ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT

343 TPD BIO-CNG PLANT, PRAYAGRAJ, UTTAR PRADESH, INDIA

SUBMITTED TO:

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

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Below Table will track all the revisions and updates that shall made in this ESIA from time to time.

Revision History						
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LIST OF ABBREVIATIONS/ACRONYMS

AAQ	*Ambient Air Quality*
AoI	*Area of Influence*
CGWA	*Central Ground Water Authority*
CGWB	*Central Ground Water Board*
CBG	*Compressed Biogas*
CNG	*Compressed Natural Gas*
CPCB	*Central Pollution Control Board*
CTE	*Consent to Establish*
CTO	*Consent to Operate*
DFBOO	*Design, Finance, Build, Own, Operate*
DG	*Diesel Generator*
DPR	*Detailed Project Report*
EHS	*Environment, Health and Safety*
EOI	*Expression of Interest*
EPA	*Environment (Protection) Act 1986*
ERMPL	*EverEnviro Resource Management Private Limited*
ERT	*Emergency Response Team*
ESIA	*Environmental and Social Impact Assessment*
ESMP	*Environmental and Social Management Plan*
ESMS	*Environmental and Social Management System*
FOM	*Fermented Organic Manure*
GGEF	*Green Growth Equity Fund*
GRM	*Grievance Redressal Mechanism*
HSE	*Health, Safety and Environment*
IEISL	*Indo Enviro Integrated Solutions Pvt Ltd.*
INDUS	*INDUS Environmental Services Pvt. Ltd.*
MSW	*Municipal Solid Waste*
NDMA	*National Disaster Management Authority*
NH	*National Highway*
NIIFL	*National Investment and Infrastructure Fund Limited*
PMC	*Prayagraj Municipal Corporation*
PPE	*Personal Protective Equipment*
PPP	*Public Private Partnership*
PUC	*Pollution Under Control*
RNG	*Renewable Natural Gas*
SPCB	*State Pollution Control Board*
SEZ	*Special Economic Zone*
SLF	*Sanitary Landfill Facility*
SPV	*Special Purpose Vehicle*
SSO	*Source Segregated Organics*
TDS	*Total Dissolved Solids*
UPSDMA	*Uttar Pradesh State Disaster Management Authority*

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0. EXECUTIVE SUMMARY

0.1 INTRODUCTION

EverEnviro Resource Management Private Limited (herein after *"EverEnviro"* or *"ERMPL"*) is a leading Compressed Biogas (CBG) Developer with pan India footprint, providing end to end solutions for sustainable management of various types of wastes covering but not limited to municipal solid waste (MSW), agricultural waste and residues, construction & demolition waste, and industrial waste. The company focuses on delivering services through implementation of state-of-the-art technologies across the waste management value chain that helps in prevention of pollution while contributing to the climate change mitigation. Indo Enviro Integrated Solutions Private Limited (IEISL) is 100% subsidiary of EverEnviro, which is engaged in specialized sector of CBG related projects.

Prayagraj Municipal Corporation (PMC) has signed a concession agreement (CA) with IEISL on 22nd November 2022, for setting up a Bio-CNG Plant to process 200 TPD of Source Segregated Organic (SSO) fraction of MSW on Design, Finance, Built, Own, Operate (DFBOO) basis under Public-Private Partnership (PPP). As per clause 2.3 of the CA, concessioner has right to use Agriculture Waste, Agro-Industrial Waste, Cattle Waste, Energy Crop etc. Therefore, EverEnviro has adopted a multi feedstock approach and decided to utilize other feedstocks such as paddy straw, Cattle dung and chicken litter along with the SSO Fraction of MSW and planned to establish a 343 TPD Bio-CNG Plant in District Prayagraj, Uttar Pradesh (UP). The proposed prosed project is located at Zone-5, Naini, Village Jahangirabad, Prayagraj, Uttar Pardesh. The land of the proposed project is owned by PMC and leased to EverEnviro for entire concession period i.e. twenty five (25) years.

In this context, the project necessitates a comprehensive evaluation of environmental and social risks through an Environmental and Social Impact Assessment (ESIA). The ESIA study is integral to identifying and addressing the environmental and social (E&S) risks and anticipated impacts associated with the establishment and operation of the Bio-CNG Plant.

EverEnviro is committed to identifying key E&S risks and assessing potential impacts of the proposed project activities. These risks will be thoroughly analyzed during the ESIA process, ensuring alignment with EverEnviro's Environmental and Social Management System (ESMS). EverEnviro's ESGMS has been formulated as per the requirements of GGEF's ESG policy and ESGMS requirements. The Everenviro ESGMS is aligned with the ESGMS of GGEF and applicable Indian E&S legal requirements. The ESIA plays a pivotal role within the ESMS by establishing a structured approach to the identification, management, and mitigation of E&S risks and impacts. The findings and mitigation strategies will be systematically documented in an Environmental and Social Management and Monitoring Plan (ESMMP).

0.2 PROJECT OVERVIEW

Prayagraj Municipal Corporation (PMC) is the Municipal Corporation of Prayagraj in the State of UP and is responsible for providing municipal and civic services that include the collection, transportation, processing and disposal of solid waste generated under municipal service area of Prayagraj. PMC has signed a concession agreement with IEISL on 22nd November 2022, for Design, Finance, Built, Own, Operate BioCNG Plant of 200 TPD capacity based on Source Segregated Organic (SSO) fraction of MSW. However, as per clause 2.3 of the CA, concessioner has right to use Agriculture Waste, Agro-Industrial Waste, Cattle Waste, Energy Crop etc. Therefore, EverEnviro has adopted a multi feedstock approach and decided to utilize other feedstocks such as paddy straw, Cattle dung and chicken litter along with the SSO Fraction of MSW and planned to establish a 343 TPD Bio-CNG Plant in District Prayagraj, Uttar Pradesh (UP). The proposed prosed project is located at Zone-5, Naini, Village Jahangirabad, Prayagraj, Uttar Pardesh. The land of the proposed project is owned by PMC and leased to EverEnviro for entire concession period i.e. twenty five (25) years. The proposed BioCNG Project, will be having total capacity of 343 TPD, and it will be based on SSO Fraction of MSW (200 TPD), paddy straw (90 TPD), Cattle dung (30 TPD) and chicken litter (23 TPD). It is intended to utilize SSO

as feedstock along with other available feedstocks and generate 21.5 ton CBG per day. The plant will be receiving the MSW from PMC and other feedstock from various local suppliers.

0.3 Environmental and Social Regulatory Framework

Reference frameworks applicable to the Project are provided below:

- Applicable E&S regulations and policies in India and the State of UP;
- Green Growth Equity Fund (GGEF) ESGMS;
- ESGMS of EverEnviro;
- International Finance Corporation's (IFC's) Performance Standards 2012 for E&S sustainability;
- The World Bank Group (WBG) General EHS Guidelines 2007;
- The WBG EHS Guidelines for Gas Distribution Systems 2007;
- The WBG EHS Guidelines for Waste Management Facilities 2007;
- Relevant International Labour Organization (ILO) Conventions;
- Good International Industry Practice (GIIP) Guidance.

0.4 Environmental and Socio-Economic Baseline

Climate and rainfall: Prayagraj has a typical humid subtropical climate, which is common in cities across north-central India. The hot season (summer) lasts from March to June, followed by the southwest monsoon that occurs from mid-June to September and the cold season or winter, extends from December to February.
The average monthly maximum temperature is 32.8°C, while the average monthly minimum temperature is 19.5°C. January is the coldest month, with a mean daily minimum temperature of 9.1°C and a mean daily maximum temperature of 23.7°C. In contrast, May is the hottest month, featuring a mean daily maximum temperature of 42.1°C and a mean daily minimum temperature of 27.4°C.

Ambient air quality: Ambient air was monitored in the project area in the month of November 2024 to estimate the quality of ambient air in and around the project site. The air quality was analysed at five (05) locations. From each location, two (2) samples were taken in a 24-hour period to estimate the concentration of primary pollutants in the ambient air. The sampling locations were selected considering the presence of habitation nearby, their accessibility, upwind and downwind directions, electricity availability and security of equipment. Results of Ambient air monitoring were within limits specified under NAAQS 2009.

Ambient noise quality: Ambient noise level was monitored continuously for 24 hours at five (5) locations around the project area using Sound Level Meter at the identified receptor locations. The noise levels obtained were analysed to arrive at the equivalent continuous noise level (Leq) for day and night-time. The day and night-time hours ranged from 06:00 to 22:00 hrs and 22:00 to 06:00 hrs respectively. Monitored Ambient noise level were found within specified limits as per Noise rules.

Drinking/Ground water quality: Sample of drinking water from nearby area of project site were collected and analysed for physico-chemical, heavy metals and biological parameters and compared to drinking water standards and found within limits.

Surface water quality: Surface water quality was assessed by collecting samples from the Yamuna River at strategic locations around the project site. A sample was taken from the Yamuna River, located 0.25 km north (upstream) of the project site. Additionally, two samples were collected downstream of the project site- one sample before the Sangam, located 1.3 km east of the project site, and another after the Sangam. These samples aim to evaluate the baseline surface water quality and assess potential impacts on water resources due to project activities.

Soil environment: Soil samples were collected from four (4) locations within project site, one sample each at 2.5m below ground surface. Additionally, (3) three soil samples were collected (1 upstream and 2 downstream of the site). In total, seven (7) soil samples within and outside of the site were collected and were analysed.

Traffic: Assessment of existing traffic conditions in the project area was undertaken to identify the problems with respect to traffic movement and to formulate the possible alternative solutions and the need for organizing the same in an efficient and economical manner. A traffic volume count survey was conducted at the road adjacent to the site.

Social baseline environment: The project site is located in Prayagraj, UP. UP is the fourth largest State in India covering an area of 2,40,928 sq. km, which is 7.33 per cent of the geographical area of the country. It borders Nepal and Uttarakhand in the North; Himachal Pradesh in the North-west; Haryana, Delhi and Rajasthan in the West; Madhya Pradesh in the West and South-west; Chhattisgarh and Jharkhand in South and South-east, and Bihar in the East. UP is administratively divided into 18 divisions, 75 Districts and 822 development blocks. There are 915 urban bodies, 13 municipal corporations, 226 municipal boards, 59,163 gram sabhas, 8,135 nyaya panchayats, 1,07,040 villages and 650 cities and towns.

The district of Prayagraj (erstwhile Allahabad) is situated at the southern tip in eastern side of UP. For implementation and monitoring of development scheme the district is divided into 20 Development Blocks. The project site completely falls under the Chaka Block in Prayagraj District, which consists of about 102 villages.

Total population in Chaka Block (where the study area is located) is 1,73,866 and on an average 1,280 people live in every sq.km. of the land. The study area is densely populated compared to the overall population density in Prayagraj district and UP. As of 2024, the population in Prayagraj District is projected to approximately 72,70,000 people accounting to the population density of approximately 1,326 persons per sq.km of land. The high population density in the Chaka Block maybe due to its location within PMC & proximity to Triveni Sangam, Allahabad Fort, city centre, other infrastructures and educational institutions.

0.5 Analysis of Alternatives

Detailed analysis of the alternatives has been conducted considering both with and without project, alternate technology for the Project and benefits of the Project. The development of BioCNG Plant is likely to have a positive impact on the environmental and economic value of the region. However, there are certain environmental and social issues, which need to be mitigated for sustainable development.

