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Date: 11-08-2026

To,
M/S Kaalendi Ventures L.L.P
Khirodharpur, Fatuha,
District Patna (Bihar)

Subject: No Increase in Pollution Load (NIPL) of proposed Change in Product Mix & Production Capacity enhancement by 50% of M/s Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District Patna, State- Bihar.

Dear Sir,

This is in reference to the above cited subject, we have carried out No Increase in Pollution Load (NIPL) of proposed Change in Product Mix & Production Capacity enhancement by 50% of M/s Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District Patna, and State- Bihar through our Empanelled Expert Mr. Vishal Duggal (NABET Accredited EIA Coordinator – Metallurgical Industries). The assessment on anticipated pollution load based on documents/information/data provided and further discussion with the experts of the unit.

The report prepared by us and is attached for your reference.

Thanking you

Authorized Signatory

(Dr. Chakresh Pathak)

M/s Environmental Management Division of India Glycols Limited, Kashipur.



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REPORT OF NO INCREASE IN POLLUTION LOAD (NIPL) OF PROPOSED EXPANSION ON M/S **KAALENDI VENTURES L.L.P.**

AT

**KHIRODHARPUR,
FATUHA,
DISTRICT – PATNA,
STATE – BIHAR**

Submitted to
State Pollution Control Board, Bihar

No Increase in Pollution Load (NIPL)
in respect of the proposed expansion/modification
of the existing project

PROJECT PROPONENT

M/S KAALENDI VENTURES L.L.P.

Khirodharpur, Fatuha,
District Patna, Bihar

REPORT DATE

AUGUST 2026



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1 INTRODUCTION

1.1 General Introduction

M/s Kaalendi Ventures L.L.P. is a progressive, technocratic partnership firm engaged in the manufacturing of high-grade structural steel components. Operating under a strategic License User Agreement as an authorized manufacturer of "**Kamdhenu Structural Steel**", the company enjoys a strong reputation for maintaining strict manufacturing standards and high-yield product quality.

The industrial unit originally commenced operations to supply basic infrastructure requirements like MS Pipes and structural frameworks. To cater to the exponentially rising core-sector demands in Bihar and neighboring regions, the project proponent has undertaken a strategic expansion and modification program. This expansion transforms the unit from a basic cold/hot processing mill into a robust, forward-integrated metallurgical plant featuring on-site billet-casting induction configurations.

As per the provisions of the Environmental Impact Assessment (EIA) Notification 2006, this project was successfully appraised as a **Category "B" under Schedule Activity 3(a) (Metallurgical Industries - Ferrous & Non-Ferrous)**.

This **No Increase in Pollution Load (NIPL)** technical report has been compiled to satisfy the statutory requirements of the Bihar State Pollution Control Board (BSPCB). It mathematically and scientifically substantiates that through structural efficiency changes, energy optimizations, and upgraded Air Pollution Control Devices (APCDs), the proposed capacity expansion **will not cause any incremental increase in the net pollution footprints** (Air, Water, and Waste loads) beyond the baselines established under previous permissions.

1.1.1 Corporate Identity & Management (The Directors)

The legal entity behind the venture is a Limited Liability Partnership (LLP) registered under the Limited Liability Partnership Act, 2008, holding **LLP Identification Number: AAF-7017**. The operations, environmental compliance policies, and long-term industrial layout are governed under the active leadership of its partners/directors:

- **Promoter / Authorized Signatory:** Sri Binay Kumar Singh
- **Project Site :** Khirodharpur, Fatuha, District-Patna, State- Bihar

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The board of management holds a profound track record in industrial governance and executes a direct, hands-on administrative structure over the factory's dedicated Environmental Management Department (EMD) and safety divisions.

1.1.2 Detailed Project Location & Spatial Attributes

The facility is established inside an active, highly structured industrial cluster, drastically mitigating localized ecological vulnerabilities:

- **Industrial / Revenue Settlement:** Mauza: Khirodharpur, Industrial Area Fatuha.
- **Administrative Jurisdiction:** Tehsil: Fatuha, District: Patna, State: Bihar (Pincode – 803201).
- **Logistics & Transport Connectivity:** Well-connected to regional transport corridors, minimizing peripheral urban traffic congestion and optimizing the inbound moving pipeline of heavy transport machinery.

1.1.3 Total Project Area & Land-Use Allocation

The total project area designated for the expanded operations aggregates to an expansive plot layout, optimized to balance productive manufacturing zones with natural carbon sinks through the integration of additional adjacent land:

- **Land Area Breakdown:**

S.No.	Particulars	Existing	Additional / Proposed	Total	Remark
1	Land (Ha)	3.721	3.176	6.897	Additional area is contiguous to the existing land
2	Greenbelt Area (Ha)	1.23	1.048	2.278	1.23 Ha (33%) Greenbelt is already developed inside the existing factory.

- **Existing Plant Area:** 37,210.0 m² (~3.721 Ha / 9.196 Acres)
- **Proposed New Adjacent Land:** 31,762.656 m² (~3.176 Ha / 7.848 Acres)

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- **Total Combined Project Area: 68,972.656 m²** (~6.897 Ha / 17.043 Acres)
(area contiguous to the existing land)
- **Greenbelt and Greenery Deployment:** In strict compliance with statutory environmental mandates, a dedicated **33.01%** of the total combined plant zone (**22,767.873 m²** out of the total 68,972.656 m²) is explicitly reserved for intensive greenbelt development. This ensures continuity from the **earlier greenbelt allocation of 33.00%** (which comprised 12,280.90 m² of the existing land). This expanded layout implements multi-layered, source-oriented biological screens comprised of dense, indigenous, fast-growing tree species to isolate noise parameters and act as a natural containment grid for fugitive particulate dust.
- **Operational Infrastructure:** The rest of the site (**46,204.783 m²**, representing **66.99%** of the total area) is evenly distributed among the industrial melting shop (Induction Furnaces), Re-rolling mill sheds, closed-loop water treatment units, solid slag crushing plants, a lined hazardous waste shelter, and internal paved heavy haul roads.

1.1.4 Production Profile & Product Configuration

The manufacturing configuration of the facility utilizes an integrated process flow. The plant produces intermediate steel blocks (MS Billets) and processes them directly into finished shapes, minimizing external handling and material movement.

The finalized production capacities authorized under the statutory clearance matrix are as follows:

Table 1-1:Existing Production Profile & Product Configuration

Sl. No.	Product Segment	Final Certified Production Capacity	Remarks
1	M.S. Billet	90,000 TPA	Primary Melting (In house consumption)
2	TMT Bar	68,000 TPA	Integrated Hot-Rolling System
3	MS Pipe (Tube)	80,000 TPA	Finished Cold/Hot Processing Line
4	Shutter Profile	32,000 TPA	Finished Downstream Profile Component

1.1.5 Corporate Vision & Core Environmental Values

M/s Kaalendi Ventures L.L.P. is committed to sustainable industrial growth. The plant is designed around three eco-friendly core pillars to ensure clean production:

- **Energy-Efficient Production System:** The proposed expansion includes installation of **one additional 15 T Induction Furnace** to increase billet production capacity. Hot billets produced from the Continuous Casting Machine (CCM) shall normally be transferred directly to the rolling mill. However, whenever the billet temperature falls below the desired rolling temperature due to operational interruptions, a **backup electrically operated induction coil** will be used for reheating. Since the induction coil operates on the principle of electromagnetic induction without any combustion, no additional emissions of PM, SO₂, NO_x or CO are generated. By eliminating the need to burn coal or heavy furnace oil for reheating, the plant prevents major air emissions
- **Zero Liquid Discharge (ZLD):** The facility operates a 100% closed-loop water system. The entire process cooling water is continuously recycled through cooling towers and heat exchangers. Absolutely no industrial wastewater or process run-off will be discharged outside the factory walls.
- **Community Welfare (CER):** In line with commitments made during the public hearing, the company actively supports local development by funding green community infrastructure, installing solar street lights, and providing technical training to local youth.

1.2 About the Existing Plant

M/s Kaalendi Ventures L.L.P. has been operating as metallurgical unit in the Industrial Area of Fatuha, Patna. The existing operational framework is fully established and legally authorized under the active Environmental Clearance (EC No. EC23B008BR110300) and the Consent to Operate (CTO No. 761 & 762 dated 02.04.2024) granted by the Bihar State Pollution Control Board (BSPCB).

The baseline parameters of the existing plant comprise the following configurations:

- **Production Framework:** The unit operates an integrated primary steel-melting and rolling setup. This consists of Induction Furnaces for primary smelting to cast

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intermediate M.S. Billets at a capacity of **90,000 TPA**, which are directly hot-rolled into TMT Bars at a capacity of **68,000 TPA**. Downstream cold/hot processing and fabrication lines are operational for producing M.S. Pipes (Tubes) at **80,000 TPA** and Shutter Profiles at **32,000 TPA**.

- **Air Pollution Control Baseline:** The existing Induction Furnaces are equipped with a canopy hood fume extraction network coupled to a high-efficiency Pulse-Jet Bag Filter system. This existing Air Pollution Control Device (APCD) captures process emissions (metallic oxides and particulate matter) and vents them via an authorized stack structure, strictly maintaining ambient and source particulate boundaries below the prescribed statutory limit of 50 mg/Nm³.
- **Water Balance Baseline:** The plant functions on an absolute **Zero Liquid Discharge (ZLD)** framework. The entire existing process cooling water load 45KLD is managed in a closed-circuit looping network utilizing internal heat exchangers and cooling towers. No industrial wastewater or chemical trade effluent is generated or discharged outside the complex boundary walls. Domestic sewage from the workforce is safely treated via an on-site 5 KLD STP.
- **Solid & Hazardous Waste Baseline:** The non-hazardous solid waste generated from existing operations includes Induction Furnace slag (sold for road base construction and brick manufacturing). Process scrap (end-cuts and steel trimmings) is entirely recharged back into the melting furnace. Hazardous waste, primarily consisting of APCD bag filter dust and spent lubricating oil, is safely contained in a dedicated, covered storage facility before being dispatched to the state-authorized re-refiners.

M/s Kaalendi Ventures L.L.P. is situated in a strategically advantageous and well-mapped zone within the notified industrial landscape of Bihar. The spatial coordinates and regional connectivity matrix are outlined below:

- **Geographical Coordinates:** The center point of the factory site is positioned at approximately: **Latitude: 25°30'15.78"N, Longitude: 85°19'49.12"E**
- **Specific Site Address:** Located at Mauza: Khirodharpur, Industrial Area Fatuha, Tehsil: Fatuha, District: Patna, Bihar (Pin Code: 803201).
- **Excellent Road Connectivity:** The project site sits adjacent to major commercial arterial corridors. It is directly connected to **National Highway 30 (NH-30)** and is in close proximity to **National Highway 31 (NH-31)**. This ensures an uninterrupted,

streamlined flow of heavy commercial vehicles transporting raw materials (such as scrap and sponge iron) and finished structural steel, entirely bypassing inner-city urban traffic.

- **Rail and Air Access:** The facility is exceptionally well-linked to logistic networks. The **Fatuha Junction Railway Station** is located just about 2.5 km away from the plant site, facilitating smooth raw material transport via rail links. For air connectivity, the **Jay Prakash Narayan International Airport** at Patna is located at a convenient distance of approximately 26 km.
- **Ecological Safeguards:** Being located within a pre-notified, heavily structured industrial area designated by the state, the site maintains a safe regulatory and physical distance from any ecologically sensitive zones, national parks, wildlife sanctuaries, or critical forest lands. This completely eliminates peripheral ecological vulnerabilities.

To systematically upscale production and fulfill regional market demands, the management has drafted a precise operational engineering plan for the 50% expansion. This planning involves optimizing existing infrastructure and adding matched manufacturing machinery within the current plant boundary.

The structural blueprint and deployment schedule for the proposed planning focus on these core adjustments:

- **Equipment Upscaling & Melting Upgrades:** The core of the proposed planning involves expanding the secondary Steel Melting Shop (SMS) by installing an additional 15-Ton energy-efficient Induction Furnace alongside existing setups. The cumulative melting cycle parameters will be upscaled to increase the intermediate production output from 90,000 TPA to 1,35,000 TPA of M.S. Billets.
- **Rolling Mill & Downstream Expansion:** To process the extra liquid steel, the TMT Bar hot-rolling line capacity will be extended from 68,000 TPA to 1,02,000 TPA. Parallel capacity expansions will be executed across the downstream forming mills to increase the output of M.S. Pipes (Tubes) to 1,20,000 TPA and Shutter Profiles to 48,000 TPA.
- **Process Coupling and Clean Reheating Optimization:** The expansion relies on a tightly integrated Direct Hot-Rolling Continuous Casting Machine (CCM) framework. The engineering layout ensures that red-hot billets travel directly from the CCM strands

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to the rolling mill stands via automated hot-conveyors to preserve thermal energy. To handle operational pauses or temperature drops without relying on fossil fuels, a specialized, all-electric **Induction Coil Heating System** is integrated into the line as a clean thermal backup. This completely eliminates the need for any coal or oil-fired reheating plants, guaranteeing zero incremental combustion emissions (SO₂, NO_x) from the rolling sector.

