस्मिक घटनाओं की संभावना को कम करने के लिए पर्याप्त सुरक्षा उपायों को अपनाया जा सके ।
- पर्याप्त नियंत्रण तकनीकों के उनके जोखिम का मूल्यांकन करना ।
- पर्यावरणीय आपदा के संभावित क्षेत्रों की पहचान करना जिन्हें नियंत्रित

संचालन द्वारा रोका जा सकता है ।

- प्रबंधन और आपातकालीन स्थिति या संयंत्र संचालन के दौरान कोई विनाशकारी घटना, यदि कोई हो ।

इस्पात संयंत्र की जोखिम पहचान

समूह	वस्तु	खतरे की प्रकृति	क्षमता का खतरा	टिप्पणियां
कच्चे माल प्रबंधन	जल उपचार रसायन जैसे अम्ल/क्षार	विषाक्त	मेजर	जैव संक्षारक
	चिकनाई तेल/ग्रीस	आग	संतुलित	ज्वलनशील
उत्पादन इकाइयां				
ढेर	धूल	श्वसन	संतुलित	वायु प्रदुषण
बीएफ . में लोहा बनाना	अनुपचारित अपशिष्ट जल का विमोचन	विषाक्त	मेजर	सतही जल का गंभीर प्रदूषण
	BFG हैंडलिंग	आग	मेजर	आग से खतरा
	हॉट मेटल और स्लैग हैंडलिंग	हीथ	मेजर	आग से खतरा
एलडी दुकानों में स्टील बनाना	रिहाई का अनुपचारित अपशिष्ट	विषाक्त	मेजर	सतही जल का गंभीर प्रदूषण
	LD गैस हैंडलिंग	आग	मेजर	आग और सीओ खतरा
	गर्म तरल स्टील और लावा हैंडलिंग	हीथ	मेजर	आग से खतरा
घुमताचक्र	गैस फायरिंग	आग	मेजर	आग से खतरा
	अनुपचारित अपशिष्ट का विमोचन पानी	विषाक्त	मेजर	सतह का गंभीर प्रदूषण पानी
कैप्टिव पावर प्लांट		आग	मेजर	आग से खतरा
उपयोगिताओं				
ईंधन गैस	गैस रिसाव	आग और विषाक्त	मेजर	आग और सीओ खतरा
बिजली की आपूर्ति	शार्ट सर्किट	आग	मेजर	आग से खतरा
तरल ईंधन	ईंधन प्रबंधन और भंडारण क्षेत्र	आग और विषाक्त	मेजर	आग और सीओ खतरा
आकस्मिक स्राव होना	आग और विषाक्त	संतुलित	आग और व्यक्तिगत	

का हाइड्रोलिक दबाव में तेल			चोट

खतरे की पहचान और एहतियाती उपाय

अनु क्रमांक	संचालन प्रक्रिया उपकरण / क्षेत्र	संभावित खतरनाक	एहतियाती उपाय	किए जाने वाले उपाय यदि कोई खतरा होता है
1.	विद्युत पैनल	विद्युतीय झटकाशॉर्ट सर्किट के कारण संभव है।	अर्थ लीकेज सर्किट ब्रेकर स्थापित है	बिजली के रिसाव की स्थिति में मुख्य आपूर्ति को तुरंत बंद कर देना चाहिए।
2.	भट्टियां	आग की लपटों के कारण आग के खतरे	1. आपातकालीन किट को स्टोर और कार्यस्थल पर आसानी से उपलब्ध रखा जाता है। 2. अग्निशमन उपकरण पाउडर/फोम प्रकार के बुझानेवाले आसानी से उपलब्ध हैं। 3. विशिष्ट स्थान पर हाइड्रेंट सिस्टम प्रदान किया गया। 4. अग्निशमन प्रशिक्षित व्यक्ति कार्यरत है। 5. किसी भी प्रकार की दुर्घटना से बचने के लिए समय-समय पर निरीक्षण किया जाता है।	उपयुक्त स्थान पर अग्निशामक और हाइड्रेंट
3.	विद्युत ट्रांसफार्मर	विद्युत शक्ति	शॉक प्रूफ इंसुलेटेड पीसीसी प्लेटफॉर्म।	तत्काल बिजली की आपूर्ति काट, बिजली के झटके के लिए घायलों का इलाज
		आग 1	अग्नि शमन यंत्र: I. रेत की बाल्टी। II. अग्निशामक: आग।	उपलब्ध संसाधनों से तुरंत आग पर काबू पाएं, जरूरत पड़ने पर बाहरी मदद को