0.6 Stakeholder Engagement

Stakeholder participation and consultation is an essential process to meaningfully engage stakeholders and discuss potential environmental, social and economic impacts (both positive contributions and potential risks) that the project may have during the design, planning, implementation and operational stages of the project and to establish an ongoing mechanism for feedback in consultation with stakeholders. For stakeholders, the consultation process creates an opportunity to be informed, as well as to inform the company about local contexts that may not be obvious, to raise issues and concerns and to help shape the objectives and outcomes of the project. The following section presents the consultative and participatory mechanisms that were adopted along with the outputs of these consultations.

INDUS Team visited the Project Site from 23rd October – 24th October 2024 and 19th November – 21st November 2024. The Project Manager at the site was notified in advance about the various kinds of stakeholders that INDUS Team would like to consult regarding the project. In this regard, consultations with PMC, feedstock suppliers of cattle dung, paddy straw & chicken litter, waste collectors, forest

department officials, etc. were undertaken, to better understand the modalities of the project and the waste management practices in the city. Consultant's social experts interacted with the local community including women, about the likely impacts, social risks, safety, livelihood, awareness, and opinions about the project.

0.7 FEEDSTOCK ASSESSMENT

Feedstocks for BioCNG plants come from a variety of sources, including municipal waste, agricultural by-products like paddy straw, poultry waste such as chicken litter, and livestock waste like Cattle dung. Each of these feedstocks presents distinct procurement challenges, such as sourcing, transportation, seasonality, and contamination risks. Effective supply chain management addresses these challenges, ensuring that the feedstock delivered to the BioCNG plant meets the necessary quality standards and is available in the right quantities at the right time.

This assessment focuses on understanding the dynamics of feedstock procurement in Prayagraj, identifying key risks and opportunities, and evaluating the efficiency of the supply chain. It includes an analysis of local supply sources, transportation risks, cost considerations, and environmental factors based on the information collected during site visits conducted by INDUS team in the months of October 2024 and November 2024. By evaluating these factors, EverEnviro can optimize its feedstock procurement strategies, reduce risks, and enhance the overall economic viability of the BioCNG production process at its BioCNG plant.

0.8 EVALUATION OF IMPACTS

This chapter evaluates the significance of each identified impact based on the collective severity of its spread, duration, intensity, and nature. Key identified impacts include:

Pre-construction and Construction Phase

During this phase, the activities that may have impacts on the environment include site preparation, evacuation and leveling; hauling of earth material and wastes; cutting and filling; erection of concrete and steel structures; painting and finishing; clean-up operations; and landscaping.

The project site was agricultural land and hence had native soil. The intensity of the impact can be considered as low. Soil contamination may result due to accidental spillage and inappropriate storage of diesel or transformer oil, etc.

Ambient air quality: The impact on ambient air quality is anticipated due to the various Project activities such as site preparation, biogas units' installation, pipeline laying, internal road network, transportation of raw materials and porta cabins, along with land clearing, levelling, excavation, grading activities, vehicle movement and Diesel Generator (DG) sets operation. The main impacts associated with construction activities shall include dust generation, exhaust emissions, etc.

Ambient noise quality: Construction will cause increased noise levels due to activities such as grading, excavating and drilling for foundations, concrete batching, construction of ancillary structures, and operation of diesel generators, material movement and site clean-up, and construction equipment like scrapers, concrete mixers, generators, pump, rock drills, etc. There is potential for disturbance to habitations in proximity of construction site. Movement of traffic during night hours can also disturb the local community. Approximately 85 – 90 dB (A) of noise is expected to be generated from construction activities which will attenuate to less than 55 dBA ((i.e., day time prescribed noise level for residential area), as well as 45 dB(A) (i.e., night time prescribed noise level for residential area), at about 100 m. The nearest habitations from the Project site are approximately 200 m away.

Impact on Water Quality: The Yamuna River is located to the North of the project site, running parallel to the Arail Road at a distance of ~250 m. Any spillage of chemicals or disposal of waste in or near project site can cause water pollution issues.

Solid and Hazardous Waste Management: The construction activities will generate different types of solid and hazardous wastes such as domestic solid waste and sewage; used oil, oil-soaked rags from generator and other construction machinery; packaging waste such as gunny bags, plastics, etc.; empty paint containers, metal scraps, and construction debris. Improper disposal of packaging materials, boxes, plastics, ropes etc. can lead to littering in the construction site and surrounding areas. Hazardous wastes such as used oil from DG sets, lubricants, hydraulic oil etc. can cause contamination of soil and water bodies if adequate precautions for storage, management and handling are not undertaken. Spillage of chemicals such as paints (if any), and curing chemicals can lead to contamination of soil.

Traffic and Transport: The Project construction activities will lead to additional traffic and increased risk of traffic-related accidents and industries to the community and workers. The traffic density along the State Highway is moderate and has adequate carrying capacity to accommodate the additional traffic due to the construction activities. However, the Arail road connecting the project site is narrow (~3.5 m wide) and hence when used for project activities will lead to increased vehicular movements which may have temporary dust entrainment related impacts on the community.

Occupational Health & Safety: The activities included in the construction phase that have potential impact to OHS of workers are land clearance for establishment of temporary structures, access road, digester tanks, mobilisation of equipment and contact with harmful gases. The following occupational health and safety risks are frequently present, in particular during the construction phase:

- Mobile vehicles and heavy equipment accidents;
- Heat stress when working in humid and high temperatures;
- Manual handling and musculoskeletal disorders;
- Vibration impacts from concrete breakers, grinders, hammer drills, chipping hammers, chainsaws, scrabbles and needle guns;
- Tripping due to uneven surfaces and obstacles;
- Falling during working at height;
- Fire due to hot works, smoking and failure in electrical installations; and
- Electrical shocks.

Operation Phase

Visual Impacts and Aesthetics: The visual impacts are evaluated with reference to passing motorists and fixed settlements, primarily the under-construction Shivalay Park adjacent to the site. The visitors to the Park may find the BioCNG Plant unaesthetic. To mitigate this, (i) landscaping around project boundary is recommended (fast-growing, dense trees such as bamboo and shrubs should be planted along the western boundary of the project site to create a natural visual barrier); (ii) Wind and acoustic barrier wall of appropriate height, constructed with suitable materials, should be provided.

Soil and Water Quality: Compaction of soils nearby and inside the project boundary from increased levelling and grading of areas will result in lower permeability and therefore, decreased infiltration and increased runoff.

Organic waste will be segregated at the source, with expected impurities not exceeding 10%, which will be received through Material Entry Gate and unloaded in the Pre-Treatment Shed area. To ensure the removal of impurities up to 10% by weight, source-segregated organic (SSO) waste will be passed through a segregation mechanism. Paper, plastics, and metal will be separated using a fine segregation system involving a conveyor belt and trommel. The segregated waste will be sent to a Hammer Mill to

reduce the size of the materials, while the rejected waste will be directed to Baswar Sanitary Landfill Facility (SLF), located at an aerial distance of ~8 km, for further processing.

During project operation, the output slurry from the digester will be sent to SLS where it will be dewatered and converted into compost/manure that will be sold off. Separated water from the process will be resent to process and excess waste water will be sent to Effluent treatment Plant (ETP), provided within the plant. Approximately 20 KLD domestic sewage and 127 KLD process wastewater is expected to be generated from the Plant. The Plant shall be discharging its domestic sewage through septic tanks and soak pits, and an ETP of capacity 140 KLD will be provided for treatment of process wastewater. The ETP is designed to treat and recycle waste water generated from various processes within the plant, it will consist of a Membrane Bioreactor (MBR) system integrated with Polyvinylidene Fluoride (PVDF) membranes, offering advanced filtration. Treated water shall be utilized in for gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads, remaining treated water shall be discharged to nearby STP of 42 MLD, for further treatment and final disposal. The Plant shall install necessary pipeline/drains and ensure necessary permissions from concerned authorities and agreement with STP administration for discharge of treated water to the STP.

Local Economy and Employment Generation: During construction phase, project would require a workforce of ~170 persons as well as vendors for vehicles and construction equipment. During its operations phase, the project will require about 130 persons to work at the facility. If hired locally, the project will contribute to the local economy positively. Additionally, feedstocks such as Paddy Straw, Cattle dung and Chicken litter shall be locally purchased, which will generate more employment and income generation opportunities to locals.

Decommissioning Phase

Typical activities during the Bio-CNG plant decommissioning and site reclamation phase include facility removal, breaking up of concrete pads and foundations, removal of access roads that are not maintained for other uses, re-contouring the surface, and re-vegetation.
Dismantling operation however will have impact on environment due to noise and dust arising out of it. During de-installation, following measures shall be adopted to handle each type of item to keep the impact low during the actual activity.

The mitigation measures for decommissioning shall include but not limited to following:

- The proponent shall inform the workers and local community about the duration of work;
- The workers shall be clearly informed about the expected schedule and completion of each activity;
- All waste generated from decommissioning phase shall be collected and disposed of at the nearest municipal disposal site or vendor;
- Sprinkling of water shall be carried out to suppress dust from decommissioning activities and transport movement;
- All necessary PPEs shall be used by the workers during demolition work;

0.9 Environmental and Social Management & Monitoring Plan

The ESMMP consists of a combination of operational policies, procedures and practices. Overall responsibility for ESMMP lies with EverEnviro, whereby specific actions will be carried out by the Contractors (including sub-contractors) at different stages. The Contractors' activities, will be supervised by EverEnviro to ensure that the implementation is being performed as planned.

0.10 Conclusion

The Bio-CNG project is a clean technology initiative that converts waste into energy, offering a sustainable solution with minimal environmental impact. The project does not require land acquisition,

ensuring that there are no displacement concerns. Further, the project site does not coincide with or overlap any designated areas [such as Legally protected areas i.e., Wildlife Sanctuary (WLS), National Park (NP), Eco sensitive Zones (ESZs), etc. or internationally recognized areas viz., Key Biodiversity Areas (KBAs), etc.], further reducing environmental risks. Available data suggests that the construction, operation, and decommissioning of the plant are likely to result in limited environmental and social impacts, all of which can be effectively managed through well-established mitigation measures. **This makes the project suitable for classification as an IFC Category B project.**

Based on the ESIA and surveys conducted for the Project, it can be safely concluded that associated potential negative environmental and social impacts can be mitigated to an acceptable level by adequate implementation of the measures as stated in the ESIA Report.

The E&S Management and Monitoring Plan (ESMMP) describes mitigation measures for impacts specific to Project activities and also discuss implementation mechanism. To conclude, the implementation of ESMMP/Management plans will help EverEnviro in complying with its internal E&S requirements as well as National/State E&S regulatory framework in addition to meeting IFC PS requirements.

1. INTRODUCTION

1.1 PROJECT OVERVIEW

Ever Enviro Resource Management Pvt Ltd (hereinafter referred to as the "***EverEnviro***" or "***Company***") plans to establish a Bio-CNG Plant in Zone-5, Naini, Village Jahangirabad, Tehsil Karchhana, District Prayagraj, Uttar Pradesh (UP). The proposed project involves the bio-methanation of a mixed feedstock comprising Source Segregated Organics (SSO) from Municipal Solid Waste, paddy straw, Cattle dung, and chicken litter to produce Bio-CNG. In this context, the project necessitates a comprehensive evaluation of environmental and social risks through an Environmental and Social Impact Assessment (ESIA).

INDUS Environmental Services Pvt. Ltd. (hereinafter referred to as "**INDUS**") has been engaged by EverEnviro for conducting the ESIA Study for Bio-Compressed Natural Gas (Bio-CNG) and Compost [Fermented Organic Manure (FOM)] Plant, in Prayagraj in the State of Uttar Pradesh, India (hereinafter referred to as "***Project***").