- **Matched Environmental Infrastructure Planning:** To ensure a net-zero addition to the pollution footprint, the proposed planning includes a proportional upgrade of the environmental protection systems. The Fume Extraction Systems (FES) serving the expanded furnace bay will be upgraded, and the Air Pollution Control Device (APCD) configuration will be expanded with a larger multi-compartment Pulse-Jet Bag Filter assembly utilizing high-efficiency membranes. This guarantees that the expanded air volumes are fully scrubbed, restricting final stack Particulate Matter (PM) concentrations to $\leq 150 \text{ mg/Nm}^3$ and ensuring a net reduction in daily particulate load.
- **Zero Land and Water Footprint Impact:** The project will generate zero industrial trade effluent, fully preserving the plant’s strict Zero Liquid Discharge (ZLD) status. The internal closed-loop water circulation networks, indirect heat exchangers, and cooling towers will be scaled up to manage the increased cooling loads from the additional 15-Ton furnace and backup induction coils. Domestic wastewater generation is limited strictly to sewage; while this was previously managed via a septic tank, a Sewage Treatment Plant (STP) of 05 KLD is now proposed to handle all domestic waste.

Table 1-2: Statutory Approvals

Sl. No.	Regulatory Approval / Clearance	Issuing Authority / Body	Reference Letter / Identification No.	Date of Issue / Validity	Operational Status / Capacity Baseline
1.	Environmental Clearance (EC)	State Level Environment Impact Assessment Authority	EC23B008BR110300 (File No: SIA/3(a)/2048/2022)	13.07.2023	MS Billet: 90,000 TPA TMT Bar: 68,000 TPA MS Pipe (Tube): 80,000 TPA

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Sl. No.	Regulatory Approval / Clearance	Issuing Authority / Body	Reference Letter / Identification No.	Date of Issue / Validity	Operational Status / Capacity Baseline
		(SEIAA), Bihar			Shutter Profile: 32,000 TPA
2.	Consent to Establish (CTE / NOC)	Bihar State Pollution Control Board (BSPCB)	CTE Vide Memo No. 1575	10.08.2023	Sanctioned under Sec 25/26 of the Water Act, 1974, and Sec 21 of the Air Act, 1981, for setup execution.
3.	Consent to Operate (CTO)	Bihar State Pollution Control Board (BSPCB)	Ref. No. 761&762 (<i>Emission & Discharge Orders</i>)	02.04.2024	Active operational license for the integrated facility. Valid for 5 Years. This forms the exact baseline for the NIPL comparison.
4.	NIPL Evaluation (<i>Current Proposed Stage</i>)	Bihar State Pollution Control Board (BSPCB)	<i>Under Submission</i>	<i>Current Application</i>	Submitted to execute a 50% increase in overall integrated capacity without increasing net baseline environmental emissions.

Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar



Figure 1-1 Covered Storage Area



Figure 1-2 Water Flow Metre & Piezometer

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1.3 List of Existing and Proposed Machinery

Table 1-3 List of Existing and Proposed Machinery

Equipment / Facility	Existing Configuration	Proposed Configuration	Final Consolidated Plant Status
Secondary Induction Furnaces	2 Units × 15 T	Addition of 1 Unit × 15 T energy-efficient induction furnace	3 Units × 15 T induction furnaces
Billet Reheating Furnace	Coal-fired reheating furnace 10 TPH	Existing furnace to be dismantled and eliminated	Not applicable (replaced by direct hot charging and induction heating)
Induction Coil for Billet Heating System (Backup)	Not available	Installation of 1 induction coil for billet reheating heating system	1 induction billet heating system for backup billet heating
Continuous Casting Machine (CCM)	Existing CCM	Upgradation of secondary water-cooling system and integration with hot charging arrangement	CCM integrated with direct hot-rolling conveyor system
Slag Crusher	10 TPH	Retained with operational optimization	10 TPH slag crusher housed within a covered slag handling area
Electrical Power Requirement	11.0 MW	Additional 5.5 MW grid power	Total connected load of 16.5 MW sourced from the state electricity grid

1.4 List of Products and Quantities

As per the valid Environmental Clearance (EC Identification No. EC23B008BR110300), the production capacities of the unit are M.S. Billet: 90,000 TPA, TMT Bar: 68,000 TPA, M.S. Pipe (Tube): 80,000 TPA, and Shutter Profile: 32,000 TPA. The specific product configurations authorized under the latest Consent to Operate (CTO) issued by the BSPCB,

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along with the newly proposed 50% capacity expansion evaluated under this No Increase in Pollution Load (NIPL) framework, are summarized in Table.

Table 1-4 : List of Products and Quantities

Product	Existing quantity (TPA)	Proposed quantity for NIPL (TPA)	Uses
Induction furnace output			
Billet (in house)	90,000.00	1,35,000.00	Inhouse
Rolling mill unit			
TMT bar	68,000.00	45,000.00	Sold to market
Strip/Billet	20,200.00	87,300.00	In- House consumption
Total *	88,200.00	132,300.00	
Strip's profile unit			
M.S. Pipe (Tube)	80,000.00	120,000.00	Sold to market
Shutter profile	32,000.00	32,000.00	Sold to market
Grand Total (sellable) TMT + Pipe+ shutter profile	180,000.00	197,000.00	Total sellable to market

**Total amount is considering the 2% as trimming and cutting losses.*

The existing procurement of billets is 93,000 TPA. Under the proposed configuration, strip/billets procurement will be reduced to 65,500 TPA, with the balance requirement being fulfilled through increased in-house production of strips.

1.5 Purpose & Scope of the Study

The primary purpose of this technical study is to establish a detailed, scientifically validated environmental and engineering assessment for the proposed 50% capacity expansion of the integrated metallurgical facility operated by **M/s Kaalendi Ventures L.L.P.** located at Mauza: Khirodharpur, Industrial Area Fatuha, Patna, Bihar.

The facility is currently authorized to produce M.S. Billets (90,000 TPA), TMT Bars (68,000 TPA), M.S. Pipes/Tubes (80,000 TPA), and Shutter Profiles (32,000 TPA) under the valid Environmental Clearance (EC Identification No. EC23B008BR110300) issued by SEIAA, Bihar, and the active Consent to Operate (CTO Ref No. 761, dated 02.04.2024) granted by the Bihar State Pollution Control Board (BSPCB). To meet growing core-sector infrastructure requirements, the company now plans to increase the total throughput of each of these lines by exactly 50%.

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This study is prepared in strict accordance with the regulatory provisions of the Environment (Protection) Act, 1986, and the procedural frameworks outlined under Section 7(ii) of the EIA Notification 2006 (as amended) regarding modifications and upscaling of industrial units. The primary objective is to technically demonstrate to the regulatory authorities that through process optimizations, the installation of an additional 15-Ton energy-efficient Induction Furnace, thermal energy conservation via direct hot-rolling casting coupled with an **electrically operated induction coil system as a backup for reheating** (completely removing the traditional fuel-fired reheating plant), and targeted upscaling of the Air Pollution Control Devices (APCDs), the proposed 50% increase in production will be achieved with net-zero incremental addition to the baseline regional pollution footprint.

The scope of this comprehensive study encompasses the following structural evaluations:

- **Mass & Material Balance Analysis:** Quantifying the raw material inputs (sponge iron, scrap metal, and ferro-alloys) relative to the final product yields to ensure strict process optimization across the expanded Steel Melting Shop (SMS).
- **Air Pollution Mitigation Matrix:** Mathematically establishing that upscaling the suction efficiency of the Fume Extraction System (FES) and expanding the multi-compartment Pulse-Jet Bag Filter capacity will keep source and ambient Particulate Matter (PM) levels strictly $\leq 150 \text{ mg/Nm}^3$, despite a higher volumetric flow of process gases from the expanded induction furnace setup, ensuring a net reduction in the daily particulate load.
- **Closed-Loop Water & ZLD Verification:** Auditing the expanded internal cooling towers, indirect heat exchangers, and scale pits to confirm that the increased cooling configuration required for the extra 15-Ton induction furnace and the backup induction coil maintains a strict Zero Liquid Discharge (ZLD) status with zero industrial trade effluent generation.
- **Solid and Hazardous Waste Mapping:** Developing a detailed downstream reuse and handling roadmap ensuring 100% recycling of the increased volume of non-hazardous induction furnace slag into local road infrastructure, and secure containment of bag filter hazardous dust for safe disposal via the state-authorized Common TSDF.
- **Spatial Resource Mapping:** -The existing plant area is $37,210.000 \text{ m}^2$ (3.721 ha / 9.196 acres), and the proposed additional contiguous land is $31,762.656 \text{ m}^2$ (3.176 ha / 7.848 acres). Accordingly, the total combined project area is $68,972.656 \text{ m}^2$ (6.897 ha

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/ 17.043 acres). The proposed additional land measuring 31,762.656 m² (3.176 ha) is contiguous to the existing EC-approved project area. Accordingly, the combined land configuration is considered with reference to the applicability of S.O. 980(E) dated 02.03.2021.

2 PROJECT DESCRIPTION

2.1 General Introduction

The proposed project involves a systematic 50% capacity expansion and technical modification of the existing integrated metallurgical facility operated by **M/s Kaalendi Ventures L.L.P.** The plant is situated within a pre-notified, well-structured industrial zone at Mauza: Khirodharpur, Industrial Area Fatuha, Patna, Bihar.

The facility is an active, fully established manufacturing unit operating under a strategic License User Agreement as an authorized producer of high-grade "**Kamdhenu Structural Steel**". Structurally, the company handles an integrated production line that spans primary metal melting, continuous billet casting, hot-rolling mills, and downstream pipe and profile finishing yards.

The baseline operations of the complex are strictly regulated and legally bound by the valid Environmental Clearance (EC Identification No. **EC23B008BR110300**, dated 13.07.2023) issued by the State Level Environment Impact Assessment Authority (SEIAA), Bihar, and the current Consent to Operate (CTO Ref No. **761& 762**, dated 02.04.2024) granted by the Bihar State Pollution Control Board (BSPCB). Under this active framework, the existing plant is permitted to manufacture M.S. Billets (90,000 TPA), TMT Bars (68,000 TPA), M.S. Pipes/Tubes (80,000 TPA), and Shutter Profiles (32,000 TPA).

To meet the rising core-sector infrastructural demands across Bihar and its neighboring regions, the project proponent plans to execute a balanced **50% increase across all four product segments. This will upscale the total annual complex throughput from the current baseline of 180,000.00 TPA to a post-expansion capacity of 197,000.00TPA.**

Table 2-1 : Existing and proposed Landuse

SL No	Type of Use	Existing area (sq. mt)	Existing area %	Proposed Area (Sq. mt)#	Proposed area %
1	Production & Allied facilities	17,082.60	45.90%	30946.773	44.87%
2	Entrance, Roads, Pavements, vacant area etc	7,851.36	21.10%	15258.003	22.12%
3	Green Belt	12,280.90	33.00%	22767.87	33.01%

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	Total	37,214.89		68,972.646	
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#area contiguous to the existing land

The proposed increase in production will be achieved through the installation of an additional **15-Ton energy-efficient Induction Furnace** in the Steel Melting Shop (SMS) and optimization of the advanced **Direct Hot-Rolling Continuous Casting Machine (CCM)** technology. As part of the modernization, the existing **coal-fired billet reheating furnace** will be completely dismantled and removed. To ensure uninterrupted rolling operations during process interruptions or extended holding periods, **one electrically operated induction billet heating system** will be installed as a **backup reheating facility**. This clean, energy-efficient induction heating system will eliminate the use of fossil fuels for billet reheating, thereby significantly reducing combustion-related emissions while improving overall energy efficiency and environmental performance of the plant.

Component	Existing Configuration	Proposed Modification	Environmental/Operational Benefit
Steel Melting Shop (SMS)	2 × 15-T Induction Furnaces	Installation of 1 additional 15-T energy-efficient Induction Furnace	Increased steel melting capacity with improved energy efficiency
Continuous Casting & Rolling	Existing Direct Hot-Rolling CCM	Optimization and integration with enhanced direct hot-charging arrangement	Improved process efficiency and reduced heat loss
Billet Reheating System	Coal-fired billet reheating furnace	electrically operated induction coil (backup only)	Eliminates coal combustion during normal operations, reduces air emissions, and provides reliable backup reheating during process interruptions
Overall Process	Conventional reheating before rolling	Direct hot charging with induction backup heating	Lower energy consumption, reduced greenhouse gas emissions, improved operational reliability, and enhanced environmental performance

To effectively control air emissions associated with the expanded operations, the existing Air Pollution Control Device (APCD) and its multi-compartment Pulse-Jet Bag Filter system will be augmented to restrict final stack emissions to $\leq 150 \text{ mg/Nm}^3$. The project has been designed

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in line with a clean manufacturing approach, emphasizing resource efficiency and environmental sustainability. This engineering configuration ensures that the 50% expansion satisfies all criteria for a No Increase in Pollution Load (NIPL) status, maintaining a net-zero addition to the regional ambient air emissions and preserving the plant's strict Zero Liquid Discharge (ZLD) operational profile. The proposal strictly complies with the provisions under Section 7(ii) of the amended MoEF&CC EIA Notification issued vide S.O. 980 (E) dated 2nd March 2021.