				बुलाएं
4.	डीजल तेल/ट्रांसफार्मर तेल आदि भंडारण।	आग का खतरा हो सकता है यदि सीधे संपर्क में आता है।	फायर प्रूफ सिस्टम उपलब्ध कराया गया है और फोम, एक्सटिंगुइशर और हाइड्रेंट सिस्टम आदि जैसे लड़ाकू उपकरण रखे गए हैं	तेल के ड्रमों को स्टोर करते और रखते समय उचित देखभाल की जानी चाहिए।
5.	रसायन भंडारण क्षेत्र	बोतल टूटने की स्थिति में, कारणसाँस लेना के कारण श्वसन प्रणाली में जलन और क्षति	1. रसायनों को संभालते समय उचित देखभाल की जानी चाहिए। 2. सभी आवश्यक और आवश्यक दवाओं के साथ प्राथमिक चिकित्सा बॉक्स साइट पर उपलब्ध होना चाहिए। 3. अग्निशामक उपकरण जैसे बुझानेवाले, रेत की बाल्टी हमेशा उपलब्ध होनी चाहिए	घटना की स्थिति में स्थिति का ध्यान रखने के लिए अन्य श्रमिकों के ज्ञान के लिए निर्देश बोर्डों को विस्थापित किया जाना चाहिए।

जोखिम के अनुसार अनुशंसित व्यक्तिगत सुरक्षा उपकरण का सारांश

	कार्यस्थल के खतरे	सुझाए गए पीपीई
आँख तथा चेहरे की सुरक्षा	उड़ने वाले कण, पिघली हुई धातु, गैसें या वाष्प, प्रकाश विकिरण	सुरक्षा चश्मा साथ साइड – शील्ड्स, सुरक्षात्मक रंग, आदि ।
सिर की सुरक्षा	गिर रहा है वस्तुएं, अपर्याप्त ऊंचाई निकासी, और ओवरहेड पावर कॉर्ड	शीर्ष और साइड इफेक्ट सुरक्षा के लिए कठोर प्लास्टिक हेलमेट।
कानों की सुरक्षा	शोर क्षेत्र	हियरिंग प्रोटेक्टर्स (ईयर प्लग या ईयर मफ्स)
पैर की सुरक्षा	असफलता या रोलिंग वस्तुएं, वस्तुओं को इंगित करता है । संक्षारक या गर्म तरल पदार्थ।	सुरक्षा के लिए सुरक्षा जूते और जूते वस्तुओं, तरल पदार्थों और रसायनों को हिलाने और विफल करने के खिलाफ।

हाथों का संरक्षण	खतरनाक सामग्री, कटौती या घाव, कंपन, अत्यधिक तापमान	रबर या सिंथेटिक सामग्री (नियोप्रीन), चमड़ा, स्टील, इन्सुलेशन सामग्री आदि से बने दस्ताने ।
स्वास प्रस्वास सुरक्षा	धूल, कोहरा, धुएं, धुंध, गैसें, धूम्रपान, वाष्प	धूल हटाने और वायु शोधन (रासायनिक, धुंध, वाष्प और गैस) के लिए उपयुक्त फिल्टर वाले फेसमास्क। एकल या बहु-गैस व्यक्तिगत मॉनीटर, यदि उपलब्ध हों।
	ऑक्सीजन की कमी	पोर्टेबल या आपूर्ति की गई हवा (फिक्स्ड लाइन) ऑनसाइट बचाव उपकरण।
शरीर/पैर की सुरक्षा	अत्यधिक तापमान, खतरनाक सामग्री, जैविक एजेंट, काटने और घाव	उपयुक्त सामग्री के कपड़ों, बॉडी सूट, एप्रन आदि को इन्सुलेट करना

व्यावसायिक स्वास्थ्य एवं सुरक्षा

मेसर्स कालिंदी वेंचर्स एल.एल.पी. प्रथम सुरक्षा में विश्वास करता है और काम या रोजगार में लगे लोगों की सुरक्षा, स्वास्थ्य और कल्याण की रक्षा से संबंधित है।

कर्मचारियों के लिए निम्नलिखित सुरक्षा उपायों को लागू किया जाएगा:

- कर्मचारियों को सुरक्षा प्रशिक्षण दिया जाता है ।
- आपात स्थिति के मामले में मैनुअल कॉल बेल प्रदान की जाती है ।
- फायर अलार्म प्रदान किए जाते हैं ।
- प्राथमिक उपचार की सुविधा और प्रशिक्षण प्रदान किया जाता है ।
- कर्मचारियों को व्यक्तिगत सुरक्षा गियर और उपकरण प्रदान किए जाते हैं ।
- नियमित अंतराल पर स्वास्थ्य जांच का आयोजन किया जाता है और रिकॉर्ड बनाए रखा जाता है ।
- संयंत्र के भीतर संवेदनशील स्थानों पर अग्नि हाइड्रेंट, अग्निशामक यंत्र उपलब्ध कराने के माध्यम से अग्नि सुरक्षा प्रणाली की परिकल्पना की गई है ।
- प्रस्तावित परियोजना के लिए साफ-सफाई की सुविधा, विश्राम कक्ष, प्लांट लाइटनिंग की भी परिकल्पना की गई है।