EverEnviro intends to identify the E&S risks and key anticipated impacts of proposed project activities involved in establishment of Bio-CNG Plant which needs to be investigated and evaluated for potential risks during the ESIA study. The ESIA is a key component of Company's Environmental and Social Management System (ESMS), as it highlights the Company's approach to identify, manage and mitigate environmental and social (E&S) risks and impacts which are documented in an E&S Management and Monitoring Plan (ESMMP). Conducting ESIA provides particular attention to impacts related to ESMS standards such as adverse impacts on people's livelihood through access restrictions or resettlement, on indigenous peoples, on cultural heritage or on biodiversity.

Prayagraj Municipal Corporation (PMC) is the Municipal Corporation of Prayagraj in the State of Uttar Pradesh and is responsible for providing municipal and civic services that include the collection, transportation, processing and disposal of solid waste generated under municipal service area of Prayagraj which will be useful in the running of Bio-CNG and Compost (FOM) Plant. In accordance with Uttar Pradesh Solid Waste Management Policy 2018, which promotes Private Participation and Investment in Solid Waste Management (Collection, Segregation, Transportation, Processing and Disposal), PMC had invited proposals from eligible bidders through Expression of Interest# Nit No/77/2022/ENV dated 28th April 2022 ("**EOI**") to set up a Bio-CNG Plant to process 200 TPD (expandable in future) quantity of Source Segregated Organic (SSO) fraction of MSW on Design, Finance, Built, Own, Operate (DFBOO) basis under Public-Private Partnership (PPP). In response to the EOI, IEISL submitted its proposal dated 9th June 2022 to implement the Project. PMC issued Letter of Acceptance through Letter# 615/Env/2022 dated 29th October 2022 to IEISL and directed to sign the Concession Agreement within 30 days from the date of its issuance.

Subsequently, PMC has signed a concession agreement with IEISL on 22nd November 2022, for DFBOO 200 TPD capacity. PMC is obligated to supply Minimum Obligated Quantity 200 TPD, in the yearly progressive manner, from third year onwards, during concession period. Maximum 10% impurities are allowed in Minimum Obligated Quantity at any stage of time. As per clause 2.3 of the CA, concessioner has right to use Agriculture Waste, Agro-Industrial Waste, Cattle Waste, Energy Crop etc. Therefore, EverEnviro has adopted a multi feedstock approach and decided to utilize other feedstocks such as paddy straw, Cattle dung and chicken litter along with the SSO Fraction of MSW and planned to establish a 343 TPD Bio-CNG Plant in District Prayagraj, Uttar Pradesh (UP). The proposed prosed project is located at Zone-5, Naini, Village Jahangirabad, Prayagraj, Uttar Pardesh. The land of the proposed project is owned by PMC and leased to EverEnviro for entire concession period i.e. twenty five (25) years.

The proposed BioCNG Project, will be having total capacity of 343 TPD, and it will be based on SSO Fraction of MSW (200 TPD), paddy straw (90 TPD), Cattle dung (30 TPD) and chicken litter (23 TPD). It is intended to utilize SSO fraction of MSW as feedstock along with other available feedstocks and generate 21.5 ton CBG per day. The plant will be receiving MSW from PMC and other feedstock from various local suppliers.

1.2 PROJECT PROPONENT

1.2.1. About the Company

EverEnviro established in 2019, is an environmental and sustainable solutions company set up by Eversource Capital. The Company offers comprehensive solutions for management of various streams, including urban municipal waste, agricultural waste and hazardous waste. The Company is promoted by Eversource Capital that is an equal joint venture between Everstone Group and Lightsource BP. Eversource manages India's largest climate impact fund with anchor investments from India's National Investment and Infrastructure Fund and UK Government's Foreign, Commonwealth and Development Office.

Indo Enviro Integrated Solutions Private Limited (IEISL) is 100% subsidiary of ERMPL, which is engaged in specialized sector of compressed biogas (CBG) related projects. The allotted projects are being implemented through a Special Purpose Vehicle (SPV) on case-to-case basis.

The company is committed to develop green and brownfield projects that help produce a low carbon alternative to fossil fuel-based natural gas. They have put in place an end-to-end infrastructure that helps source wet waste from sources such as homes, businesses, industrial, agricultural, medicinal, animal husbandry among others. Their state-of-the-art plants then convert this waste into Bio-CNG through a multi-stage process. Ever Enviro already have off-take contracts with transport and other local/government bodies for the produced RNG.

1.3 OBJECTIVE AND SCOPE OF WORK

The main objective of the ESIA study is to identify, evaluate and manage environmental and social impacts that may arise due to implementation and operation of the proposed project in compliance with the reference framework. The specific objectives are to:

- Provide a project description to understand the environmental and social setting and sensitivities of the BioCNG project. This also includes any associated facilities that may be required (access roads, transmission lines etc.) and description of the larger setting in which the project is located.
- Discuss the policy, legal and administrative framework within which the assessment is carried out, including the host country regulations, obligations under relevant international environmental and social treaties, agreements and conventions, IFC Performance Standards and subsequently reviewing the Environmental and Social compliance requirements against the mentioned requirements.
- Collect and generate a baseline environmental and socioeconomic profile of the Project and its surrounding areas (facilities like access road etc.);
- Review of the land lease process to assess any legacy or current/existing issues (like informal settlers, livelihood dependence, other usage etc.)
- Conduct a socio-economic survey involving consultation with local community, stakeholders, household surveys to identify the needs and problems of community with respect to the project activities.
- Review the feedstock procurement/supply chain process and determine the conformance to Industry best practices and applicable supply chain standards and frameworks.
- Assess potential environmental and social impacts of the Project on the established environmental and social baseline;

- Compare reasonable alternatives against the proposed project site, technology, design and operation in terms of their potential environmental and social impacts; and
- Formulate mitigation and enhancement measures and prepare a Environmental and Social Management and Monitoring Plan (ESMMP) based on the impacts assessed including providing a monitoring plan to monitor the impacts on an ongoing basis and to identify any impacts/mitigation requirements that may occur subsequent to the completion of the ESIA.

INDUS' assessment methodology for the ESIA is designed to address potential recognized environmental conditions or other conditions that may pose potential environmental and social risks and regulatory compliance issues associated with the activities on and adjacent to the property in which the Site is located. INDUS' findings are based on professional judgment and are provided to EverEnviro to allow informed decisions to be made regarding the property agreement, and for future environmental risks management of the Site.

In order to meet the objectives mentioned above, the scope of work for the ESIA entails:

- ***Reconnaissance:*** Reconnaissance survey and primary site assessment to collect and review baseline environmental and social conditions;
- ***Secondary Data Collection***: Literature survey, data collection and examination of available environmental and social information;
- ***Regulatory Review:*** The study assesses the regulatory framework within which the project will operate by reviewing the applicable local, state, national and international environmental and social legislations;
- ***Environmental and Social Baseline Generation:*** Baseline data collected during the field study with respect to land use, socioeconomic profiles and ecology. The baseline supplemented by secondary data obtained through document review with respect to meteorology, soil quality, land-use, geology, geomorphology, hydrology, ecology and socioeconomic profiles in the study area;
- ***Review the feedstock procurement/supply chain process and determine the conformance to Industry best practices and applicable supply chain standards and frameworks:*** Assess the feasibility of Feed stock availability, feed stock generation locations, quantum of generation, availability, pricing, tie up with EE and transportation risks, Determine the uninterrupted flow of feed stocks round the year for all varieties including MSW, Paddy Straw, Cattle Dung and Chicken Litter. Assess the legal compliances of feed stock suppliers w.r.t. applicable legal regulations, Assess the payment obligations of EE, MoU signed with feedstock suppliers, Risk and opportunities in the procurement of feed stocks.
- Identification, prediction and evaluation of potential aspects and impacts on various environmental and social sensitivities due to the project activities envisaged during land acquirement (through lease), construction, operation and decommissioning stages;
- Ascertain whether project footprint or its immediate environment is considered to be ecologically sensitive regarding endangered or protected species;
- Suggesting mitigation measures for identified environmental, ecological and social impacts and plans to maximize project benefits in consultation with affected communities;
- Comparison and analysis of alternatives considered for the project with respect to location and power generation technology;
- ***Preparation of ESMMP***: Preparation of Environmental and Social Management and Monitoring Plan (ESMMP) based on the ESIA and suggest procedures for mitigation and monitoring of environment and social impacts on an ongoing basis as well as to identify any requirements that may occur after the completion of the ESIA.

1.4 APPROACH AND METHODOLOGY

The ESIA has been undertaken following a systematic process that predicts and evaluates the impacts the project could have on aspects of the physical, biological, socio-economic and cultural environment, and identifies measures that the project will take to avoid, minimise/reduce, mitigate, offset or

compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the ESIA process are described below.

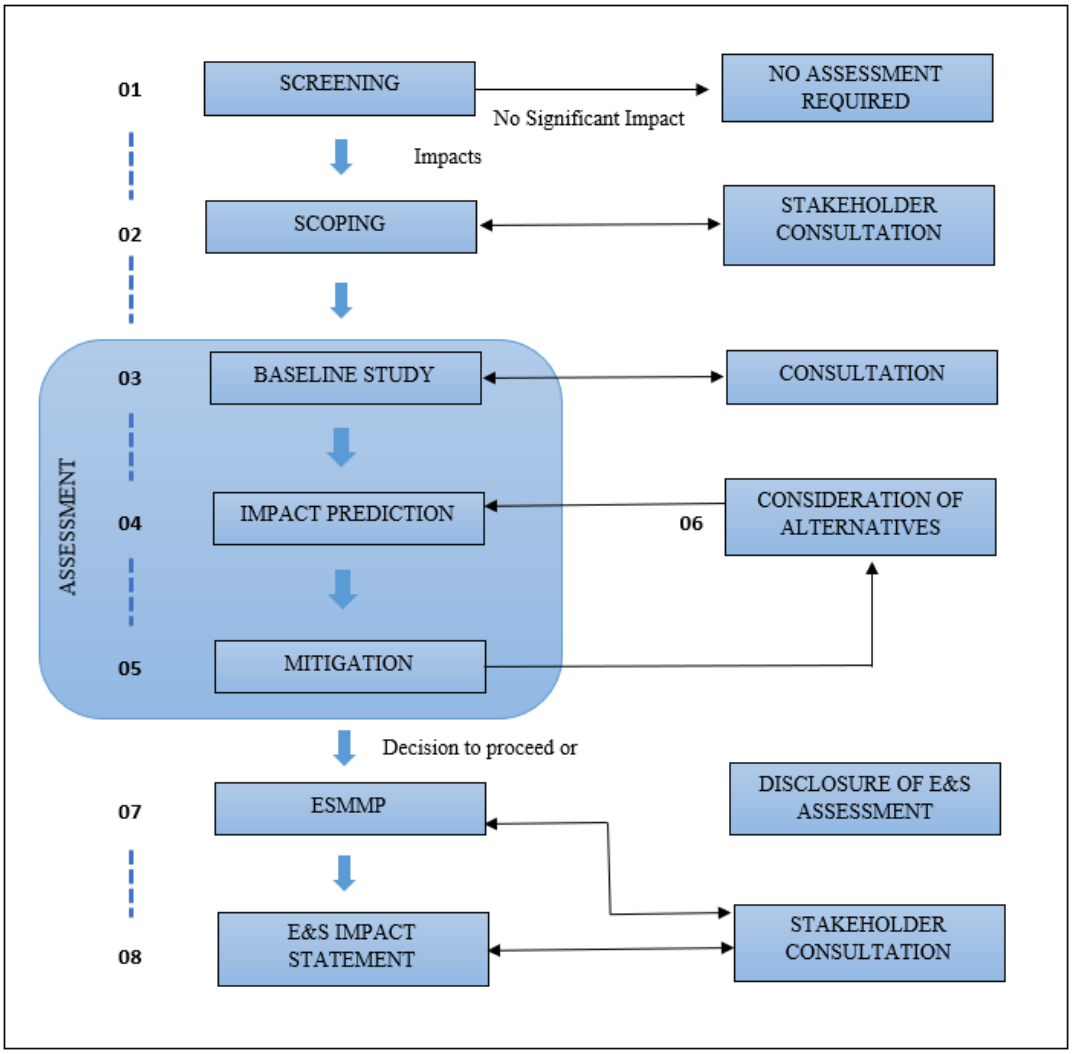

Figure 1: Approach and Methodology applied for the execution of the E&S impact assessment study

1.4.1. Screening and Scoping

1.4.1.1 Screening Methodology

For the screening exercise, INDUS undertook discussions with the project team and reviewed the secondary data available in the public domain. INDUS also conducted a preliminary site visit in the month of October 2024 to attain Key Observations and Findings and submitted a report. The following sub sections provide an understanding of the methodology followed.