2.2 Location of the Project

The geographical co-ordinates of plant is Latitude: 25°30'15.78"N Longitude: 85°19'49.12"E Located at Mauza: Khirodharpur, Industrial Area Fatuha, Tehsil: Fatuha, District: Patna, Bihar (Pin Code: 803201).

2.3 Screening Category:

As per the statutory provisions of the Environmental Impact Assessment (EIA) Notification dated 14th September 2006 (and its subsequent amendments), the proposed 50% capacity expansion of **M/s Kaalendi Ventures L.L.P.** is classified under the following regulatory screening criteria:

- **Schedule Activity:3(a) * Sector / Core Industry:Metallurgical Industries (Ferrous & Non-Ferrous)**
- **Regulatory Category:Category "B"**

2.4 Manufacturing Process

M/s Kaalendi Ventures L.L.P. utilizes an optimized, forward-and-backward integrated process flow to scale up production capacity by 50%. The operations span two core production segments:

Table 2-2 Technological Modifications Matrix

Sl. No.	Production Segment / Division	Existing Setup	Proposed Technological Upgrades (Post-Expansion)
1.	The Melting & Casting Division	Existing Induction Furnaces and Continuous Casting	Addition of one (1) new 15-Ton energy-efficient Induction Furnace to expand billet output from 90,000 TPA to 1,35,000 TPA. Along with this an electrical induction coil will be

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Sl. No.	Production Segment / Division	Existing Setup	Proposed Technological Upgrades (Post-Expansion)
	<i>(Steel Melting Shop - SMS)</i>	Machine (CCM) framework.	installed in place of reheating furnace for backup
2.	The Rolling & Downstream Processing Division <i>(Rolling Mills & Fabrication Yards)</i>	Downstream hot-rolling and structural forming lines.	Complete elimination of the traditional fuel-fired Reheating Plant. Implementation of continuous casting machine. An electric Induction Coil System as a thermal backup for reheating and induction furnace.

2.4.1 The Melting & Casting Division (Steel Melting Shop - SMS)

The operational steps, material paths, and engineering features designed for the capacity expansion are detailed below:

2.4.1.1 M.S. Billet Production (From 90,000 to 1,35,000 TPA)

The manufacturing of intermediate Mild Steel (M.S.) Billets is executed inside the expanded Steel Melting Shop (SMS) utilizing energy-efficient electrical induction melting technology:

1. Raw Material Charging

To enhance resource efficiency and promote circular economy principles, the metallic charge mix has been optimized with increased utilization of steel scrap. The induction furnaces will be charged with **88,922 TPA of Sponge Iron (DRI), 56,587 TPA of M.S. Scrap, and 16,168 TPA of Pig Iron & Other Metallic Inputs**, resulting in a total furnace charge of **161,677 TPA**. Compared to the existing configuration, the proposed expansion significantly increases scrap utilization while reducing dependence on virgin metallic inputs. The raw materials are systematically sorted, weighed, and charged into the existing and newly proposed **15-Ton energy-efficient Induction Furnaces**. Required quantities of ferro-alloys, such as Ferro-Manganese and Ferro-Silicon, are added during melting to achieve the desired chemical composition and product quality.

2. Induction Melting

The metallic charge is melted using high-frequency electromagnetic induction, wherein electrical energy is directly converted into heat within the metal charge. This energy-efficient process eliminates direct fossil-fuel combustion during steel melting, resulting in improved thermal efficiency and reduced emissions. Under the proposed expansion, an additional **15-**

Ton Induction Furnace will be installed, while the existing **coal-fired reheating furnace will be replaced by an electrically operated induction heating system**, thereby eliminating coal consumption, ash generation, and associated particulate emissions.

3. Slag Generation and Recovery

During the melting process, non-metallic constituents and oxidizable impurities separate from the molten steel to form slag. With the proposed induction furnace input of **161,677 TPA**, approximately **25,060 TPA of slag** will be generated. The slag will be processed through a dedicated **slag recovery unit**, where about **12,530 TPA of metallic values** will be recovered through magnetic separation and recycled back into the induction furnace. The remaining **12,530 TPA of processed slag** will be supplied for utilization in cement manufacturing, road construction, and other approved applications, ensuring efficient resource recovery and minimizing waste disposal.

4. Continuous Casting and Rolling

The refined molten steel is tapped into refractory-lined ladles and transferred to a **Continuous Casting Machine (CCM)**, where it is continuously cast into high-quality **M.S. Billets**. The proposed billet production capacity is **135,000 TPA**, compared to the existing **90,000 TPA**. These billets are entirely utilized captively in the rolling mill for the manufacture of TMT bars and strips.

2.4.2 The Core NIPL Feature: Induction furnace /coil along with CCM

To achieve a 50% production increase across the line without adding to the fossil fuel combustion load, the plant couples its continuous casting with an all-electric downstream thermal matrix:

1. **Direct Hot-Rolling Conveyance:** Under normal operations, the red-hot billets cast at the CCM strands retain intense internal thermal energy $\geq 1000^{\circ}\text{C}$. They are transferred instantly onto automated hot-conveyors and fed directly into the rolling mill stands without being allowed to cool down, preserving natural casting heat.
2. **Induction Coil Backup System:** To handle operational pauses, short mill delays, or localized temperature drops, an **electrically operated Induction Coil Heating System is installed directly on the hot-conveyor line as a clean thermal backup**. This water-cooled copper coil system converts high-frequency alternating current into a

concentrated electromagnetic field. As a billet passes through, eddy currents are induced internally, providing rapid, uniform Joule heating to restore the required rolling temperature in seconds without any open flames or physical contact.

3. **Absolute Elimination of the Reheating Furnace:** By relying on direct casting heat paired with an all-electric induction backup coil, the plant layout **completely removes the traditional fuel-fired reheating plant**. This eliminates the need to install or burn coal, furnace oil, or gas for the 50% TMT expansion—permanently preventing a major point-source of Particulate Matter (PM), Sulfur Dioxide (SO₂), and Nitrogen Oxides (NO_x).
4. **Rolling & Quenching (Thermex Technology):** The hot billets are routed through a series of progressive roughing, intermediate, and finishing rolling mill stands to reduce their cross-section into target reinforcement bar diameters. The hot-rolled bars then undergo controlled online water-quenching via a multi-stage Thermex cooling system. This structural tempering creates a high-tensile tempered martensite outer layer over a ductile ferrite-pearlite core, producing high-grade, certified TMT Bars.

2.4.2.1 Downstream Processing: M.S. Pipe (Tube) & Shutter Profile Manufacturing

The processing lines utilize high-efficiency mechanical deformation and forming techniques to handle the increased output:

1. **M.S. Pipe / Tube Production (From 80,000 to 1,20,000 TPA):** Raw commercial steel strips or slit coils are continuously fed into a cold roll-forming mill. A sequence of contoured rollers gradually bends the flat strips into a circular hollow profile. The open longitudinal seam is joined using High-Frequency Induction Welding (HFIW), which relies on localized electrical resistance heating without external filler metal. The continuous tube is sliced to size by an automated flying saw, straightened, and hydro-tested.
2. **Shutter Profile Production (From 32,000 to 32,000 TPA):** Steel sheets are routed through automated cold-rolling and stamping dies that press distinct architectural corrugations into the metal. The profiles are mechanically trimmed, interlocked, and bundled for downstream structural assembly.

2.4.3 Mass and Material Balance Analysis (Input vs. Output)

Table 2-3 Metallurgical Mass Balance & Yield Allocation Matrix

Material Stream	Existing (TPA)	% of Input	Proposed (TPA)	% of Input
Input				
Total Furnace Input (Raw Material + Recovered Metal)	107,785	100.00	167,677	100.00
Primary Output				
Billet Production	90,000	83.5	135,000	80.4
Slag Generation	16,707	15.5	25,060	14.9
Process Loss	1,078	1.0	1,676	1.0
Slag Recovery				
Slag Processed	16,707	100.00*	25,060	100.00*
Recovered Metal	2,506	15.00*	12,530	50.00*
Slag Reject	14,201	85.00*	12,530	50.00*

Although billet production is proposed to increase by 50% (from 90,000 TPA to 135,000 TPA), the project incorporates an advanced **Mechanical Separation System (Crushing + Magnetic Separation + Jigs)** to maximize recovery of entrapped metallic values from induction furnace slag. The recovered metal is recycled back into the induction furnace as secondary raw material, significantly improving furnace yield and reducing the requirement for fresh metallic charge. With the implementation of this high-efficiency recovery system, metal recovery from slag is enhanced to approximately **50%**, resulting in a reduction of the final slag reject from **14,201 TPA** under the existing operation to **12,530 TPA** after the proposed expansion. This represents a **net reduction of 1,671 TPA (11.8%)** in slag requiring disposal, despite a **50% increase in production capacity**. Accordingly, the proposed expansion not only avoids any additional solid waste burden but also achieves a substantial reduction in waste generation through improved material recovery, efficient resource utilization, and adoption of circular economy principles, thereby enhancing the overall environmental performance and sustainability of the steel manufacturing process.

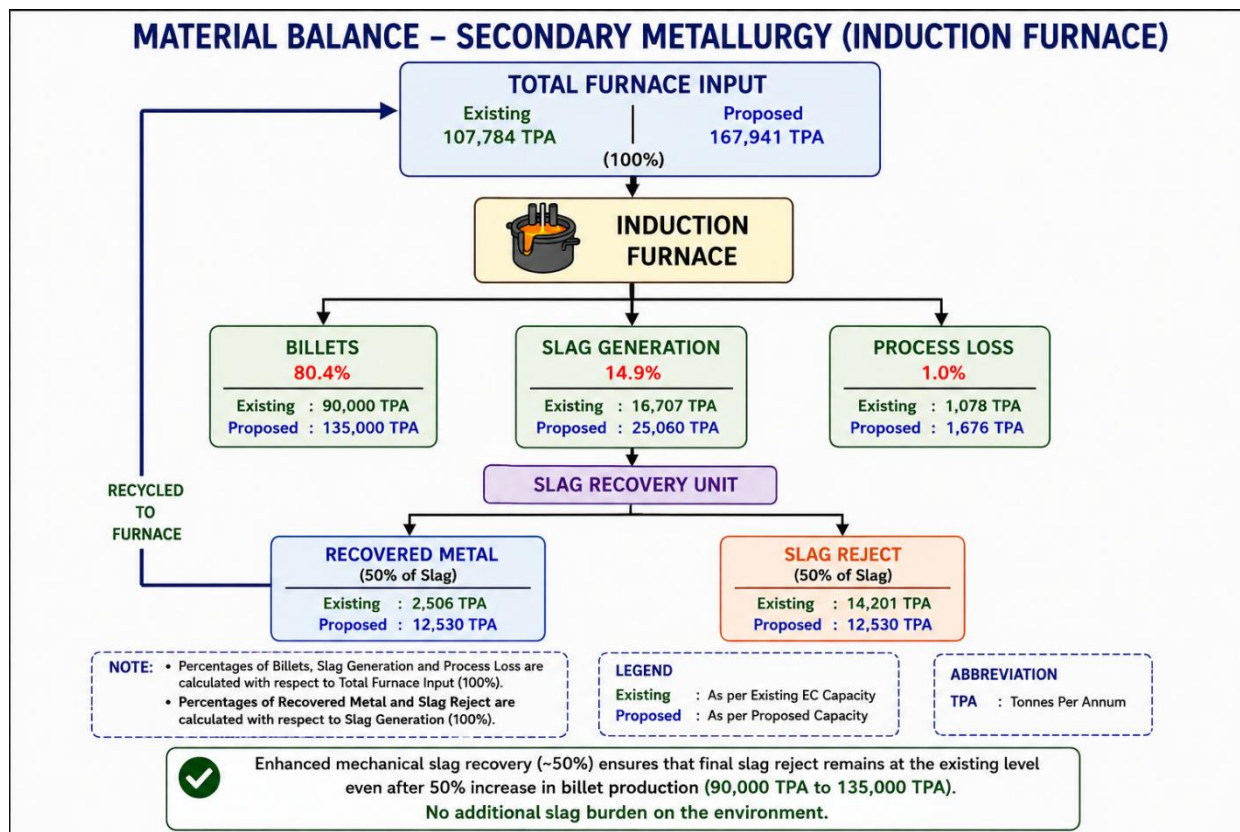


Figure 2-1 : Process flow of the Billet formation

2.5 Working Methodology of proposed induction coil

The metal industry utilizes induction coils as the primary heat source across several major manufacturing processes. Instead of heating the air around the metal (like a gas furnace), the coil forces the metal to **heat itself from the inside out** via induced electrical currents (eddy currents)

A. Billet Heating (Pre-Forging and Rolling)

The solid blocks of metal (billets) can be smashed into shapes or rolled into sheets, they must be softened. Billets are pushed through a long tunnel of induction coils. The coils rapidly raise the metal's temperature to its plastic state (e.g., 1100°C to 1250°C for steel) in seconds, prepping it for heavy hydraulic presses or rolling mills.