6 परियोजना लाभ

- भौतिक मूलढ़ांचा
- रोजगार के अवसर

- अप्रत्यक्ष रोजगार
- सामाजिक अवसंरचना

7 पर्यावरण प्रबंधन योजना

- निर्माण और संचालन चरण के दौरान होने वाले अवांछनीय प्रभावों को कम करने के लिए प्रदूषण नियंत्रण/शमन उपाय ।
- प्रबंधन योजनाओं का विवरण (हरित पट्टी विकास योजना, अपशिष्ट प्रबंधन योजना आदि)
- EMP के कार्यान्वयन के लिए चिन्हित/अनुशंसित संस्थागत व्यवस्था ।
- परियोजना के बाद पर्यावरण निगरानी कार्यक्रम शुरू किया जाना है ।
- निधि आवंटन के लिए प्रयास करना और EMP के लिए उसी को खर्च करना ।

पर्यावरण निगरानी लागत

क्रमांक	शीर्षक	पूंजी लागत रु. लाख	आवर्ती लागत रु. लाख (वार्षिक)
1	वायु प्रदूषण नियंत्रण	60.00	7.0
2	ध्वनि प्रदूषण नियंत्रण (भूनिर्माण की लागत, हरित पट्टी सहित)	5.0	1.5
3	ठोस अपशिष्ट प्रबंधन	5.00	3.00
4	पर्यावरण निगरानी और प्रबंधन (प्रयोगशाला की स्थापना सहित)	10.0	1.0
5	व्यावसायिक स्वास्थ्य और सुरक्षा उपाय और HIRA	15.0	2.0
6	आरडब्ल्यूएच संरचना	10.0	2.00
7	विविध (परामर्शदाताओं की नियुक्ति,	1.0	2.0
	कुल	**106**	**18.5**

निष्कर्ष

प्रस्तावित परियोजना में प्रभावों का अनुमान किया गया है। इन प्रभावों को परियोजना क्षेत्र में लागू किए गए शमन उपायों से कम किया जाता है। इन प्रभावों के अलावा रोजगार के अवसर प्रदान करने और आसपास के

क्षेत्र के विकास के संदर्भ में कुछ लाभकारी प्रभाव भी अपेक्षित हैं । यह स्थानीय लोगों के जीवन और अर्थव्यवस्था पर कई प्रभाव पैदा करेगा।

निर्माण चरण में परिवहन का प्रभाव, हवा, शोर, कंपन पर पडेगा । चूंकि प्रस्तावित परियोजना उद्योगों और सुव्यवस्थित बुनियादी सुविधाओं से घिरी हुई है । विभिन्न प्रणालियों से उत्पन्न होने वाले हानिकारक उत्सर्जन को एक फिल्टर द्वारा नियंत्रित किया जाएगा और यदि कोई अपशिष्ट जल उत्पन्न होता है तो उसे विनिर्माण प्रक्रिया में पुनर्नवीनीकरण किया जाएगा ।

परिचालन चरण के दौरान हवा की गुणवत्ता में मामूली बदलाव हो सकता है । अपशिष्ट जल को विनिर्माण प्रक्रिया में पुनर्नवीनीकरण किया जाएगा । इंडक्शन फर्नेस से धूल के साथ विकसित गैसों को उच्च दक्षता वाले पल्स जेट टाइप फिल्टर में साफ किया जाएगा ।

व्यावसायिक स्वास्थ्य के संबंध में, संचालन चरण के दौरान कर्मचारियों के स्वास्थ्य पर न्यूनतम प्रभाव अपेक्षित है । कंपनी ने संयंत्र परिसर के अंदर वर्षा जल संचयन प्रणाली के विकास के साथ-साथ परियोजना क्षेत्र परिसर के अंदर हरित पट्टी बनाने का प्रस्ताव रखा है ।

परियोजना स्थानीय लोगों के बीच रोजगार के अवसर पैदा करेगी जो जीवन स्तर में सुधार के लिए सहायक होगा।

इस प्रकार, यह निष्कर्ष निकाला जा सकता है कि प्रदूषण नियंत्रण और शमन उपायों के विवेकपूर्ण और उचित कार्यान्वयन बहुत प्रासंगिक है प्रस्तावित परियोजना समाज के लिए फायदेमंद होगी । स्टील की मांग-आपूर्ति का अंतर और विशेष रूप से क्षेत्र और सामान्य रूप से देश के आर्थिक विकास में योगदान देगा ।