1.4.1.2 Pre-Assessment Meeting

INDUS team had a brief Pre-Assessment Meeting with the EverEnviro team in October 2024 followed by a series of discussion. The discussion was held with regard to the expectation from this assessment in terms of scope of work, deliverables, timeline and methodology to be followed.

1.4.1.3 Document Review

Literature survey, examination of available environmental and social information, project related documents and regulatory review to understand the applicable, local and national legislation and

regulatory frameworks was conducted. Further, review of the secondary information available on the project areas, the administrative block, the district and the state were also undertaken.

1.4.1.4 Scoping Methodology

Potential Area of Influence (AOI) is identified under scoping for this ESIA Study to identify potential interactions between the project and resources/receptors in AOI and the impacts that could result from these interactions, and to prioritize these impacts in terms of their likely significance.

For the purpose of the ESIA study, an area of 5 km (aerial distance) radius has been considered as the Area of Influence (AoI) for identification and assessment of potential environmental and social impacts around the proposed project. AoI is further classified as:

- **Direct Impact Zone (Core Components):** The area covering the Project Site and an area of 1 km (aerial distance) radius has been designated as the area under the direct influence of the project for environmental, ecological and social impacts.
- **Indirect Impact Zone (Shared Facilities):** Area outside the direct impact zone of the project, up to a radius of 5 km from project site's centre, is considered as the indirect influence zone for the project for environmental, ecological and social impacts.

All the baseline environmental profiling, including environmental monitoring, socio-economic studies and public consultations, have been carried out within the AoI of 5 km. For ecological studies, area up to 10 km radius from project site's centre, was considered for secondary data search.

The scoping exercise was undertaken on the basis of the information available on the project, the discussions held with the project team and the prior understanding of INDUS Team on Bio-CNG projects. Potential impacts have been identified through a systematic process whereby the features and activities (both planned and unplanned) associated with the pre-construction, construction, operation and decommissioning phases of the project have been considered with respect to their potential to interact with resources/ receptors. Potential impacts have each been classified in one of three (3) categories:

- **No interaction:** where the project is unlikely to interact with the resource/ receptor
- **Interaction likely, but not likely to be significant:** where there is likely to be an interaction, but the resultant impact is unlikely to change baseline conditions in an appreciable/detectable way; and
- **Significant interaction**: where there is likely to be an interaction, and the resultant impact has a reasonable potential to cause a significant effect on the resource/receptor.

1.4.1.5 Scoping Matrix

Potential Area of Influence (AOI) is identified under scoping for this ESIA Study to identify potential interactions between the project and resources/receptors in AOI and the impacts that could result from these interactions, and to prioritize these impacts in terms of their likely significance.

The Potential Interactions Matrix for Project activities and likely impacted resources/ receptors is presented in ***Error! Reference source not found.***. Interactions that are likely to lead to significant impacts are presented in ***Table 22*** and will be the focus of the impact assessment. Owing to site conditions there are certain possible interactions that will not take place. As a result, these interactions have been "scoped out" and are presented in ***Table 33.***

Table 1: Activity-Impact Interaction Matrix for Planning, Construction, Operation & Maintenance and Decommissioning Phases

E&S Resources and Receptors Project Activity/ Hazard	Land Use and Topography	Soil Environment	Visual Impact	Traffic and Transport	Water resources	Air Quality	Noise Quality	Ecology & biodiversity	Loss of land-based livelihood	Employment opportunities	Infrastructure and services	Occupational health and Safety	Community health and Safety
PRE-CONSTRUCTION PHASE													
Land Procurement													
CONSTRUCTION PHASE													
Site Clearance, Site Levelling and Grading													
Sourcing and Transportation of Construction Materials and equipment													
Storage and Handling of Raw Materials and Debris													
Civil Works (site preparation, RCC foundations, access road construction etc.)													
Operation of DG sets													
Constructing tanks, laying of Pipelines connecting digester and purifier etc.													
Handling and Disposal of Wastes													
OPERATION PHASE													
Bio-CNG plant operations													
Maintenance of ancillary facilities such as store, yard, site office													
Site Maintenance and Security													
Handling and Disposal of Waste													
Material Handling and Storage													
Water Requirements for employees													
Repair and Maintenance of unit													
Inspection and maintenance of pipelines													
DECOMMISSIONING PHASE													
Removal of all the tanks, conveyor belts and plant units													
Removal of foundations													

Site restoration													
Waste Management													
Material Handling and Storage													

	Represents interactions reasonably possible with one of the outcomes leading to potential significant impact
	Represents interactions reasonably possible but none of the outcome will lead to significant impacts
	Represents "no" interactions are reasonably expected

Table 2: Identified interactions with potential significant impacts

Sl No	Interaction (between project activity and Resource /Receptor	Justification for Expectation of Potentially Significant Impacts
1	***Changes in Land Use***	Construction of plant would lead to changes in the land use; Setting up the project would require clearing of vegetation for Project related activities; Installation of digestors and other components, paving and widening of access roads, setting up site office will lead to permanent change in land use;
2	***Alteration of Topography and drainage***	Analysis of the Project site as well as its surrounding area exhibits primarily flat terrain with slight undulation. Project activities (e.g., site development, construction of access roads) are likely to result in alteration in the topography and drainage of this area As reported by the project team of EverEnviro, there will be few site levelling works carried out for this project.
3	***Impact on Soil / Land Environment***	Vegetation clearance and construction can change the soil properties and negatively affect soil stability in the area; Vehicle movement can compact or erode soil further; Improper waste disposal can contaminate soil and groundwater; Storage and handling of hazardous waste (e.g. fuel and lubricant) and accidents/negligence leading to leaks and soil contamination; Generation of hazardous waste during operation of the Project e.g. small amounts of waste oil; and Restoration of site after project life cycle
4	***Impact on Air Quality***	Operation of D.G. sets, vehicular movement, site clearing and excavation and construction activities can cause fugitive and point source emission.
5	***Impact on Water Environment***	Construction of the project will require water from local sources to carry out its activities. Further, plant operations will require large quantity of water. Therefore, there can be impact on surface/ground water resource; Water discharge from construction activities can lead to water stagnation which can be the cause of vector borne diseases as well as further discharge to surface water may adversely impact surface water quality Surface run off from the project area may result in localised water logging in and around the project boundaries. Domestic and process wastewater generated from the project operations, may adversely impact soil and water quality, However, as informed, an ETP of capacity 140 KLD will be installed within the project site.
6	***Increased Ambient Noise Levels***	Operation of construction equipment, machinery, piling, D.G. sets, vehicular movement and maintenance activities would increase the ambient noise levels; Local communities, such as that of nearby village, may be disturbed due to higher than anticipated noise.
7	***Ecology & Biodiversity***	Impact on habitats and species may result from vegetation clearance, construction of plant and labour activities. Aquatic flora and fauna of nearby waterbodies may adversely impact due to disposal of wastewater or surface runoff from the plant.
8	***Local Economy and Employment***	Local community might choose to work during the construction of access roads and other project components and as security guards for the plant. There is also a likelihood of reduced dependence on agriculture for income.

Sl No	Interaction (between project activity and Resource /Receptor	Justification for Expectation of Potentially Significant Impacts
		▪ Feedstocks such as Paddy Straw, Cattle dung and Chicken litter shall be locally purchased, which will generate more employment and income generation opportunities to locals
9	***Community Health & Safety***	▪ Community health and safety hazards include noise pollution, increased traffic, dust pollution and any effects due to structural damage. In the case of spills/leaks, there is a potential for fire hazards and soil/water contamination.
10	***Labour and Human Rights***	▪ The internal policies of the developer, contractors and subcontractors will largely determine the labour and working conditions practiced in the project throughout its lifecycle. However, the scale of impacts either positive or negative will be observed mainly during the construction stage when the number of workers engaged is the highest compared to other stages of the project. ▪ Impacts on female workers and migrant workers may be a focused area of assessment.
11	***Cumulative Impact***	▪ Due to presence of other infrastructure projects within a 5-10 km radius, there are chances of increased air pollution and noise levels due to construction activities and traffic.

Table 3: Scope-Out Interactions

Sl No	Impact Title	Reason for Scope Out
1	***Impact on ambient air quality during operation phase***	▪ The Bio-CNG generation process will not have any air emissions; ▪ The site activities will be mainly scheduled maintenance work and cleaning of plant facilities.
2	***Involuntary Resettlement and Land-based Livelihoods***	▪ Land is owned by PMC, which is leased to EverEnviro. The project doesn't involve land procurement from locals, hence there is no resettlement impact and no impact on and land-based livelihoods
3	***Indigenous People***	▪ There are no land parcels taken on lease from the local population. The villages also do not fall under the scheduled areas (as defined in Schedule V of Constitution of India). Hence, no direct impacts on indigenous people are envisaged.
4	***Demography (Influx and Displacement)***	▪ The projects will not result in any physical displacement of the local community. Further, the labour for the construction phase will primarily be recruited from the local community, the influx of population in the study area due to the project is expected to be restricted to the skilled employees of EverEnviro and contractors.
5	***Impact on cultural resources and heritage structures***	▪ No structures bearing cultural, historical, religious or spiritual significance are located within the vicinity of the project; ▪ Community consultations and discussions with the site team of EverEnviro also confirmed that the project would not impact any such structure.
6	***Natural/Common Property Resources***	▪ Based on the consultation with local community, it was understood that no such properties fall within the project area and hence, this aspect has been scoped out of the assessment study.

1.4.1.6 Environmental and Social Management and Monitoring Plan (ESMMP)

The results of the ESIA study form the basis of the project ESMMP. The ESMMP will incorporate measures and procedures for the short and long-term environmental and social management of the project during its various stages. The ESMMP in tabular format with defined roles and responsibilities for implementation and supervision is developed for the Project and is presented in Section 9 of this ESIA report.

1.5 LIMITATIONS

During the assessment, INDUS relied on interviews and the documents provided by the Project personnel. INDUS has assumed, where reasonable to do so, that the information provided is true and accurate. If information to the contrary is discovered, our conclusions may not be valid. All the relevant information presented in this report has been collected either from the Site, Site representative or through other sources including internet, primary & secondary data collected by INDUS, information available in public domain through various Notifications of the State and Central Government, stakeholder consultations, etc.