B. Induction Melting (Foundries)

A large induction coil is wrapped around a non-conductive, heat-resistant crucible filled with metal. The magnetic field creates currents so intense that they melt tons of solid metal. The magnetic forces also naturally stir the liquid metal, ensuring a perfectly uniform alloy mix.

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C. Process Volatiles & Particulate Matter Management (1.84% Mass Partition)

An induction coil is used in industry for heating solid billets (before forging, extrusion, or rolling), the process features zero direct combustion emissions. Unlike gas-fired or oil-fired furnaces, the induction coil creates heat directly inside the metal via magnetic fields.

Emission Type	Coal based Reheating Furnace	Induction Furnace (Steel Melting)	Induction Coil
Fuel Combustion (CO ₂ , SO ₂ , CO)	High (Direct result of coal/oil/gas combustion)	Zero (No fossil fuel combustion within the furnace)	Nil (No fuel combustion involved)
Thermal NO _x	High (Generated due to high-temperature burner flames)	Negligible to Zero (No combustion flame involved)	Nil (No combustion flame)
Particulate Matter (PM) / Dust	Moderate (Scale formation and combustion ash)	Moderate to High (Generated from charging scrap, alloy additions, slag handling, and metal fumes)	Very Low (Only minor scale particles)
Metal Oxide Fumes (FeO, MnO, ZnO, etc.)	Low	High (Produced during smelting and refining of scrap/metal charge)	Negligible
Oil/VOC Smoke Fumes	Moderate (From fuel combustion and oily billets)	Moderate (From oily, painted, or contaminated scrap during charging and melting)	Low (Limited to localized burning of surface contaminants, if any)
Greenhouse Gas (Direct Emissions)	High	Zero (Direct emissions); indirect emissions depend on electricity source	Nil (Direct emissions)

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Emission Type	Coal based Reheating Furnace	Induction Furnace (Steel Melting)	Induction Coil
Stack Emissions Requirement	Essential due to combustion gases	Required mainly for collection and treatment of dust and metal fumes through bag filters	No process stack emissions
Scale Generation	High (Due to prolonged exposure of billets to oxidizing atmosphere)	Low (No billet reheating; oxidation mainly occurs on molten metal surface)	Low (Rapid and localized heating reduces oxidation)

2.5.1 Machineries:

To facilitate the systematic 50% capacity expansion, the facility is integrating newly acquired adjacent land, expanding the total project site boundary to **6.897 Hectares (17.04 acres)**. The additional land Contiguous to the existing land where EC is already obtained. The plant layout optimizes this expanded space by adding high-efficiency metallurgical production infrastructure. The core Steel Melting Shop (SMS) is being scaled up through the installation of one (1) additional 15-Ton energy-efficient electrical induction furnace, integrated with matched multi-strand Continuous Casting Machines (CCM) to seamlessly cast and scale up the output.

1. Electrical & Power Machinery

This subsystem converts standard grid electricity into the precise high-frequency alternating current required to generate the magnetic field.

- **Solid-State Power Supply (Inverter):** The core electrical drive. It utilizes High-Power transform 50/60 Hz factory power into medium or high frequencies (typically 1 kHz to 10 kHz for billet heating).
- **Isolation Transformer & Capacitor Bank:** Steps down voltage, isolates the mains power for safety, and tunes the electrical circuit (resonance matching) to balance the inductive load of the coil.

- **Control Cabinet:** Equipped with a Programmable Logic Controller (PLC) and Human-Machine Interface (HMI) screen to track heating recipes, log temperatures, and communicate with robotic loaders.

2. Induction Coil Assembly

The physical apparatus where the heating process takes place.

- **Copper Induction Coil:** Heavy-duty, high-conductivity copper tubing wound into a long tunnel configuration (helical design) sized to clear the cross-section of the billet.
- **Internal Refractory Liner:** A high-temperature ceramic or quartz sleeve placed inside the copper coil ID. It thermally insulates the water-cooled copper from the radiating heat of the 1200°C billets.
- **Water-Cooling Manifold:** Because thousands of amperes pass through the copper, integrated internal channels circulate deionized water to prevent the coil from melting.

3. Mechanical Handling Machinery

Billet heating lines must continuously transport massive, heavy chunks of metal through the center of the coil with high precision.

- **Infeed Table / Magazine Loader:** A heavy step-rocker mechanism or v-roller conveyor that automatically sequences raw, cold billets from a bulk bin.
- **Billet Pusher / Pinch Rollers:** Heavy-duty hydraulic rams or motorized, dual-grip pinch rollers that drive the train of billets smoothly and continuously through the coil liner.
- **Wear Rails (Skid Rails):** Water-cooled stainless steel or high-nickel alloy rails that run along the bottom of the coil tunnel. The heavy billets physically slide across these rails as they pass through.
- **Fast-Extraction Outfeed:** Motorized high-speed rollers at the exit of the coil that rapidly pluck the hot billet out of the tunnel and deliver it to the forging press before it loses heat.

4. Auxiliary & Monitoring Machinery

- **Pyrometer / Thermal Sensors:** Non-contact infrared optical pyrometers focused directly on the billet exit point to check that every billet has hit its exact target temperature (e.g., 1150°C).

- **Reject Gate:** A mechanical trapdoor triggered by the PLC. If a billet exits too cold (due to a power dip) or too hot, it is automatically dumped into a reject bin before reaching the forge tooling.
- **Chiller / Heat Exchanger:** A closed-loop industrial water-cooling system (evaporative tower or refrigerated chiller) dedicated to keeping the power supply and coil safely below 50°C.

2.5.2 Project Cost & Financial Appraisals

Total Capital Investment: The total estimated capital expenditure (CapEx) required to implement the proposed 50% capacity expansion, equipment modifications, and environmental control system upgrades is approximately **Rs. 45.5 Crores**.

Environmental Management Plan (EMP) Budget Allocation: Out of the total expansion cost, a dedicated minimum budget of **2% (Rs. 0.91 Crores)** is earmarked specifically for upgrading the canopy hood suction fans, expanding the bag filter compartments, maintaining the ZLD water lines, and strengthening the peripheral greenbelt buffer.

For finished product manufacturing, the hot-rolling mill utilizes automated, insulated hot-conveyor lines for the direct thermal transfer of billets, bypassing fuel-fired reheating furnaces. The downstream lines feature heavy-duty cold roll-forming mills, automated High-Frequency Induction Welding (HFIW) matrices for precision M.S. Pipe (Tube) fabrication, and high-speed cold-stamping presses for Shutter Profile shaping.

To maintain a strict **No Increase in Pollution Load (NIPL)** status, all primary production machinery is paired with upgraded environmental control hardware, including high-velocity aerodynamic canopy hoods and multi-compartment Pulse-Jet Bag Filter systems designed to maintain emissions below statutory limits.

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Figure 2-2: Layout Plan showing Greenbelt Area

3 POLLUTION LOAD ASSESSMENT

3.1 General Introduction

Pollution load assessment exercise carried out by comparing the pollution load to be generated after proposed changes in the project in compare to the existing pollution load in terms of Water and Waste Water, Air emissions, Hazardous waste, and Solid waste.

The assessment of pollution load is done as per the explanation provided in the amended EIANotification dated 2nd March 2021, which read as follows:

The amendment in notifications explains: “Pollution load” shall be determined on the basis of multiplication of **quantity and concentration of different components and parameters (as provided or referred in the Prior Environment Clearance or the Environment Impact Assessment Report (EIA) and Environment Management Plan** based on which such Prior Environment Clearance has been granted), in respect of emissions, effluents or discharge, solid, industrial hazardous waste and such other parameters notified under the Environment (Protection) Rules, 1986 as amended from time to time.”

Pollution load assessment exercise carried out by comparing the pollution load that was permitted as per EC/NIPL/CTO with the pollution load estimated after proposed expansion with installation of an additional high-tech cement mill.

3.2 Mass and Material Balance

3.2.1 Production Details

At present, the authorized and consented production capacity of the integrated metallurgical facility operated by M/s Kaalendi Ventures L.L.P. stands at a total complex throughput of 180,000.00TPA. This baseline is legally established under the Environmental Clearance (EC) granted by SEIAA, Bihar vide Identification No. EC23B008BR110300 dated 13.07.2023, and the subsequent active Consent to Operate (CTO) issued by the Bihar State Pollution Control Board (BSPCB) vide Ref. No. 761& 762 dated 02.04.2024. The specific baseline capacities are:

Table 3-1 Product Details

Product	Existing quantity (TPA)	Proposed quantity for NIPL (TPA)	Uses
	Induction furnace output		

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Product	Existing quantity (TPA)	Proposed quantity for NIPL (TPA)	Uses
Billet (in house)	90,000.00	1,35,000.00	Inhouse consumption
Rolling mill output			
TMT bar	68,000.00	45,000.00	Sold to market
Strip/ Billet	20,200.00	87,300.00	Inhouse consumption
Total *	88,200.00	132,300.00	
Strip's profile output			
M.S. Pipe (Tube)	80,000.00	120,000.00	Sold to market
Shutter profile	32,000.00	32,000.00	Sold to market
Grand Total (sellable) TMT + Pipe+ shutter profile	180,000.00	197,000.00	

**Total amount is considering the 2% as trimming and cutting losses.*

The existing procurement of billets is 93,000 TPA. Under the proposed configuration, strip/billets procurement will be reduced to 65,500 TPA, with the balance requirement being fulfilled through increased in-house production of strips.

3.2.2 Raw Material Details

Raw Material and Charge Mix Optimization: The proposed expansion will increase the annual metallurgical raw material requirement from 107,785 TPA to 161,677 TPA, directly supporting the capacity expansion of MS Billets from 90,000 TPA to 135,000 TPA via the installation of an additional 15-Ton Induction Furnace. To optimize resource efficiency, the facility is adopting a revised metallic charge mix: decreasing Sponge Iron (DRI) utilization from 80% to 55%, while increasing MS Scrap utilization from 15% to 35% and Pig Iron from 5% to 10%. The recovered fe-metal from slag will also used as input material for the induction furnace. No new raw material categories are proposed. The incremental requirement will be met through procurement from authorized suppliers and enhanced utilization of internally generated recyclable scrap. All raw materials will continue to be stored and handled within covered storage facilities equipped with appropriate environmental safeguards—including impervious flooring, dust suppression, and efficient material handling practices—ensuring strict compliance with applicable environmental norms while actively reducing specific solid waste generation.

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Table 3-2 Raw Material Details

Sr. No.	Raw Material	Existing Quantity (TPA)	Proposed Quantity (TPA)	Net Change (TPA)
1	Sponge Iron (DRI)	86,227	88,922	+2,695 (+ 3.12%)
2	M.S. Scrap	16,168	56,587	+40,419 (+2505)
3	Pig Iron & Others	5,389	16,168	+10,779 (+200%)
	Total Metallic Charge	107,785	161,677	+53,892
4	Billet/Strip procurement	93,000	65500	-27,500

3.2.3 Fuel and Energy Consumption Details

Because the facility operates electrical induction smelting technology and incorporates advanced process integration, the fuel consumption pattern is highly streamlined.

Table 3-3 Fuel and Power Consumption Matrix

S. No.	Energy / Fuel Name	Quantity (Baseline CTO)	Quantity (Proposed Post-Expansion)	Primary Source	Environmental & Process Parameters
1.	Electricity (Grid Demand)	11.0 MW	16.5 MW	Bihar State Power Holding Company Ltd. (BSPHCL)	Primary clean energy source for induction melting and mechanical rolling mills.
2.	Coal	150 kg/Ton	Nil		No emission from burning of coal
3.	High Speed Diesel (HSD)	180L/hr	180L/hr	Authorized Local Retail Outlets	Bypassed during normal operations. Restricted to standby emergency DG sets (times 500 KVA).

Table 3-4 : Comparative Assessment of Heating Technologies

Parameter	Fuel-Fired Reheating Furnace	Electric Resistance Furnace	Induction Heating System

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Fuel Combustion	Yes	No	No
PM Emission	High	Negligible	Negligible
SO ₂ Emission	Present (fuel dependent)	Nil	Nil
NO _x Emission	Present	Nil	Nil
CO Emission	Present	Nil	Nil
Direct Process Air Pollution	High	Very Low	Very Low
Heating Efficiency	40–70%	60–80%	80–95%
Scale Formation	High	Moderate	Low
Heating Time	Longer	Moderate	Shorter
Temperature Control	Moderate	Good	Excellent
Energy Utilization	Moderate	Good	Very High

The adoption of induction heating technology will therefore contribute to improved energy efficiency, reduced environmental footprint, enhanced product quality, and increased production capacity while ensuring compliance with applicable environmental standards.