1.6 LAYOUT OF REPORT

The report is organized in a single volume with the remainder of the report including:

Section	Title	Description
Section 1	***Introduction***	Introduction to the Project, Scope and Methodology adopted for ESIA
Section 2	***Project Description***	Technical Description of the project and its requirements
Section 3	***Environmental Compliance Requirements for the Plant***	Environmental and Social Regulatory Framework- its applicability and relevance to the project
Section 4	***Environmental and Socio-economic Baseline***	Outlines the Environmental, Ecology and Social baseline status in the study area of the Project
Section 5	***Analysis of Alternatives***	Discusses the comparative analysis of alternative for the project
Section 6	***Assessment of Feedstock Procurement and Supply Chain***	Reviews the feedstock procurement/supply chain process and determines the conformance to Industry best practices and applicable supply chain standards and frameworks
Section 7	***Stakeholder Mapping and Engagement***	Outlines the details and outcomes of the stakeholder consultations.
Section 8	***Assessment of Impacts***	Details the identification and assessment of risks and impacts and presents mitigation measures for minimizing and /or offsetting adverse impacts identified during pre-construction, construction, operation and decommissioning phase
Section 9	***Environmental and Social Management and Monitoring Plan (ESMMP)***	Outlines the ESMMP considering identified impacts and planned mitigation measures and monitoring requirements.
Section 10	***Conclusions and Recommendations***	Summary of impacts identified for the Project, conclusion and recommendation of the study.

1.7 CONFIDENTIALITY

INDUS understands the importance of confidentiality in these kinds of studies. As such, we will ensure that all documents created in the course of the work outlined above (including any changes directed by EverEnviro) will be marked as "PRIVILEGED & CONFIDENTIAL". We also ensure to EverEnviro that no information collected during this assignment will be divulged to any party outside INDUS and any other organizations without EverEnviro's prior written consent. Preliminary and final reports will be provided directly to the EverEnviro management or as specifically authorized by them.

2. PROJECT DESCRIPTION

2.1 PROJECT BACKGROUND

Prayagraj Municipal Corporation (PMC) is the Municipal Corporation of Prayagraj in the State of Uttar Pradesh and is responsible for providing municipal and civic services that include the collection, transportation, processing and disposal of solid waste generated under municipal service area of Prayagraj. In accordance with Uttar Pradesh Solid Waste Management Policy 2018 which promotes Private Participation and Investment in Solid Waste Management (Collection, Segregation, Transportation, Processing and Disposal), PMC had invited proposals from eligible bidders through Expression of Interest# Nit No/77/2022/ENV dated 28th April 2022 ("EOI") to set up Bio-CNG plant to process 200 TPD (expandable in future) quantity of Source Segregated Organic (SSO) fraction of MSW on Design, Finance, Built, Own, Operate (DFBOO) basis under Public-Private Partnership (PPP).

In response to the EOI, IEISL submitted its proposal dated 9th June 2022 to implement the Project. PMC issued Letter of Acceptance through Letter# 615/Env/2022 dated 29th October 2022 to IEISL and directed to sign the Concession Agreement within 30 days from the date of its issuance.

Subsequently, PMC has signed a concession agreement with IEISL on 22nd November 2022, for DFBOO 200 TPD capacity. The concession is granted for period of 25 years from the Commercial Operation Date. PMC is obligated to supply Minimum Quantity of 200 TPD, in a yearly progressive manner, from third year onwards, during concession period. Maximum 10% impurities are allowed in Minimum Obligated Quantity at any stage of time. As per clause 2.3 of the CA, concessioner has right to use Agriculture Waste, Agro-Industrial Waste, Cattle Waste, Energy Crop etc. Therefore, EverEnviro has adopted a multi feedstock approach and decided to utilize other feedstocks such as paddy straw, cattle dung and chicken litter along with the SSO Fraction of MSW and planned to establish a 343 TPD Bio-CNG Plant in District Prayagraj, Uttar Pradesh (UP). The proposed prosed project is located at Zone-5, Naini, Village Jahangirabad, Prayagraj, Uttar Pardesh. The land of the proposed project is owned by PMC and leased to EverEnviro for entire concession period i.e. twenty five (25) years.

The proposed BioCNG Project, will be having total input of 343 TPD, and it will be based on SSO Fraction of MSW (200 TPD), paddy straw (90 TPD), Cattle dung (30 TPD) and chicken litter (23 TPD). It is intended to utilize SSO as feedstock along with other available feedstocks and generate 21.5 ton CBG per day. The plant will be receiving the MSW from PMC and other feedstock from various local suppliers.

A brief summary of project is elaborated in ***Table 4***.

Table 4: Brief Summary of Project

Name of the Company	Indo Enviro Integrated Solution Private Limited
Address of the Project Site	Zone-5, Naini, Jahangirabad, Prayagraj, Uttar Pradesh – 211008, India
Total Project Cost	176.56 INR Crore
Employment Opportunities	During construction phase, project would require a workforce of approximately 200 persons. During its operations phase, about 150 persons would be required at the plant.
Owned/Leased	Leased from PMC for 25 years
Raw Materials quantity required	343 TPD (200 TPD Source Segregated Organic Waste (SSO) + 90 TPD Paddy Straw + 30 TPD Cattle Dung + 23 TPD Chicken Litter)
Biogas Technology	CSTR, Mesophilic heating
Total reactor volume (5 Digesters, MFT-3)	6400 cum/digester

BioCNG quantity	21.5 TPD
Water requirement	Approximately 186 KLD fresh water for process and 20 KLD for Domestic use
Generation of Liquid Effluent	127 KLD
Generation of Solid Manure	109 TPD - FOM
Rejects	20 TPD - Inert
Expected Emission Reduction	49,000 Ton CO_2 equiv. per annum

Source: DPR and Information Received from EverEnviro

2.1.1. About Promoter

EverEnviro is a leading CBG Developer with pan India footprint, providing end to end solutions for sustainable management of various types of wastes covering but not limited to municipal solid waste (MSW), agricultural waste and residues, construction & demolition waste, and industrial waste. The company focuses on delivering services through implementation of state-of-the-art technologies across the waste management value chain that helps in prevention of pollution while contributing to the climate change mitigation.

Indo Enviro Integrated Solutions Limited (IEISL) is 100% subsidiary of EverEnviro, which is engaged in specialized sector of CBG related projects. The allotted projects are being implemented through a Special Purpose Vehicle (SPV) on case-to-case basis. This project will be implemented through the SPV, Prayagraj RNG Pvt. Ltd.

2.1.2. Responsibilities of EverEnviro

As per the Concession Agreement, EverEnviro has been obligated to establish a BioCNG project primarily based on SSO fraction of solid waste under PPP with PMC on DFBOO basis within 18 months from the date of issue of CTE by Uttar Pradesh Pollution Control Board (UPPCB). The company shall at its own cost and expense, investigate, study, design, construct, set up, operate & maintain the Project in accordance with the provisions thereof.

- The Company shall be responsible for obtaining various Clearances and Permits from Government Authorities with the assistance of PMC.
- To produce BioCNG, i.e. Road Ready Fuel compliant to IS 16087:2016 specifications or any other product from the Organic Fraction of solid waste supplied by PMC.
- The Company, shall at its own cost and expense, purchase and maintain during the Term, adequate insurance with respect to the Project.
- The Company shall, at all times, ensure that all aspects of the Project and processes employed in the construction, operation and maintenance thereof, shall conform with the Applicable laws pertaining to environment, health, safety and labour aspects, including any clearances, consents, authorizations required from the UPPCB.
- The Company shall maintain all records of the quantum (measured in tonnes) of SSO fraction of solid waste supplied to the Project Site, the waste processed, and the amount of rejects.
- The Company shall make arrangements for the engagement of all staff and labour required for the Project, local or otherwise, and their payment, housing, feeding and transport.
- For the construction work and routine maintenance, the Company shall employ technically qualified personnel.
- During the Term, the Company and its sub-contractors shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notifications and by laws of the State of Central Government or local authority and any other labour law.
- The Company shall transfer the rejects left after the processing of the SSO fraction of solid waste to the landfill site. The landfill site shall be within a radius of 10 kms from the Project Site. Baswar

Sanitary Landfill Facility (SLF) is located at an aerial distance of ~8 km from the project site at Baswar, Naini, Prayagraj.

2.1.3. Responsibilities of PMC

As per the Concession Agreement, PMC shall provide 10 acres of land on as is basis, free from Encumbrance & Legacy Waste at a fixed Nominal Lease Rent for the entire duration of Concession Agreement.

- PMC shall provide Approach Road, Power Supply, Water Supply, Street Light, Drainage, Sewer Line up to the Project Site at its cost.
- PMC shall mandatorily supply Minimum Obligated Quantity (200 TPD, excluding maximum 10% impurities) of SSO fraction of solid waste up to Project Site during the Concession Period on free of cost basis in the next two (2) years as following:
  a) During 1st year from Commercial Operation Date (COD) – 100 TPD (excluding maximum 10% impurities)
  b) During 2nd year from COD – 150 TPD (excluding maximum 10% impurities)
  c) 3rd year onwards from COD – 200 TPD (excluding maximum 10% impurities)

  In case PMC can supply 200 TPD waste earlier than the above stipulated time and intimates the same through a letter, Royalty payment will start from that time.
- PMC shall be solely responsible for the segregation of solid waste into two (2) fractions namely Organic Fraction and Inorganic Fraction. In case, any lot of the supplied SSO fraction of solid waste contains impurities more than 10%, then the same will be jointly inspected by PMC and Company and if the lot is found inappropriate for processing, the same shall be taken back by PMC at its own cost and through its own resources without any financial implication on the Company.
- PMC shall grant exclusive Right/Right of First Refusal to EverEnviro on quantity of Organic Fraction of solid waste generated in the Municipal Service area of PMC beyond the existing agreement for the entire Concession Period to safeguard the investment made by the Company.
- PMC to allow usage of any other Organic wastes like agro waste, agro-industrial waste, cattle waste, napier grass, etc. to meet the process requirements and/or to utilize full installed capacity of the Project without any restrictions. It is being clarified that this shall not impact PMC's obligation to supply the Obligated Quantity to Company.
- PMC shall ensure that, during the Term, the supply of all organic fraction of solid waste generated by Prayagraj shall be exclusive with the Company and PMC shall not allow any other Third Parties or person/company/ies or authority/ies to set-up, develop and operate any other processing system for SSO fraction of solid waste excluding the existing ongoing projects.
- In case of increase in supply of SSO fraction of solid waste above the Obligated Quantity, PMC and Company shall mutually agree to an augmentation plan to process the increased capacity of organic fraction of solid waste at the existing processing site on allocation of additional land. In such a case, Royalty will also increase in the same proportion as the capacity.
- PMC shall allocate the site for disposal of the process rejects near the Project Site within a radius of 10 kms from BioCNG project. In the event, the landfill site gets changed to another site in the future, thereby increasing the distance for transportation of the rejects, then PMC shall consider the increase in transportation cost and reimburse the same to the Company.
- Baswar SLF is located at an aerial distance of ~8 km from the project site at Baswar, Naini, Prayagraj.

2.2 PROJECT SITE DESCRIPTION

A preliminary site visit was conducted by INDUS Team from 23rd October to 24th October 2024 in which a site walkover was undertaken by the Team to understand the existing site conditions that may pose potential environmental risks and regulatory compliance issues associated with the activities on and adjacent to the project site. Along with it, a survey was also conducted in the surroundings of the project site to review the environmental and social conditions around the site, including geographical features, land use, infrastructure, environmentally sensitive areas, etc.

Further, another site visit was conducted by INDUS Team from 19th to 21st November 2024 in which detailed consultations with various stakeholders related to this project such as PMC, Site team, Feedstock suppliers, Waste collection workers, Forest department, Local Community, etc. were conducted, to assess various E&S risks & impacts on these stakeholders due to establishment of this plant. Following details/observations were noted during this site visit:

- The Project Site (Coordinates: 25.421495, 81.869003) is located in Zone-5, Naini, Jahangirabad, Prayagraj, Uttar Pradesh - 211008, India. The total area of the Site is 12.95 acres.
- The project site is accessible via Arail Road, which runs parallel to the Yamuna River along one side of the site. Simultaneously, a second lane has been constructed which was being used as an access route to the site during the visit. This access road shall improve accessibility to the site upon completion, easing transportation for both construction and operational activities.
- The project site is located on the northern side along Arail Road, with the Yamuna River flowing parallel to the site at a distance of approximately 0.25 km. The site is separated from the Yamuna River by the main Arail Road, which runs along the northern boundary of the site and is positioned at a higher elevation. This elevation significantly reduces the risk of flooding from the river. However, the site is at a lower elevation compared to Arail Road, and its general slope directs water towards the north. As a result, during heavy rainfall, the plant may face an increased risk of waterlogging and flooding. To mitigate this risk, a proper stormwater drainage system shall be required to ensure efficient water flow and prevent any adverse impacts from potential flooding.
- At 1.5 km towards North Eastern side from the project site, Triveni Sangam is located, where the three rivers— Ganges, Yamuna, and the mystical river Saraswati meet. It is also a sacred bathing space for Hindus. Siberian birds migrate to the wetlands of Sangam and nearby every November. The Triveni Sangam hosts the annual Magh Fair and the Kumbh Mela every 12 years, attracting millions of pilgrims .
- On the north-west direction, residential colony of Kydganj is located beyond Naini Bridge over Yamuna River. In the southern direction, agricultural fields are located followed by the residential colony of Jahangirabad and Ambedkar Nagar. On the eastern side is the road from where the material will be received, followed by agricultural land with minor vegetation cover.
- Adjacent to southeastern boundary of the site is a graveyard and a 42 MLD Sewage Treatment Plant. Further in the same direction, Adhyapak Residential colony is located. To the western direction, Shivalay Park is being developed followed by Kumbh Mela parking ground and Shri Sarveshwar Mahadev Baikunth Dham Mukti Dwar[1].
- Across the Yamuna River, Allahabad Fort, built by Emperor Akbar in 1583, is present.
- Approximately 400 trees are present within the site such as Peepal, Neem, Wild fig, Shisam, Gulmohar, etc. along with new plantations of approximately 500 trees, on the periphery of the project site. It was informed that the trees present on the project site shall not be required to be removed.
- A religious and tourist spot Arail Ghat and several temples, including the Someshwar Mahadev Mandir and Triveni Pushp, are located approximately 1-2 kilometers beyond the eastern boundary of the site. These religious landmarks contribute to the cultural significance of the area for the surrounding community.

[1] It is a Hindu temple and place of worship located in Prayagraj, UP.

The Project Site is well-connected by major transportation routes, facilitating easy access. Key access points include:

- **Nearest Road**: NH 30 (Uttarakhand-Andhra Pradesh Highway) is located about 0.5 km to the west of the Project Site.
- **Nearest Railway Station**: Daraganj Railway Station is approximately 2.6 km to the northeast and Prayagraj Rambag Railway Station is approximately 2.7 km to the northwest of the Project Site.
- **Nearest Airport:** Prayagraj Airport l is located at a distance of about 13 km to the west.

The following Map indicates location of project in the the state of Uttar Pradesh, India and indicative location of project in the city of Prayagraj are provided in ***Figure 2***.

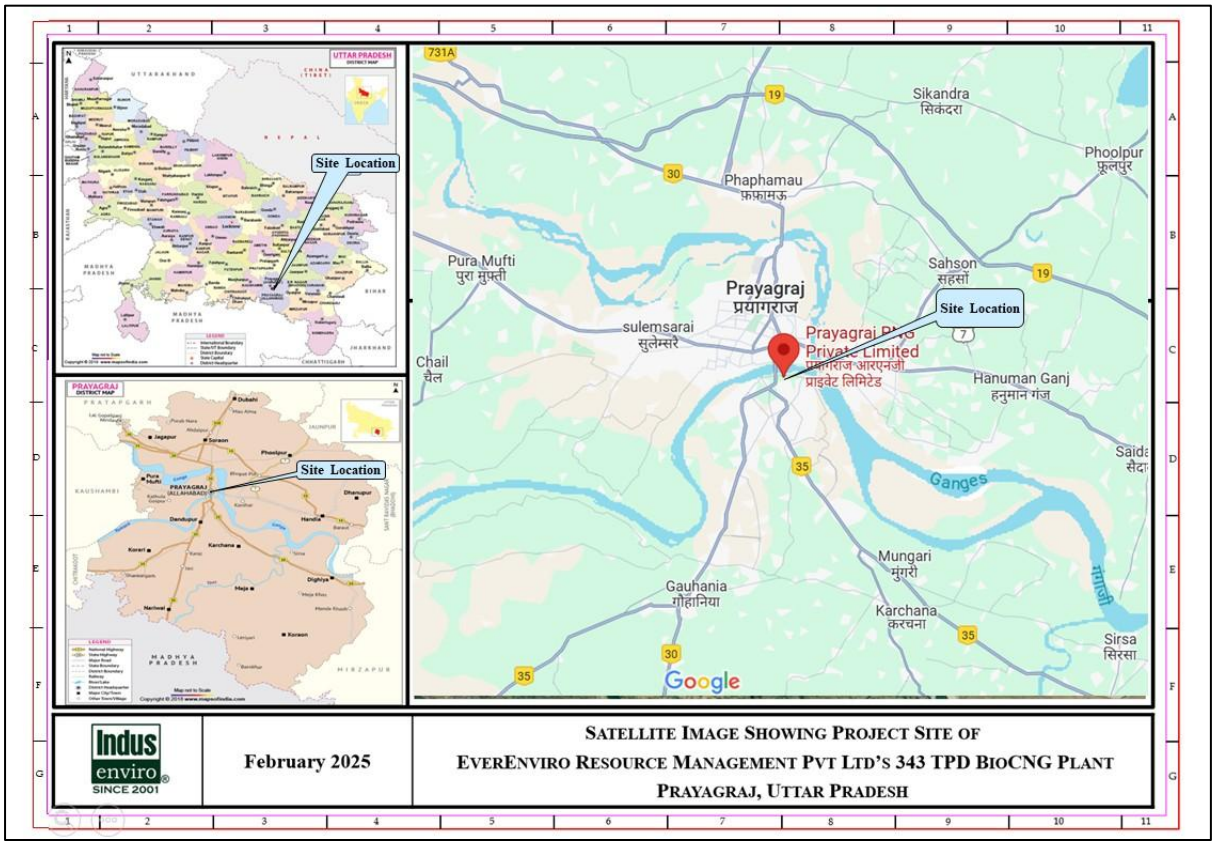

Figure 2: Project Location Map

2.2.1. About Prayagraj District

Prayagraj district, covering an area of approximately 5,480 square kilometers, is situated in the northern part of India within the state of Uttar Pradesh. Geographically located between 25° 15' to 25° 39' North latitude and 81° 46' to 82° 11' East longitude, the district is bordered by the Pratapgarh district to the north, Kaushambi district to the west, Sant Ravi Das Nagar (Varanasi) to the east and Rewa district in Madhya Pradesh to the south. The district is divided into eight (8) talukas which includes 20 development Blocks and 2,802 populated Villages. The administrative headquarters of Prayagraj district is in the city of Prayagraj, which was formerly known as Allahabad.

Prayagraj is known for its historical and spiritual significance, particularly due to the confluence of the Ganges, Yamuna, and the mythical Sarasvati rivers at Triveni Sangam, a major pilgrimage site. Additionally, Prayagraj is the most significant and revered location for the Kumbh[2] Mela. The sacred

[2] The Kumbh Mela is a major Hindu pilgrimage and one of the largest religious gatherings in the world, held every 12 years at four rotating locations in India, including Prayagraj (Allahabad), where the Ganga, Yamuna, and the mythical Saraswati rivers converge at the sacred Sangam (Confluence)..

Triveni Sangam (confluence) is believed to be the meeting point of divine energies, and taking a dip at this holy junction is considered a pathway to attaining spiritual liberation. Prayagraj hosts the grandest and most massive Kumbh Mela, which occurs every 12 years, and in 2025 it will be held from 13th January 2025 to 26th February 2025.

The district has traditionally been an agricultural zone, with major crops including wheat, rice, and sugarcane. Moreover, Prayagraj is home to various educational institutions, such as the University of Allahabad, one of the oldest universities in India, and is known for several colleges that provide quality education in different fields. The economy of Prayagraj is diverse, encompassing sectors such as agriculture, manufacturing, trade, and services. The city is a significant urban center that boasts a vibrant industrial sector with companies involved in textiles, food processing, and pharmaceuticals, contributing to the region's economic growth. Prayagraj houses many major Indian corporates such as Dabur India Ltd, Triveni Engineering & Industries Ltd, Southern Petrochemical Industries Corporation (SPIC), Bharat Heavy Electricals Limited (BHEL), Unilever and Hindustan Aeronautics Limited (HAL), etc.

2.3 PROJECT OVERVIEW

2.3.1. Description of Biogas Technology

Biogas is a high-energy gaseous mixture, which is a product of the natural decomposition process of organic material in the absence of oxygen. This process is known as anaerobic digestion that is used to generate biogas from biologically degradable feedstocks, such as manure, organic waste, agricultural residues such as straw, food processing waste, or energy crops (maize, grass, sugar cane, etc.). These feedstocks are fermented in hermetically sealed fermentation tanks, so-called digesters, where they are converted into biogas and organic fertilizer.

The most important component of biogas is combustible methane (CH_4), which is also a major component of natural gas. Depending on the feedstocks used, the methane content in biogas varies between 50 and 65%. The second major component of biogas is carbon dioxide (CO_2) with a content of 35-50%. Apart from that, other substances, such as nitrogen, water, oxygen, and hydrogen sulphide (H_2S), may also be found in biogas in low concentrations. Organic manure is by-product of biogas process, which has rich value as fertilizer.

Production of biogas from organic matter involves several microbiological activities which convert solid or semi-solid materials into gaseous form. The decomposition is carried out by mixed cultures of facultative anaerobic microorganisms (those that can live both with and without oxygen) and anaerobic microorganisms (those that only survive without oxygen) such as bacteria, moulds and single-cell organisms in a moist environment. Each decomposition step is interlinked to produce biogas carried out by different groups of micro-organisms. The detailed process of biogas production is elaborated in ***Figure 3*** with further details in below sections.