3.3 Closed Loop Water and ZLD Verification

The existing water requirement of the complex is 51.5 KLD that will remain same. This increase is driven by the higher thermal cooling load of the induction loops and an expanded workforce, which will scale up from 100 to 120 manpower.

This water will be sourced entirely from existing authorized groundwater wells and supplemented by plant-wide rooftop rainwater harvesting setups. The expansion will generate zero industrial trade effluent, fully preserving the plant's strict Zero Liquid Discharge (ZLD) status. All domestic sewage, which was earlier managed via a septic tank system, will now be treated through a newly proposed on-site Sewage Treatment Plant (STP).

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Table 3-5 Water Consumption & Effluent Matrix

Water Demand Segment	Existing (KLD)	Change (KLD)	Total in NIPL (KLD)	Wastewater Generation (KLD)	Remarks
Industrial Process Cooling	45.0	+1daily make-up	46	Nil	Closed-loop cooling system will be adopted. No industrial effluent will be generated. Only 1 KLD/day make-up water is required to compensate for evaporation losses at approximately 2%. *15 KLD initial filling is a one-time requirement.
Domestic Consumption	6.5 (As per EC)	-1.1	5.4	4.7	Workforce will increase from 100 to 120 persons , increasing domestic water demand from 4.5 KLD to 5.4 KLD at 45 LPCD as per NBC norms. The balance 1.1 KLD water will be utilized for industrial purposes without compromising domestic requirements. Domestic sewage will be treated in the proposed 5 KLD STP , and treated water will be reused for greenbelt irrigation and other permissible uses .
Total Water Requirement	51.5 (As per EC)	No Change	51.5	4.7	As per the EC, 45 KLD is allocated for industrial use and 6.5 KLD for domestic use. With the workforce increasing from 100 to 120 persons , domestic water demand will increase from 4.5 KLD to 5.4 KLD , considering 45 LPCD/person as per NBC norms. The balance 1.1 KLD from the EC-approved domestic allocation will be transferred to industrial use. After expansion, only 1

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Water Demand Segment	Existing (KLD)	Change (KLD)	Total in NIPL (KLD)	Wastewater Generation (KLD)	Remarks
					KLD/day of make-up water will be required to compensate for evaporation losses (approximately 2%), while 15 KLD for initial system filling is a one-time requirement . Thus, the overall water requirement remains within the EC-approved limit, with no net increase in daily water consumption .

3.3.1 Water Treatment & Environmental Safeguards

- **Zero Liquid Discharge (ZLD) Compliance:** The plant operates on a strict ZLD configuration. The industrial cooling matrix features oil skimmers and dual-compartment settling scale pits to remove suspended iron-scale flakes. The treated water is continuously pumped back into the closed-loop cooling circuit, ensuring zero trade effluent discharge outside the plant boundaries.
- **Sewage Treatment Plant (STP) Implementation:** Domestic blackwater and greywater, totaling ~5 KLD, will no longer be routed to the legacy septic tank and soak pit system. Instead, a new, dedicated on-site **Sewage Treatment Plant (STP)** is proposed to treat all domestic wastewater. The treated sewage will be completely reused for on-site green belt development and dust suppression, ensuring zero environmental discharge into public surface-water corridors.
- **Monitoring& Resource Management:** Piezometric wells and digital flow meters are installed at the main intake lines to ensure accurate, real-time post-project water resource mapping and statutory compliance

3.4 Solid and Hazardous Waste Mapping

To prevent land degradation and maintain clean operational matrices, solid wastes are systematically categorized and safely managed:

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Table 3-6 Solid and Hazardous Waste Generation & Disposal Protocol

Waste Stream	Existing (TPA)	Proposed (TPA)	Net Change (TPA)	Waste Management / Disposal
A. Non-Hazardous Metallurgical By-products				
Slag (Non-Hazardous/Recyclable By-products)	14,201	12,530	-1,446	Combined generation is reduced by approximately 11.8% . Slag generation/reject reduces from 14,201 TPA to 12,530 TPA through an advanced Mechanical Separation System (Crushing + Magnetic Separation + Jigs) , with recovery of approximately 50% of entrapped metallic values. Recovered metal will be recycled back into the induction furnace, while the remaining inert slag will be utilized/sold to authorized users.
B. Coal Combustion Residues – Eliminated				
Coal Ash	5,367	Nil	-5,367	Completely eliminated due to replacement of the coal-fired reheating furnace with an electrically operated induction heating system .
C. Hazardous Waste (Scheduled Waste)				
APCD Dust (Bag Filter Dust)	147	147	Nil	Collected from bag filters associated with the induction furnaces and managed through authorized TSDF/recyclers in accordance with the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
APCD Dust from Re Heating Furnace	250	0	-250	Nil

Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar

Waste Stream	Existing (TPA)	Proposed (TPA)	Net Change (TPA)	Waste Management / Disposal
Total Hazardous Waste	147	147	Nil	No net increase in hazardous waste generation. APCD dust will continue to be managed through authorized agencies.
Spent Lubricating Oil (Hazardous Waste – Category 5.1)	1.2 KL/Annum	0.0	1.2 KL/Annum	Stored in leak-proof containers within a covered, impervious storage area and handed over to CPCB/SPCB authorized recyclers/re-refiners.

Table 3-7: Specific Waste Generation

Waste Stream	Existing (kg/T Billet)	Proposed (kg/T Billet)	Remarks
Slag	185.6	185.6	No change in specific slag generation.
Coal Ash	59.6	Nil	Eliminated due to replacement of the coal-fired reheating furnace with an induction heating system.
APCD Dust	1.63	1.09	Reduced due to higher production, although annual APCD dust generation remains unchanged.
Total Non-Hazardous Waste	250.3	190.6	Overall reduction of ~24% in specific waste generation.
Total Hazardous Waste (APCD Dust)	1.63	1.09	Reduction of ~33% in specific hazardous waste generation.

The proposed NIPL will lead to **overall improvement in waste minimization and resource recovery**. The total non-hazardous waste generation is reduced from 19,568 (**14,201 +5,367**) TPA to 12,530 TPA, resulting in a net reduction of 7,038 TPA (35.97%). This reduction is mainly attributed to the **complete elimination of coal ash** following replacement of the coal-fired reheating furnace and the reduction in final slag reject through the **Mechanical Separation System (Crushing, Magnetic Separation and Jigs)**, with recovery and recycling of entrapped metallic values.

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The recovered metallic fraction from slag will be **recycled back into the induction furnace**, while the processed inert slag will be utilized/supplied to authorized users. Further, **APCD dust generation remains unchanged at 147 TPA**, with proper collection and disposal through **authorized TSDF/recyclers**. Thus, the proposed modification will achieve **substantial waste reduction, increased material recovery and recycling, and improved waste management**, without any net increase in hazardous waste generation.

3.5 Spatial Resource Mapping

3.5.1.1 Greenbelt Development and Ecological Sinks

Land Area and Greenbelt Development: The total designated land area of the unit located in Fatuha is 6.897 Hectares (68,972.66 m²). Out of this integrated area, a dedicated zone of 2.277 Hectares (22,767.87 m²) has been developed into a dense, multi-tiered greenbelt. This achieves a green cover proportion of 33.01%, successfully satisfying the mandatory regulatory requirement of a 33% green buffer zone. The plantation layout features local, native, dust-tolerant species selected in strict compliance with the Central Pollution Control Board (CPCB) Guidelines for Developing Greenbelts (PROBES/75/1999-2000).

Table 3-8 Main Plant Species at the Kaalendi Ventures Premises

Sn	Botanical Nomenclature	Local Common Name	Canopy Style	Environmental Significance & Pollution Sink Capacity
1.	<i>Azadirachta indica</i>	Neem	Evergreen	High attenuation capacity for Particulate Matter (PM) and ambient noise.
2.	<i>Terminalia arjuna</i>	Arjun	Deciduous	Robust structural bark; highly tolerant to industrial dust loading.
3.	<i>Dalbergia sissoo</i>	Sheesham	Evergreen	Deep root matrix; functions as an effective topsoil binder.
4.	<i>Polyalthia longifolia</i>	Ashok	Evergreen	Columnar canopy; ideal for peripheral boundary noise attenuation.
5.	<i>Ficus religiosa</i>	Peepal	Evergreen	Wide canopy area; maximizes high-volume carbon sequestration.
6.	<i>Ficus benghalensis</i>	Banyan	Evergreen	Long-lived native species; provides local avifauna habitats.

- **Aesthetic and Environmental Buffering:** Open spaces along internal roads where tree plantation is physically restricted have been carpeted with flowering herbs and seasonal

grasses to bind topsoil and eliminate dust entrainment caused by vehicle movement. The existing greenbelt is regularly strengthened using organic manure and treated domestic wastewater.

3.6 Air Pollutants Emission and Mitigation

3.6.1 Stack Emissions

Air pollution load accounting maps point-source emissions from stationary processing machinery. The baseline facility utilizes an integrated Direct Hot-Rolling Matrix where raw steel billets exit the Continuous Casting Machine (CCM) at approximately 1000°C to 1050°C and transfer immediately onto insulated conveyor loops feeding the rolling mill roughing stands. This process design completely eliminates traditional fuel-fired reheating plants, allowing the facility to avoid all fossil fuel combustion emissions during continuous downstream processing.

To handle operational interruptions, mechanical bottlenecks, or short-term mill delays, an all-electric Induction Coil heating system is integrated directly onto the conveyor line to serve strictly as a clean thermal backup for normalizing billet temperatures. The standby emergency power network is restricted to a 1x500 KVA DG set running on High-Speed Diesel (HSD) with fuel consumption constrained to 180 L/hr exclusively during grid failure. The principal point-source parameter assessed under NIPL protocols is Particulate Matter (PM).

To handle the upscaled melting shop volume (with the Steel Melting Shop expanding from 90,000 TPA to 1,35,000 TPA), the plant is installing **one (1) additional 15-Ton energy-efficient electrical Induction Furnace**. To capture the extra process emissions from this new crucible, the plant will deploy supplementary high-efficiency lateral and fourth-hole canopy suction hoods at the furnace lip.

Furthermore, the downstream point-source filtering network will be upgraded to a larger, multi-compartment Pulse-Jet Bag Filter assembly utilizing advanced ePTFE-treated membranes. Even with the addition of the new 15-Ton induction furnace, this advanced air pollution control device (APCD) configuration is engineered to guarantee that final stack PM emissions remain strictly $\leq 150 \text{ mg/Nm}^3$ under peak operating conditions, securing a net environmental reduction in stack PM load from 460 kg/day to 450 kg/day and satisfying the criteria for a No Increase in Pollution Load (NIPL) status

Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar

The emission load calculations are given in **Table below**

Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar

Table 3-9 Point-Source Stack Emission & Performance Load Design

Point Identifier	Source	Design Gas Flow Rate (Nm³/hr)	Stack Ht. from Ground Level (m)	Stack Internal Diameter (m)	Permitted PM Level under Baseline EC/CTO (mg/Nm3)	Existing PM Emission Load (kg/day)	Proposed NIPL PM Emission Load (kg/day)	Engineering Justification & Pollution Control Equipment Specs
Steel Melting Shop Stack	(Expanded SMS: Existing 2X15 Ton + New 1X 15-Ton Induction Furnace & CCM Strands)	55,000/ Induction furnace	30.0	2	150	300	450	Upscaling suction canopy hoods over the expanded furnace bay (including the new 15-T unit) routed to an augmented pulse-jet bag filter assembly using woven fiberglass media with ePTFE membranes. Minimizes particulate output below baseline thresholds despite higher melt volume, fulfilling NIPL criteria.
Reheating furnace*		1,11,000	30.0	2	250	160	0	This unit will be replaced with Electric Induction coil.
Emergency Diesel Generator Stack	(1 x 500 KVA Standby Unit)	2,200	5 (above roof)	0.25	--	Intermittent (Emergency Only)	Intermittent (Emergency Only)	Retained exclusively for standby emergency operations during grid failure (bypassed during standard operations). No modification to capacity or fuel consumption; features an acoustic enclosure and optimized fuel-injection timings.

Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar

Total PM emission					460	450	
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***NO_x - 165 kg/day and SO₂ - 285 Kg/day will be omitted in the NIPL scenario as the Reheating furnace will be removed.**

3.6.2 Results of Air Modelling

Windrose Diagram shows that the predominant wind direction i.e. wind is blowing from North West and flows towards South East.

Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar

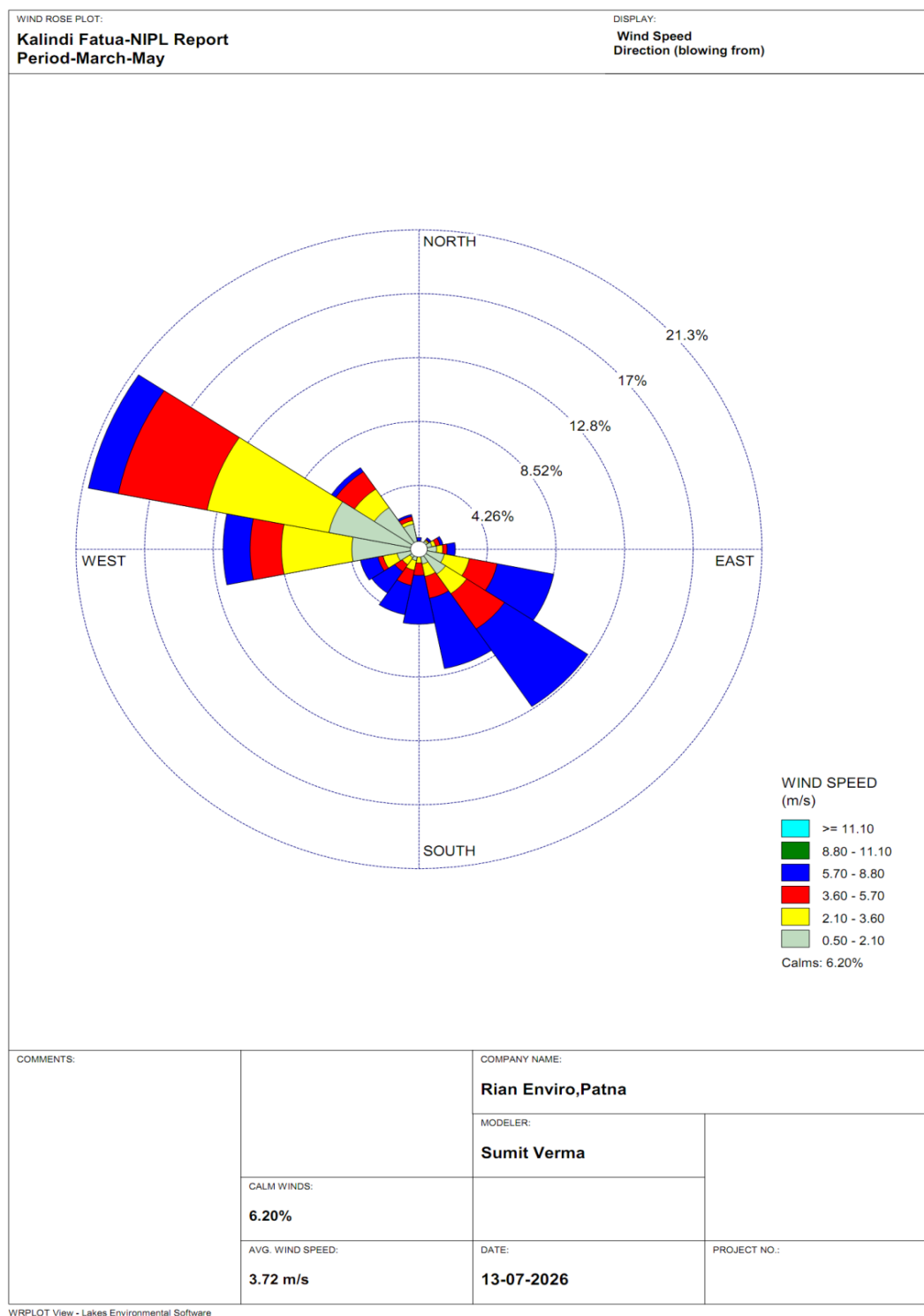


Figure 3-1: Windrose Diagram

NIPL of Kalindi Ventures
PM10-24Hrs-Controlled in Existing Scenario

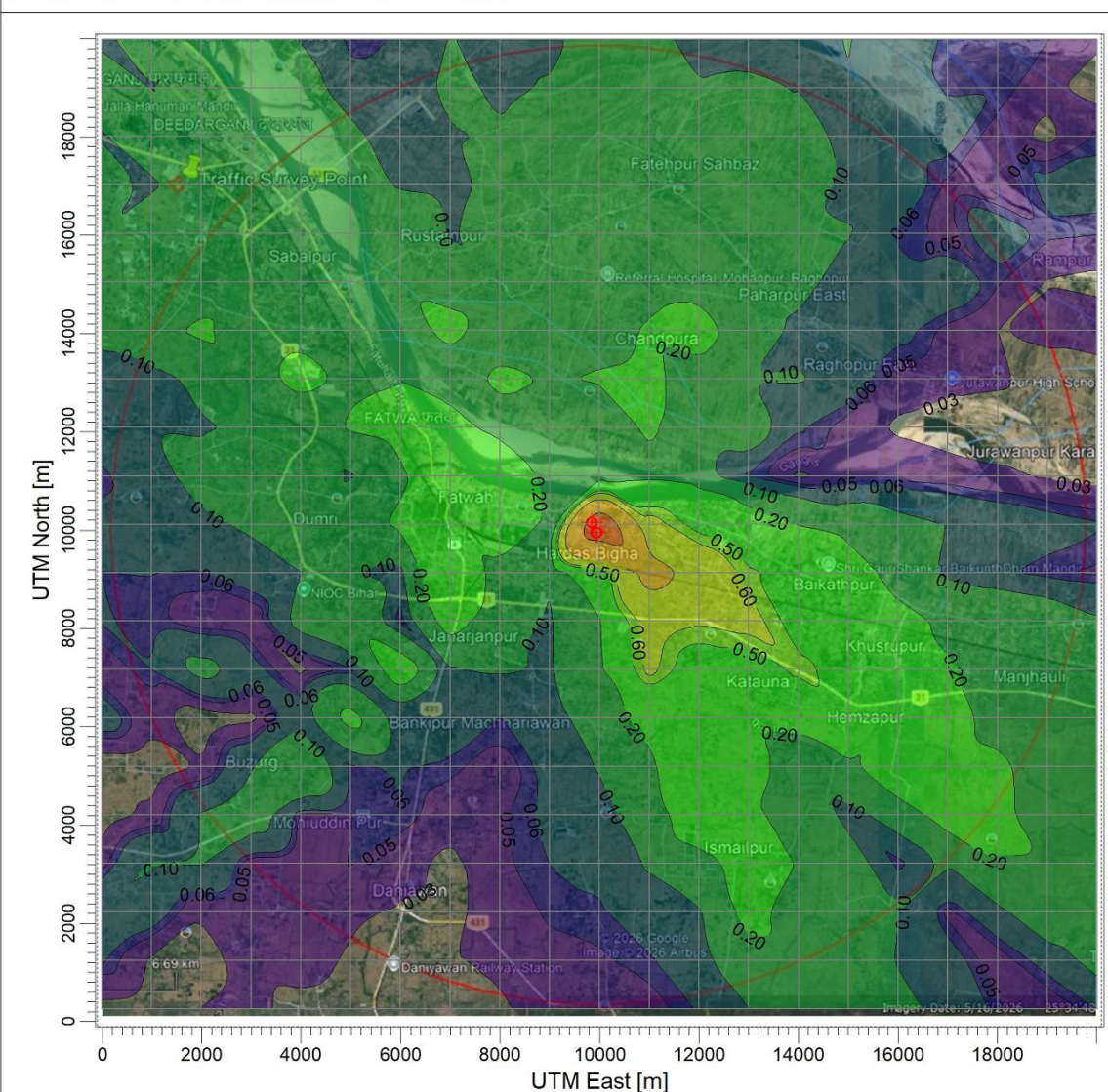


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Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar

NIPL of Kalindi Ventures

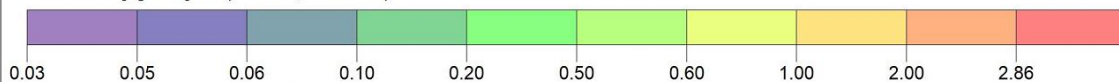
PM10-24Hrs-Controlled in Proposed NIPL Scenario



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

ug/m³

Max: 2.86 [ug/m³] at (9999.96, 10120.81)



3	Rian Enviro, Patna	
441	Sumit Verma	
Concentration	SCALE:	1:130,945
2.86 ug/m ³	0 5 km	

AERMOD View - Lakes Environmental Software

D:\Muzaffar\Metallurgy\Kaalendi Ventures\NIPLAQM\aqm\AQMNIP\AQMNIP.LSC

Figure 3-3: Isopleth of PM10 Controlled in NIPL Scenario

Assessment on “No Increase in Pollution Load” for M/S Kaalendi Ventures L.L.P at Khirodharpur, Fatuha, District-Patna, State- Bihar

The results of predicted scenario show that there will be no significant impact of dispersion on the overall air quality.

3.6.3 Fugitive Emission Audits and Material Handling Controls.

Fugitive particulate pathways at the metallurgical plant involve process mechanical transfers, raw charge loading/unloading, finish shears, internal transport routes, and slag handling yards. To prevent wind entrainment and dusting during handling, all bulk inputs (Sponge Iron/DRI, Scrap, and Ferro-Alloys) are confined to fully covered storage bays constructed with impervious concrete flooring.

Table 3-10 Existing vs. Proposed Fugitive Emission Management Infrastructure

Sn	Potential Fugitive Emission Source Point	Baseline Control Measures (As per EC/CTO)	Upscaled NIPL Control System Deployment	Net Fugitive Load Variance

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1.	Primary Raw DRI & Scrap Ingestion Bays	Periodic manual sweeping; open storage stockpiles.	Enclosed structural sheds with paved flooring and gravity-fed automated material handling chutes.	Significant reduction in wind entrainment.
2.	Intermediate Billet Direct Mechanical Conveyors	Insulated transfer tracks.	Fully enclosed insulated conveyor loops equipped with specialized jet-pulse nuisance bag filters.	Complete capture of high-temperature scale flakes.
3.	Reheating furnace	Pulverizer, dust suppression of the stock, covered transport bay	Not required as electric induction coil will be used for reheating	Complete reduction
4.	Plant Internal Logistics & Transit Roadways	Water sprinkling twice daily using mobile tankers.	Paved concrete roads with fixed mist-sprinkler arrays; water sprinkling frequency increased to 4 times daily.	Minimizes traffic dust re-suspension.
5.	Furnace Slag Separation Yard	Manual handling and open cooling beds.	Covered slag separation yards with integrated magnetic separation units and dust-suppression sprays.	Eliminates dry dust drift.

3.6.4 Interpretation:

The point-source emission matrix demonstrates clear adherence to the No Increase in Pollution Load (NIPL) statutory mandate by achieving a net reduction in localized particulate discharge despite a 50% increase in manufacturing volume. For the primary Steel Melting Shop (SMS) stack—which evacuates process fumes from the induction furnaces and continuous casting strands at a design gas flow rate of 55,000 m³/hr—the existing baseline setup operates at a permitted Particulate Matter (PM) threshold of 150 mg/Nm³, equating to a baseline emission load of 460.0 kg/day. Under the upscaled configuration, the facility replaces conventional suction canopy layouts with structurally optimized, high-temperature lateral movable suction hoods integrated into an advanced multi-compartment Pulse-Jet Bag Filter assembly. Utilizing high-efficiency woven fiberglass filter media treated with expanded Polytetrafluoroethylene (ePTFE) membranes, this air pollution control setup systematically cuts peak PM concentrations down to 150 mg/Nm³.

Concurrently, point-source emissions from the 1 × 500 KVA standby Emergency Diesel Generator (DG) stack remain completely unchanged and strictly intermittent. Operating at a

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design gas flow rate of 2,200 m³/hr through a 4.5-meter roof-mounted stack, the standby power unit is restricted exclusively to short intervals during grid failure. The incorporation of a built-in acoustic enclosure paired with optimized electronic fuel-injection timings ensures that emergency peak concentrations settle as per standard. Because the direct hot-rolling process matrix completely eliminates the need for any fossil-fuel-fired reheating furnaces across the rolling mill, the plant limits its industrial stack inventory to these two points. The mathematical product of volumetric flow rate and parameter concentration conclusively proves that upscaling the plant's operational capacity will result in a cleaner, more efficient emission profile that reduces the regional pollution footprint below existing baseline limits.

3.7 Online Continuous Emission Monitoring System (OCEMS)

To maintain transparent, verifiable reporting under NIPL frameworks, the facility has integrated an Online Continuous Emission Monitoring System (OCEMS). The instrumentation is linked directly to the central data servers of both the Bihar State Pollution Control Board (BSPCB) and the Central Pollution Control Board (CPCB) for real-time tracking.



Figure 3-4 Online Monitoring System

Table 3-11 Details of Online Monitoring System

Sn	Monitoring Attribute (Location / Source)	Constituents / Parameters Monitored	Date of Installation of OCMS	Date of Last Calibration of OCMS	Status of OCMS Functioning	Date of Connection to BSPCB Server	Date of Connection to CPCB Server
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1	Steel Melting Shop (SMS) Stack <i>(Continuous Emission Monitoring System - CEMS)</i>	Particulate Matter (PM)	09/08/2022	04/08/2025	Active & Functional	22-09-2022	26-09-2022
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3.8 Noise Pollution Assessment and Acoustic Mitigation

Anticipated Industrial Noise Sources: High-intensity point-source acoustic emissions ≥ 85 dB(A) at source) are localized around specific heavy-duty process machinery. These primarily include raw scrap processing units/shredders, high-capacity induction furnace power transformers, high-velocity cooling tower fans, reciprocating/screw air compressors, heavy finishing mill drive motors, and the multi-strand Continuous Casting Machine (CCM) shearing systems.