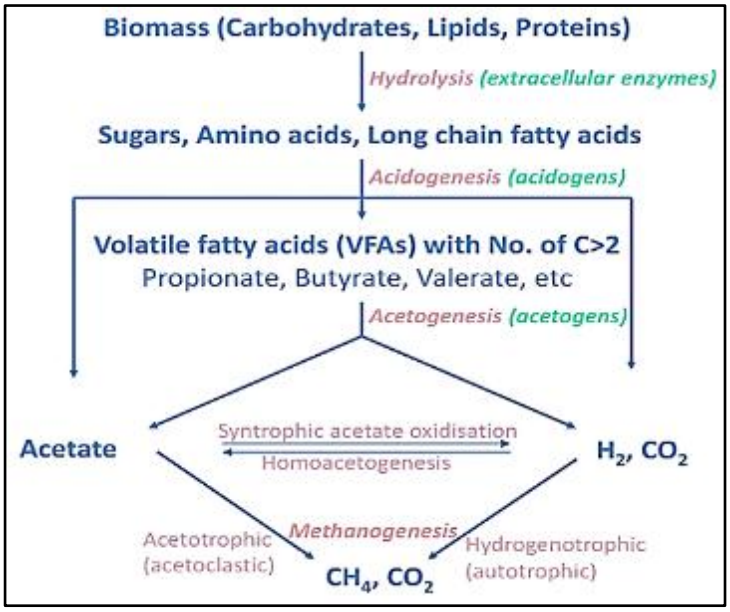

Figure 3: Anaerobic digestion bio-chemical processes

1) ***Hydrolysis***: The feedstock mainly consists of water insoluble photo-synthetically fixed bio-polymer (carbohydrates, proteins and fats). These un-dissolved compounds are broken down into water-soluble fragments of respective monomers (glucose, amino acids, fatty acids, glycerol, etc.) by extracellular enzymes produced by aerobic and facultative anaerobic hydrolytic bacteria.
2) ***Acidogenesis***: In the second stage, facultative acidogenic bacteria (acidogens) transform the products of the first stage into simple, low molecular weight short-chain volatile organic acids, ketones, alcohols, H_2, and CO_2 by another set of extracellular enzymes. The principal acidogenesis products are volatile fatty acids (VFAs) such as propionic acid, butyric acid, acetic acid, formic acid, lactic acid, ethanol, etc. Out of these products, the hydrogen, carbon dioxide and acetic acid are utilized directly by the methanogens in the final stage.
3) ***Acetogenesis***: Here, the rest of the acidogenesis products, C3-C6 VFAs (propionic acid, butyric acid) and alcohols are transformed by acetogenic bacteria (obligate anaerobe) into hydrogen, carbon dioxide and acetic acid.
4) ***Methanogenesis***: In the terminal step of anaerobic digestion i.e., methanogenesis, H_2 and CO_2, acetate or methyl-group containing compounds are converted into methane by methanogenic archaea in two (2) ways: (i) Cleavage of acetate to generate CO_2 and methane and (ii) Reduction of CO_2 with H_2.

Collection of Hydrolysis gas:
At the hydrolysis, some gases occur as a by-product of metabolism of the microorganism. Primarily it is CO_2 and most notably at this step the main part of H_2S occurs. This so-called Hydrolysis gas carries no energy value but is responsible for very strong malodor. By using a two-phase digestion system, it is possible to collect the Hydrolysis gas separately and pass through a Biofilter. In such a unit, the hydrolysis/exhaust gas mixture could be cleaned in a way that no unpleasant odour will disturb the neighborhood. Due to the separate collection of the hydrolysis gas, the Biogas quality of two-phase Biogas Plant is always better than single phase system.

Two-phase Anaerobic digestion:
In a two-stage digestion system, the complex polymers will be broken down to their monomers during the first two (2) steps: Hydrolysis and Acidification. The group of active microbes will cut the long chain of carbon molecules into shorter-chain compounds. Since the substrate is going to be more liquid, this phase is called as hydrolysis. The intermediates of the acidification are in the first line volatile short-chained fatty acids, alcohols, CO_2 and H_2. At the beginning of all processes, the Hydrolyzing bacteria

are aerobic and facultative anaerobic and are living in a closed symbiosis with the acidifying bacteria therefore one can put these degradation phases into one room; it is done at two-phase Biogas Plants. The optimal temperature for hydrolysis and Acidification process is in the range of 30 – 40°C.

The pre-acidified (hydrolyzed) substrate may transfer to the second step of two-phase digestion system, for further disintegration. In this second step, the involved microbes are living in a closed symbiosis, and due to this reason, it must be centralized in a strictly anaerobic environment for optimum methanogenesis. The methanogenesis step (in 2nd stage) has its optimal pH-value between 6.8 and 7.8 (if in case the pH value is more than 8 then one should analyze for ammonia accumulation because it could affect the process due to toxicity).

Temperature:
The methanogenesis step could be operated generally at mesophilic temperature range of 35 – 40°C and thermophilic temperature range of 52 – 55°C. In general, either mesophilic or thermophilic anaerobic digestion is used for methanogenesis. The mesophilic temperature range is considerably steady and has less disturbance-susceptibility than thermophilic range.

2.3.2. Project Components

The proposed BioCNG Project, will be having total capacity of 343 TPD, and it will be based on SSO Fraction of MSW (200 TPD), paddy straw (90 TPD), Cattle dung (30 TPD) and chicken litter (23 TPD). It is intended to utilize SSO as feedstock along with other available feedstocks and generate 21.5 ton CBG per day. The plant will be receiving the SSO fraction of MSW from PMC and other feedstock from various local suppliers. During the operation phase, approximately 109 TPD FOM shall be produced that will be stored at site before being sold off, and around 20 TPD reject waste shall be taken to Baswar Sanitary Landfill Facility (SLF) of PMC, located at an aerial distance of ~8 km at Baswar, Naini, Prayagraj for further processing. Approximately 20 KLD domestic sewage and 127 KLD process wastewater is expected to be generated from the Plant.The Plant shall be discharging its domestic sewage through septic tanks and soak pits, and ETP of capacity 140 KLD shall be provided for treatment of process wastewater.

Various components of the Project are explained as follows:

1. ***MSW Pre-Treatment Storage Area***
   This area consists of weighbridge, shed for unloading waste, trommel and hammer mill.
   a) A weighbridge, also known as a truck scale or loading scale, is a large set of scales that measures the weight of vehicles and their contents.
   b) A trommel is a rotating drum or screen that separates materials by size, shape, and density.
   c) Also called pulverizer mills, hammer mills are size-reduction machines that grind or crush various materials for industrial applications.
2. ***Hydro Cyclone***: Hydro cyclones are conical machines that use centrifugal force to separate solids and liquids in wastewater.
3. ***Liquid Digester Tank (LDT)***: LDT converts the waste received from Hammer Mill into a liquid form with the help of additional water, which is then fed into PDT for pre-digestion.
4. ***Pre-digester Tank (PDT)***: In PDT, bacteria are enriched using hot water to break down waste and create an acidic slurry.
5. ***Main Digester Tanks***: A digester tank is a closed container that uses anaerobic digestion to break down organic materials and produce biogas. The Plant will consist of five (5) Digesters. Each digester has six (6) agitators and an automated heating system. The agitators are mechanical devices used to constantly mix the organic material inside the tank, ensuring even distribution of temperature, nutrients, and bacteria throughout the digestion process. The heating system ensures that the temperature of the digesters is maintained in the mesophilic range of 38-40 degree Celsius. The digesters have double membrane balloon on top, for gas storage. The biogas generated will be routed to the storage balloon and subsequently directed to a gas cleaning system. Any excess gas that is unutilized in the gas management system, is routed to the flaring

unit, to ensure no methane is released directly into the atmosphere. The gas piping has water traps to ensure the piping is free of any water accumulation.

6. ***Gas Cleaning System***: The Gas Cleaning System utilizes "Vacuum Pressure Swing Adsorption" (VPSA) technology for separating specific components from a gas mixture. It uses a vacuum to selectively adsorb certain gases onto a specialized material, like a zeolite molecular sieve, effectively "cleaning" the gas stream by removing unwanted components, such as carbon dioxide and producing clean biogas.
7. ***Hot Water Generator***: It is a system that produces hot water specifically designed to heat the contents of an anaerobic digester, usually through a heat exchanger, maintaining the optimal temperature needed for the bacteria to efficiently break down organic material and produce biogas.
8. ***Compressor and Cascade Area***: A compressor is a mechanical device used to increase the pressure of the biogas produced during the anaerobic digestion process, allowing for easier storage and transportation of the gas to its point of use. The compressed gas cylinders are stored in a cascade system.
9. ***Fire Water Tank***: It is provided for storing waste that can be used for various purposes during construction and operation phases and emergencies.
10. ***Flare*** refers to a controlled burning process where excess biogas produced by the digester is intentionally ignited and burned off, typically through a dedicated flare stack, instead of being captured and utilized; essentially, it's a way to safely dispose of unwanted gas by combusting it rather than releasing it directly into the atmosphere.
11. ***Buffer Tank*** is a storage tank used to regulate the flow of organic material (feedstock) entering the digester, ensuring a consistent feed rate and preventing fluctuations in the digestion process, essentially acting as a "buffer" to stabilize the system by managing the incoming volume and potentially adjusting its composition before it enters the main digester tank.
12. ***Windrow Area***: Windrow drying is a process of removal of water from the manure. It also converts undigested organic matter into compost manure. This process is completely aerobic in nature. After completing the drying process, this material is sold to farmers as "Fermented Organic Manure" after proper screening and refinement.
13. ***Effluent Treatment Plant***: It is a system designed to treat the liquid waste (effluent) produced by the digester before it can be safely discharged back into the environment or reused within the facility; essentially, it cleans the wastewater released from the digestion process. Approximately 20 KLD domestic sewage and 127 KLD process wastewater is expected to be generated from the Plant. The Plant shall be discharging its domestic sewage through septic tanks and soak pits, and ETP of capacity 140 KLD shall be provided for treatment of process wastewater. The ETP is designed to treat and recycle waste water generated from various processes within the plant, it will consist of a MBR system integrated with PVDF membranes, offering advanced filtration. Treated water shall be utilized in for gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads, remaining treated water shall be discharged to nearby STP of 42 MLD, for further treatment and final disposal. The Plant shall install necessary pipeline/drains and ensure necessary permissions from concerned authorities and agreement with STP administration for discharge of treated water to the STP.
14. ***Solid-Liquid Separator & Decanter***: It is a separate section or mechanism within the digester system that is designed to separate the liquid (supernatant) from the solid sludge by allowing the solids to settle at the bottom, effectively "decanting" the liquid phase, which can then be removed for further treatment or discharge.
15. ***H_2S Scrubber***: A system specifically designed to remove hydrogen sulfide (H_2S), a foul-smelling gas produced during the anaerobic digestion process, from the biogas generated by the digester, essentially cleaning the gas before it can be used for energy production. It does this by passing the biogas through a liquid solution that absorbs and neutralizes the H_2S molecules, protecting equipment from corrosion and improving the overall quality of the biogas.

A layout plan presenting various components of the Project is illustrated in ***Figure 4***.