Ambient and Boundary Conditions: Ambient noise levels along the expanded **6.897-Hectare (17.04-acre)** property perimeter are strictly monitored and engineered to comply with the Model Rules under the Factories Act and CPCB Ambient Air Quality Standards for Industrial Zones. The perimeter noise levels are maintained well within the statutory thresholds of **75 dB(A) during day hours (06:00 to 22:00)** and **70 dB(A) during night hours (22:00 to 06:00)**.

Engineering and Acoustic Safeguards:

- **Vibration Isolation:** All upscaled rotating machinery, heavy motors, and induction furnace structures are anchored on reinforced, high-mass concrete foundations integrated with anti-vibration mounts and elastomeric pads (neoprene/polyurethane) to minimize structural-borne noise transmission.
- **Enclosures & Silencers:** High-volume air compressors and blowers are enclosed within custom acoustic hoods/enclosures lined with sound-absorbent rockwool material. High-velocity exhaust ports and pneumatic vents are fitted with industrial-grade reactive/absorptive silencers.

- **Workplace Hygiene & Mandatory PPE:** For areas exceeding the threshold of 85 dB(A), strict administrative controls (rotational shifts) are enforced to limit cumulative occupational noise exposure. Personnel deployed in high-noise zones (e.g., SMS floor, transformer rooms) are mandatorily equipped with high-performance hearing protection devices, including **custom-molded silicone earplugs and heavy-duty acoustic earmuffs certified under IS 9167 / IS 6229 standards**, ensuring a minimum Noise Reduction Rating (NRR) of 25–30 dB.

Ecological Attenuation Buffer: The strategically developed **2.277-Hectare (33.01%) dense, multi-tiered native greenbelt** functions as a highly effective natural acoustic barrier. The thick canopy design features dust-tolerant, broad-leaved native tree species planted in a staggered layout, which actively absorbs, refracts, and scatters high-frequency sound waves, preventing noise migration into the surrounding micro-environment.

3.9 Induction Furnace Performance Calculation & Cycle Optimization

The production throughput of the expanded Induction Melting Shop is governed by the total installed crucible capacity, the power density applied to the metallurgical charge, and the total operational cycles (heats) completed within a 24-hour manufacturing window.

Existing Operating Parameters (As per CTO): The plant operates an established twin-crucible network consisting of 2 Units of Medium Frequency Induction Furnaces with a capacity of 15 Tons each (Total Batch Holding Capacity = 30 Tons). Running at an average tap-to-tap cycle duration of 115 minutes, the shop completes 20 collective heats per day, yielding 300 Tons Per Day (TPD) of liquid steel. Over 300 annual working days, this equates to the baseline output of 90,000 TPA of M.S. Billets.

Upscaled Technical Framework: To scale up intermediate output to 1,35,000 TPA (450 TPD), the plant introduces **one (1) additional 15-Ton energy-efficient Induction Furnace**, increasing the total shop configuration to 3 Units of 15 Tons each. To power this expanded melting matrix and the downstream automated casting/rolling infrastructure, the total complex electrical demand drawn from the grid is scaled from 11.0 MW to 16.5 MW.

The Mathematical Validation: With the addition of the third 15-Ton crucible and the implementation of advanced digital thyristorized power panels, the shop floor manages a highly

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efficient parallel melting routine. Rather than forcing unrealistic melting speeds on older shells, the three-furnace matrix allows the plant to comfortably log a total of 30 collective heats per day across the three crucibles (an average of 10 heats per furnace per day), providing a stable tap-to-tap turnaround time of approximately 144 minutes per heat under optimal power management

$$\text{Total Steel melting Shop Output} = 3 \text{ Induction Furnaces} \times 10 \text{ heats/day/furnace} \times 15 \text{ Tons/heat} = 450 \text{ Tons Per Day (TPD)}$$

$$\text{Annual Billet Production} = 450 \text{ TPD} \times 300 \text{ operational days/annum} = 1,35,000 \text{ TPA M.S. Billets}$$

Table 3-12 Mechanical Optimization Parameters for Induction Melting Shop

Engineering Parameter	Baseline Status (Active CTO)	After Expansion Configuration (NIPL Framework)	Technological Intervention & Optimization Strategy
Physical Furnace Count	2 Units	3 Units	Addition of one (1) 15-Ton energy-efficient electrical induction furnace unit within the existing SMS bay footprint.
Volumetric Size per Crucible	15 Tons	15 Tons	Standardized shell sizing maintained across all units for uniform metallurgical blending.
Total Complex Grid Demand	11.0 MW	16.5 MW	Supplementary clean electrical power sourced from the grid to sustain the expanded 3-furnace melting matrix.
Total Shop Operational Heats	~20 Heats/Day	~30 Heats/Day	Achieved through the parallel operation of 3 units, averaging 10 optimized heats per furnace

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			inside a standard 24-hour window.
Daily Billet Yield	300 Tons	450 Tons	Proportional mass balance increase matching the downstream direct hot-rolling and continuous casting capacity.
Net SMS Annual Output	90,000 TPA	1,35,000 TPA	Exactly achieves the targeted 50% intermediate capacity expansion with zero fuel-combustion addition.

3.9.1 Downstream Direct Hot-Rolling Alignment

Once the liquid steel yield scales to 450 TPD across the three-induction-furnace matrix, it passes directly through the Continuous Casting Machine (CCM), which is retrofitted with intensified secondary water-spray cooling loops and high-speed copper mold jackets to sustain an accelerated continuous strand withdrawal velocity.

The red-hot billets emerge from the CCM strands at approximately 1000°C to 1050°C and bypass the traditional cooling yard stacking area entirely. Instead, they transfer immediately onto automated, heavily insulated hot-conveyor roller matrices that channel them straight into the roughing stands of the rolling mill. To ensure absolute process reliability during transient mechanical pauses or rolling bottlenecks, the line is integrated with an all-electric Induction Coil thermal backup system. This system instantaneously applies high-frequency electromagnetic energy to normalize billet core temperatures when necessary, bypassing the requirement for a fuel-fired reheating furnace.

Because the billets consistently retain their core thermal mass, structural deformation resistance remains remarkably low. This enables the automated mechanical rolling stands to run at accelerated linear delivery speeds, smoothly processing the additional 150 Tons per day generated by the expanded furnace shop while maintaining zero incremental combustion emissions (SO₂, NO_x, or fuel-derived PM) across the downstream processing sectors.

3.9.2 Finished Processing and Forming Mill Upgrades

- **M.S. Pipe & Tube Line (80,000 TPA----->1,20,000 TPA):** To match the increased billet processing volume, the secondary cold roll-forming mill undergoes an upgrade of its induction seam-welding modules. High-frequency solid-state tube welders are introduced, enabling the cold-formed steel strips to pass through the continuous forming, welding, sizing, and automated flying cut-off loops at a significantly higher linear velocity.
- **Shutter Profile Line (32,000 TPA-----→32,000 TPA):** The existing intermittent mechanically driven profile presses are replaced with multi-stage continuous automated cold roll-forming lines. This technical intervention enables raw steel coils to be uncoiled, profiled, structurally aligned, and cut to precision lengths in a single continuous automated pass, drastically eliminating dead time and scaling output capacity by exactly 50%.

3.9.3 Pollution Load Assessment Summary

A final analysis of point-source and fugitive emissions confirms that the proposed 50% capacity expansion at the Fatuha industrial complex meets NIPL guidelines. The implementation of advanced automation, closed-loop systems, and improved air pollution control technology ensures a net reduction in the facility's total emission footprint compared to baseline limits.

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Table 3-13 Comprehensive NIPL Pollution Load Comparison Matrix

Environmental Parameter Evaluated	Existing (EC/CTO)	Proposed (post-NIPL)	Net Change	Remarks
Total Water Demand	51.5 KLD (As per EC)	51.5 KLD	No Change	In NIPL – Cooling Water – 46 KLD Domestic Water – 5.4 KLD.
Domestic Sewage	6.0 KLD	-1.3 KLD	4.7 KLD	Reduction by 21.6%. Will be treated in 5 KLD STP
Process Trade Effluent	0 KLD	0 KLD	Nil	No Change
Particulate Matter (PM) Emission Load	460 kg/day	450 kg/day	-10 kg/day	Reduction by 2.2%.
SO ₂ & NO _x Emissions	NO _x - 165 kg/day and SO ₂ - 285 Kg/day.	NO _x - 0 kg/day and SO ₂ - 0 Kg/day.	Nil	Reduction by 100%. Reheating furnace will be removed.
Coal Consumption	14250 TPA	Nil	100% Reduction	Reduction by 100%. Reheating furnace will be removed
Coal Ash Generation	5,367 TPA	Nil	-5,367 TPA	Reduction by 100%. Completely eliminated due to removal of the coal-fired reheating furnace.
Slag (Non-Hazardous Waste)	14201 TPA	12530 TPA	-1446 TPA	Reduction by -10.2%.
Hazardous Waste (APCD Dust)	147 TPA	147 TPA	No Change	Dust from three induction furnaces only. Although one additional induction furnace is installed, omission of the reheating furnace maintains APCD dust generation at the existing level.
Spent Lubricating Oil (Hazardous Waste – Category 5.1)	1.2 KL/Annum	1.2 KL/Annum	No Change	Stored in leak-proof containers within a covered, impervious storage area and handed over to CPCB/SPCB authorized recyclers/re-refiners.
Project Cost	38.30 ₹ Crore	45.50 ₹ Crore	+7.20 ₹ Crore	Investment towards capacity enhancement and adoption of cleaner, energy-efficient technology.

3.10 Compliance of Criteria mentioned in S.O.980 (E) dated 02.03.2021 for NIPL

S.No.	Conditions	Compliance
	AND WHEREAS, with core principle of “no increase in pollution load”, the Central Government has amended the EIA notification by notifications number S.O. 3518(E), dated the 23 rd November, 2016 and number S.O. 236 (E), dated the 16 th January, 2020 providing flexibility in change in product-mix; change in quantities within products or number of products in the same category including resultant increase in the production with a cap of 50 per cent for which environmental clearance has been granted; change in configuration of the plant from the environmental clearance conditions during execution of the project	The unit is proposing expansion in the production capacity by 50% i.e. from existing capacity of MS Billet from 90000 TPA to 135000 TPA. TMT Bar from 68,000 TPA to 45,000 TPA MS Pipe 80,000 TPA to 1,20,000 TPA Shutter Profile from 32,000 TPA to 32,000 TPA
In paragraph 7 (II)	for clauses (b) and (c), the following clauses shall be substituted, namely: - <i>(b) Existing projects (having Prior Environmental Clearance) with no increase in pollution load:</i> Any increase in production capacity in respect of processing or production or manufacturing sectors (listed against item numbers 2,3, 4 and 5 in the Schedule to this notification) with or without any change in (i) raw material-mix or (ii) product-mix or (ii) quantities within products or (ii) number	Existing project has obtained EC from SEIAA Bihar vide File No SIA/3(a)/2048/2022 dt 13.07.2023. The project falls under the activity/sector list in item number 3 i.e. 3(a) Metallurgical industries (ferrous & nonferrous). (iv) configuration of the plant or process or operations in existing

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	of products including new products falling in the same category or (iv) configuration of the plant or process or operations in existing area or in areas contiguous to the existing area (for which prior environmental clearance has been granted) shall be exempt from the requirement of Prior Environmental Clearance provided that there is no increase in pollution load (derived on the basis of such Prior Environmental Clearance): <i>Provided that such exemption shall be applicable only consequent to</i>	area or in areas contiguous to the existing area i.e. 3.176 Ha contiguous to the existing area.
A	the project proponent furnishing information regarding such changes along with no increase in pollution load certificate, from the environmental auditor or reputed institutions empanelled by the State Pollution Control Board or Union Territory Pollution Control Committee or Central Pollution Control Board or Ministry of Environment, Forest and Climate Change, as per the procedure laid down in Appendix-XIII, on PARIVESH portal as well as to the concerned State Pollution Control Board or Union Territory Pollution Control Committee.	No increase in pollution load certificate is issued by M/S Environmental Management Division of IGL Kashipur, a QCI-NABET accredited EIA Consultancy Organization.
B	installation and implementation of Online Continuous Monitoring System (OCMS) with at least 95% uptime, connected to the servers of the Central Pollution Control	The unit has a well maintained Online Continuous Monitoring System (OCMS) which is producing more than 95% uptime

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	Board and State Pollution Control Board or Union Territory Pollution Control Committee concerned to report the quantity and quality, of emission and discharges:	realtime data and the same has been connected with CPCB and SPCB servers.
	Provided further that the provisions of this clause shall not be applicable if such change or increase results in change in category of project or activity from Category-„B2“ to either Category-„A“ or Category „B1“.	The existing project is a Category B project.

4 CONCLUSIONS AND RECOMMENDATIONS

In an overall assessment of the engineering modifications, resource utilization, and environmental performance, the proposed expansion of **M/s NIPL** qualifies as a **No Increase in Pollution Load (NIPL)** project in accordance with the provisions of the amended **MoEF&CC EIA Notification dated 2nd March, 2021 [Clause 7(ii)]**. The proposed investment of **₹45.50 Crores** is primarily directed towards process modernization, installation of an additional **15-Ton energy-efficient Induction Furnace**, replacement of the existing **coal-fired reheating furnace** with an electrically operated induction heating system, and strengthening of environmental management infrastructure. The project enhances the cumulative production capacity from **1,80,000 TPA to 1,97,000 TPA** on the area of **6.897 ha** plant premises. The proposed additional land measuring **31,762.656 m² (3.176 ha)** is contiguous to the existing EC-approved project area. Accordingly, the combined land configuration is considered with reference to the applicability of S.O. 980(E) dated 02.03.2021.

The proposed modification/expansion of the integrated steel plant is aimed at enhancing production efficiency, improving resource utilization, and transitioning towards cleaner production practices within the existing project configuration. The proposal includes an increase in **billet production from 90,000 TPA to 1,35,000 TPA (+45,000 TPA)** for in-house consumption and an increase in **final sellable products from 1,80,000 TPA to 1,97,000 TPA (+17,000 TPA)**. The expansion will be supported by installation of one additional **15-Ton Induction Furnace** and replacement of the existing coal-fired reheating furnace with an electrically operated induction heating system. The proposed changes will be implemented within the existing plant area along with the contiguous additional land, while maintaining the designated greenbelt area. The modification also incorporates enhanced scrap utilization, mechanical recovery of metallic values from slag elimination of coal consumption and coal ash generation, and continued **Zero Liquid Discharge (ZLD)** for industrial operations. These measures are intended to enhance production capacity while minimizing waste generation, reducing emissions, conserving natural resources, and strengthening circular economy practices.

4.1 Comparative Assessment of Environmental Load Post Expansion

Table 4-1 : Environmental Parameter Comparison pre and post NIPL

Environmental Aspect	Existing / EC Quantity	Proposed Expansion (Net Change)	Total post-expansion	Comparative Assessment & Compliance Strategy
Billet Production – In-house Consumption (TPA)	90,000	+45,000	1,35,000	Billet production increases by 50% through installation of one additional 15-Ton Induction Furnace . The entire billet production will be consumed in-house for manufacturing of rolled products; hence, billet is an intermediate product and is not considered separately as final sellable output.
Final Sellable Products (TPA)	1,80,000	+17,000	1,97,000	Final sellable production increases by 9.44% . The final products comprise TMT bars, M.S. pipes/tubes and shutter profiles, which will be sold to the market.
Total Fresh Water Requirement (KLD)	51.5 (As per EC)	No Change	51.5 (Same as per EC)	As per the EC, 45 KLD is allocated for industrial use and 6.5 KLD for domestic use. With the workforce increasing from 100 to 120 persons , domestic water demand will increase from 4.5 KLD to 5.4 KLD , considering 45 LPCD/person as per NBC norms. The balance 1.1 KLD from the EC-approved domestic allocation will be transferred to industrial use. After expansion, only 1 KLD/day of make-up water will be required to compensate for evaporation losses (approximately 2%), while 15 KLD for initial system filling is a one-time requirement . Thus, the overall water requirement remains within the EC-approved limit, with no net increase in daily water consumption .

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Environmental Aspect	Existing / EC Quantity	Proposed Expansion (Net Change)	Total post-expansion	Comparative Assessment & Compliance Strategy
Industrial Process Cooling (KLD)	45.0	+1 daily make-up	46	Closed-loop cooling system will be adopted. No industrial effluent will be generated. Only 1 KLD/day make-up water is required to compensate for evaporation losses at approximately 2 %. 15 KLD initial filling is a one-time requirement.
Domestic Water Consumption (KLD)	6.5	-1.1	5.4	Workforce will increase from 100 to 120 persons , increasing domestic water demand from 4.5 KLD to 5.4 KLD at 45 LPCD as per NBC norms. The balance 1.1 KLD water will be utilized for industrial purposes without compromising domestic requirements. Domestic sewage will be treated in the proposed 5 KLD STP , and treated water will be reused for greenbelt irrigation and other permissible uses.
Industrial Effluent (KLD)	Nil	Nil	Nil	Closed-loop cooling will be maintained and Zero Liquid Discharge (ZLD) will continue. No industrial wastewater discharge is envisaged.
Domestic Sewage (KLD)	6.0	-1.3	4.7	Domestic sewage will be treated through the proposed 5 KLD STP and treated water will be reused for greenbelt development/irrigation.
Stack PM Emission Load (kg/day)	460	-10	450	PM load will reduce due to elimination of the coal-fired reheating furnace and installation of high-efficiency Pulse-Jet Bag Filters.
SO ₂ & NO _x Emission Load (kg/day)	SO ₂ – 285; NO _x – 165	Reduction/ Elimination of reheating-	Lower than existing	Coal combustion will be eliminated by replacing the coal-fired reheating furnace with an electrically operated induction heating system.

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Environmental Aspect	Existing / EC Quantity	Proposed Expansion (Net Change)	Total post-expansion	Comparative Assessment & Compliance Strategy
		furnace emissions		
Slag (Non-Hazardous/Recyclable By-products) (TPA)	14,201	-1,671	12,530	Combined generation is reduced by 9.58% . Slag will undergo Mechanical Separation (Crushing + Magnetic Separation + Jigs) for recovery of metallic values. Recovered metal will be recycled back to the induction furnace, while inert slag will be utilized/sold to authorized users.
Coal Ash (TPA)	5,367	-5,367	Nil	Completely eliminated due to omission of the coal-fired reheating furnace.
APCD Dust – Hazardous Waste Category 35.1 (TPA)	147	No Change	147	Generated from bag filters associated with the induction furnaces. The waste will be managed through authorized TSDF/recyclers .
Spent Lubricating Oil – Hazardous Waste Category 5.1 (KL/Annum)	1.2	No Change	1.2	Stored in leak-proof containers in a covered, impervious storage area and handed over to authorized recyclers/re-refiners.

4.2 Overall Environmental Justification

Although the production capacity is proposed to increase by **approximately 50%**, the expansion incorporates modern engineering controls and cleaner production practices that substantially reduce the pollution intensity per tonne of steel produced.

Key environmental benefits include:

- **Production Capacity Enhancement:** The proposed modification will increase **billet production for in-house consumption from 90,000 TPA to 1,35,000 TPA**, representing a **50% increase (+45,000 TPA)**. The final **sellable product capacity will increase from 1,80,000 TPA to 1,97,000 TPA**, representing a net increase of **17,000**

TPA (9.44%). Since billets are fully consumed in-house, they are treated as an intermediate product and are not added separately to the final sellable product capacity.

- **Land Area and Contiguous Additional Land:** The proposed expansion will be implemented in the existing plant area along with **31,762.656 m² (3.176 ha)** of **additional contiguous land**. The combined project area is **68,972.656 m² (6.897 ha)**. Accordingly, the contiguous land configuration will be considered for applicability of **S.O. 980(E) dated 02.03.2021**, as applicable.
- **Greenbelt Development:** A total area of **22,767.873 m²**, equivalent to **33.01% of the combined project area of 68,972.656 m²**, has been earmarked for greenbelt and plantation development.
- **Installation of Additional Induction Furnace:** One additional **15-Ton energy-efficient Induction Furnace** will be installed, increasing the total number of induction furnaces from **two to three**. This will facilitate the enhancement of billet production from **90,000 TPA to 1,35,000 TPA**.
- **Omission of Coal-Based Technology:** The existing **coal-fired reheating furnace will be completely omitted** and replaced with an electrically operated induction heating system, resulting in cleaner and more energy-efficient operations.
- **Enhanced Scrap Utilization:** The metallic charge mix will be optimized through increased utilization of **M.S. Scrap**, reducing dependence on virgin raw materials and promoting resource conservation and circular economy principles.
- **Elimination of Coal Consumption:** Coal consumption associated with the reheating furnace will be **completely eliminated** following its replacement with an electrically operated heating system.
- **Elimination of Coal Ash:** The omission of the coal-fired reheating furnace will completely eliminate the generation of approximately **5,367 TPA of coal ash**, thereby substantially reducing the solid-waste burden of the plant.
- **Slag Recovery and Waste Minimization:** The entire induction furnace slag will be processed through an advanced **Mechanical Separation System comprising Crushing, Magnetic Separation and Jigs** for recovery of entrapped metallic values. Approximately **50% of the metallic values** will be recovered and recycled back into the induction furnace. Consequently, the final slag requiring utilization/disposal will reduce from **14,201 TPA to 12,530 TPA**, representing a reduction of approximately **11.8%**, despite the increase in billet production.

- **Hazardous Waste Generation:** APCD dust generation will remain unchanged at **147 TPA**, despite installation of one additional induction furnace. The additional dust generation associated with the new induction furnace will be offset by elimination of the coal-fired reheating furnace-related dust generation. The APCD dust will be managed through authorized recyclers/TSDF, as applicable.
- **Reduction in Air Pollution:** Replacement of the coal-fired reheating furnace with an electrically operated induction heating system, together with high-efficiency **Pulse-Jet Bag Filters**, will reduce the overall particulate matter emission load. The elimination of coal combustion will also eliminate the associated **SO₂ and NO_x emissions** from the reheating furnace, resulting in an overall improvement in the plant's emission profile.
- **Water Conservation and Zero Liquid Discharge:** Industrial cooling will operate through a **closed-loop cooling system**, requiring only **1.0 KLD/day of make-up water** to compensate for evaporation losses (approximately 2%). The 15 KLD required for initial filling of the cooling system is a **one-time requirement** and is not a recurring daily demand. As per the EC, **45 KLD** is allocated for industrial use and **6.5 KLD** for domestic use. With the workforce increasing from **100 to 120 persons**, domestic water demand will increase from **4.5 KLD to 5.4 KLD**, based on **45 LPCD/person** as per NBC norms. The balance **1.1 KLD** from the EC-approved domestic allocation will be transferred to industrial use. Thus, the **overall water requirement remains within the EC-approved limit, with no net increase in daily water consumption**, while **Zero Liquid Discharge (ZLD)** is maintained.
- **Domestic Sewage Management:** Domestic sewage generated from the increased workforce will be treated in the proposed **5 KLD STP**, with treated water reused for **greenbelt development/irrigation and dust suppression**, thereby minimizing freshwater consumption and preventing untreated sewage discharge.
- **Cleaner Production:** The proposed modification represents a transition from a **coal-based reheating process to an electricity-based heating system**, eliminating coal consumption and associated emissions while improving process efficiency and reducing the environmental footprint of the facility.
- **Resource Efficiency and Circular Economy:** Increased utilization of **M.S. Scrap**, recovery and recycling of metallic values from induction furnace slag, reduce dependence on virgin resources, and strengthen **circular economy practices** within the plant.

4.3 Performance Indicator

Table 4-2 : Performance Indicator Pre & Post NIPL

Performance Indicator	Existing	Proposed	Improvement
Billet Production Capacity	90,000 TPA	135,000 TPA	50% increase
Number of Induction Furnaces	2 Nos.	3 Nos.	Capacity enhancement with energy-efficient induction melting
Coal-fired Reheating Furnace and ash generation	1 No./ 5,367 TPA	Nil	100% eliminated
Industrial Effluent Discharge	Nil	Nil	ZLD maintained
Domestic Sewage Reuse	Septic Tank	100% through 05 KLD STP	Improved water recycling
Slag Recovery	14,201 TPA	12,530 TPA	50% metal recovery will be done from generated slag
APCD Dust Generation	147 TPA	147 TPA	No increase despite 50% higher billet production
Stack PM Emission	460 kg/day	450 kg/day	~2% reduction
NO _x and SO _x emission	NO _x - 165 kg/day and SO _x - 285 Kg/day.	Nil	100% eliminated
Fresh Water Consumption	51.5 KLD	~51.5 KLD	No increase in water demand as per the EC's sanctioned water consumption load of 51.5 KLD.

4.4 Conclusion:

Overall, the proposed modification **enhances billet production by 50%** while increasing final **sellable product output by only 9.44%**. Despite the increase in production, the project eliminates coal consumption and approximately 5,367 TPA of coal ash generation, **eliminates coal-fired reheating furnace-associated SO₂ and NO_x emissions**, **reduces PM emission load**, maintains APCD dust generation at the existing 147 TPA, and reduces final slag requiring utilization/disposal from 14,201 TPA to 12,530 TPA through enhanced metallic recovery. The project also maintains **Zero Liquid Discharge for industrial operations** and promotes

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recycling of slag-derived metallic values and increased M.S. scrap utilization. Overall, the proposed modification represents a transition toward a cleaner, more resource-efficient and circular steel manufacturing process with reduced fossil-fuel dependence and a lower environmental footprint.