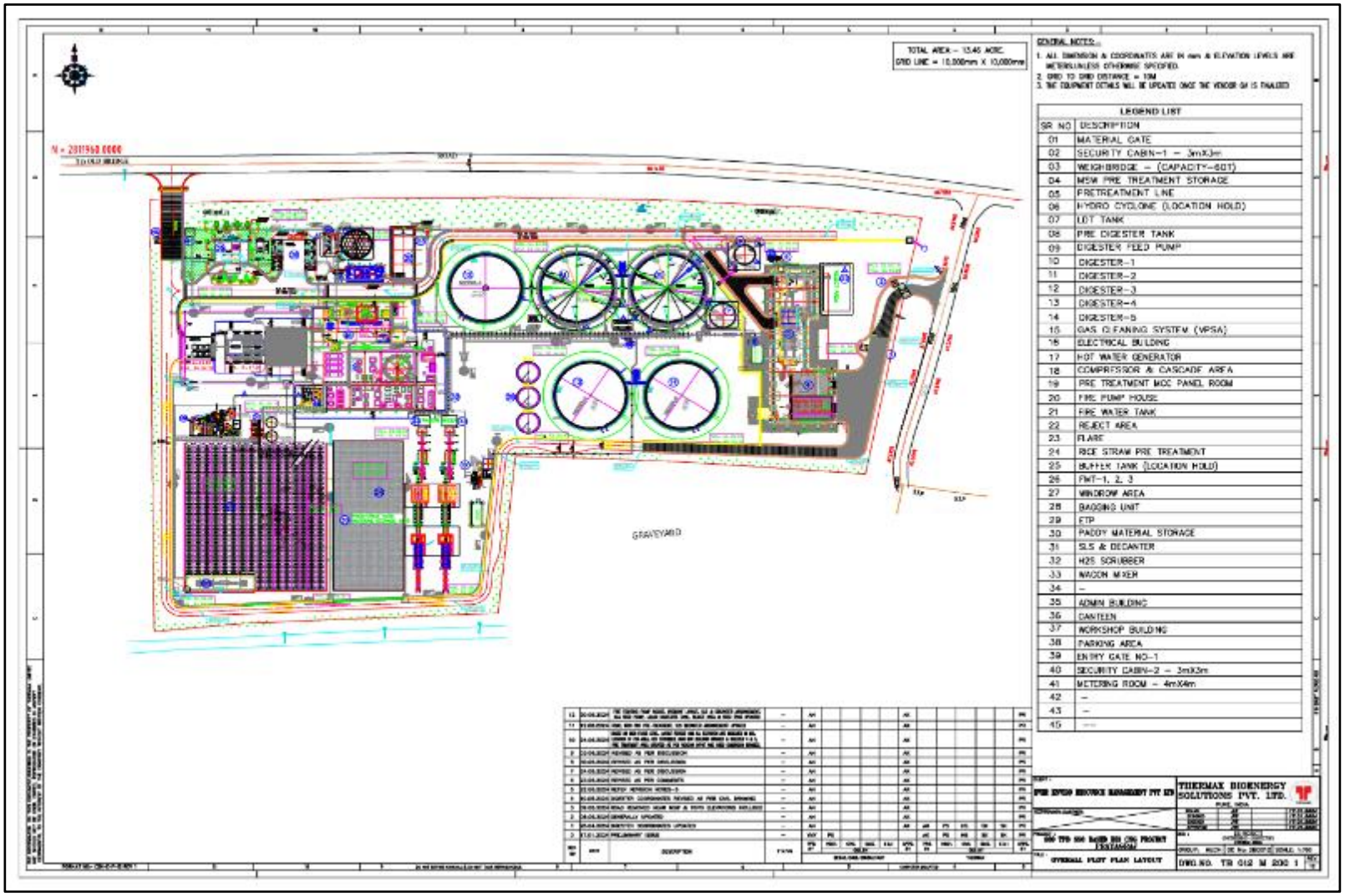

Figure 4: Plant Layout

2.3.3. The Process flow of Bio CNG Plant

Organic waste will be segregated at the source, with expected impurities not exceeding 10%. The source-segregated organic waste will be received through Gate 2 (Material Entry Gate) and unloaded in the Pre-Treatment Shed area. To ensure the removal of impurities up to 10% by weight, source-segregated organic (SSO) waste will be passed through a segregation mechanism. Paper, plastics, and metal will be separated using a fine segregation system involving a conveyor belt and trommel. The segregated waste will be sent to a Hammer Mill to reduce the size of the materials, while the rejected (inert) waste will be directed to Baswar Sanitary Landfill Facility (SLF), located at an aerial distance of ~8 km, for further processing. The processed waste from the Hammer Mill will be converted into liquid form using an LDT system, with the addition of water. This liquid waste will then be fed into the Pre-Digestion Tank (PDT), where it will be transformed into a pre-digested slurry.

The pre-digested slurry will be fed into digesters for anaerobic digestion, producing biogas. The biogas generated will be routed to a double-membrane storage balloon and subsequently directed to a VPSA-based purification system. Once purified, the biogas will be upgraded to Bio-CNG, which will then be compressed and stored in cylinders at the cascade area for further utilization.

Following anaerobic digestion, the post-digested liquid containing 6–7% solids will be sent to a solid-liquid separation system, specifically a decanter system, to separate the solid and liquid components. The solid fermented material will be laid on windrows for curing and drying with the help of an aero-tiller machine, to achieve the desired moisture content and Carbon-to-Nitrogen ratio. The resulting product, known as Fermented Organic Manure (FOM), will be packaged and sold to farmers as organic fertilizer.

The liquid effluent from the process will be treated in an ETP of capacity 140 KLD, provided within the plant. The ETP is designed to treat and recycle waste water generated from various processes within the plant, it will consist of a MBR system integrated with PVDF membranes, offering advanced filtration. Treated water shall be utilized in for gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads, remaining treated water shall be discharged to nearby STP of 42 MLD, for further treatment and final disposal.

The entire process flow is visually represented in ***Figure 5***.

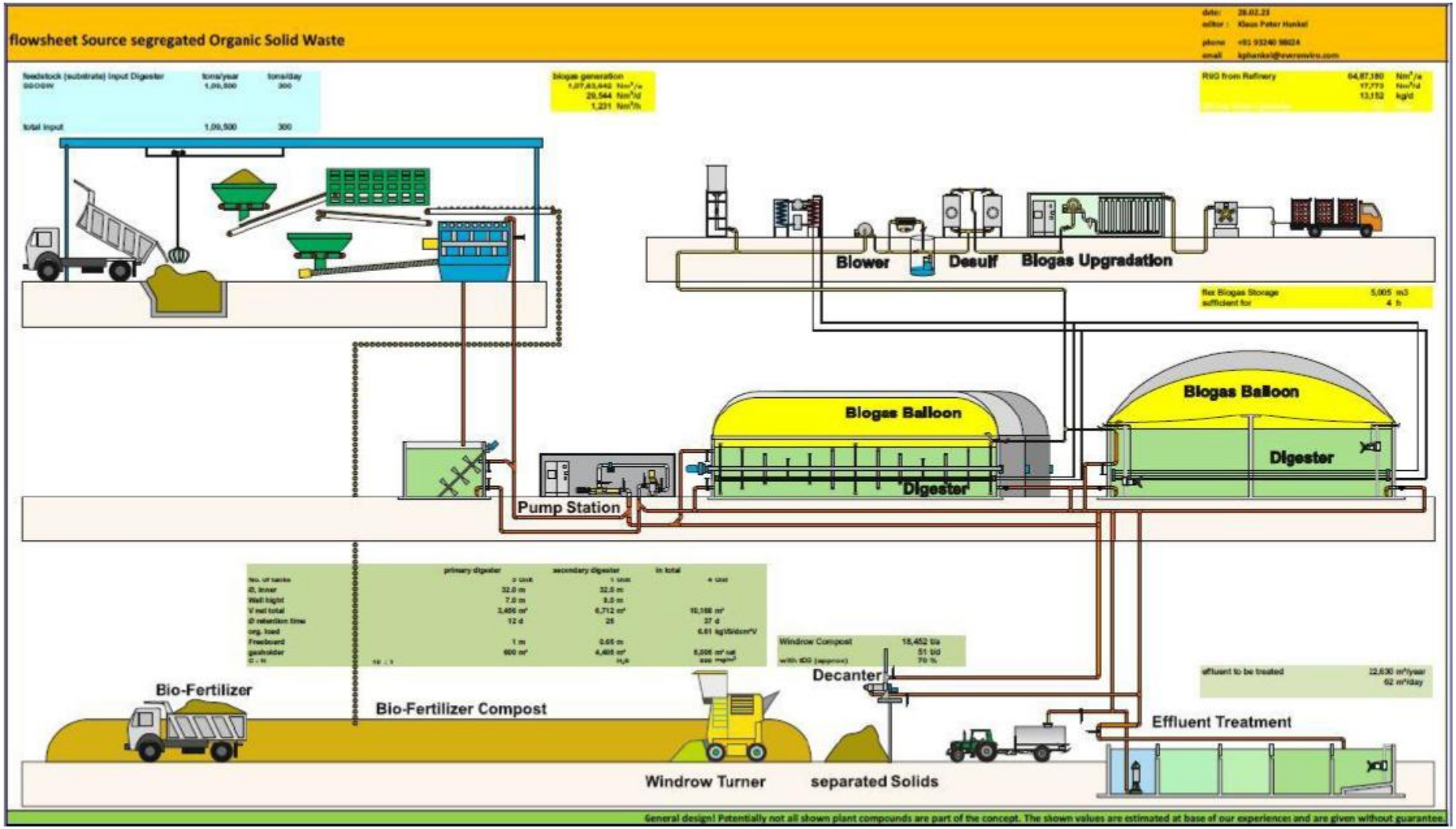

Figure 5: Process Flow diagram of the Project

2.4 RESOURCE REQUIREMENT AND WASTE MANAGEMENT

2.4.1. Land Requirement

The entire land parcel required for setting up the project on 12.95 acres of land has been leased to EverEnviro by PMC for 25 years starting COD, after which it will expire unless renewed. The land is owned and has been under PMC's possession and thus does not envisage any physical or economic displacement. It was earlier being used as a nursery for growing plantations by Forest Department or parking ground during Kumbh Mela. As reported, there are no pending litigations or disputes on the land, and it is free of all encroachments, obstructions or encumbrances. The position of the project/land procurement vis-à-vis key socio-economic issues are as follows:

1) ***Schedule V Area and Tribal Land***: The Project Area does not fall under Schedule V areas as defined under Article 342 in the Indian Constitution. The land identified for the project does not comprise of any tribal land/ land parcels owned by members belonging to the Indigenous Peoples (IP).
2) ***Forest Land***: The project will be developed on government land, earlier being used as a nursery and parking ground; hence, no forest land will be used for the project.
3) ***Common Property Resources (CPRs)***: The Project Site can be accessed from three (3) sides. One is the main Arail Road that runs adjacent to the Project Site alongside Yamuna River. It is the main road with establishments such as residential, temples, schools, etc. present on one side and Yamuna river on the other. Vehicles for office use, school buses, etc. travel from this road only and the vehicles carrying waste will also be using the same road. The villagers did not have any objections when informed that the vehicles carrying the waste shall be properly covered with a tarpaulin sheet. Another approach road is parallel to this Arail road and third one is from Adhyapak Colony's side from where the material will be received.
4) ***Landlessness***: The project has not resulted in new land procurement, therefore, has not affected any landowner.

2.4.2. Manpower Requirement

The project structure comprises a diverse team to ensure smooth execution and operational efficiency. The project would require ~200 persons during the construction period. Key personnel include one Project Manager supported by civil, mechanical and electrical engineers along with feedstock procurement team. Third party workforce would include 75 civil workers, 60 mechanical workers, and 25 electrical workers.

For the operation phase, the Company plans to deploy a team consisting of 11 on-roll employees for core responsibilities, and 122 third-party workers to handle diverse site operations effectively.

2.4.3. Water Requirement

During construction, water is required for domestic use and in construction activities. Drinking water requirement will be met through packaged water supplied by local vendors, and domestic water requirement of approximately 8 KLD (considering 45 litre/person/day) will be met through PMC water supply. As per the Concession Agreement, the responsibility for supply of water at the project site falls under PMC, therefore PMC has sought provision from Jalkal Vibhag [3](Water Works Department) for 100KLD water supply for construction requirement, at the Project Site through a Letter dated 31st May 2024. As informed during the site visit, Prayagraj Jalkal Vibhag has installed a borewell for supply of water during construction phase, inside the premises.

During operation phase, plant will require approximately 186 KLD fresh water for process, and 20 KLD for domestic purposes. The water supply for operation phase fresh water requirement will be provided by the PMC. During the operations phase, water will be required for feedstock preparation, hot water generation, anaerobic digestion, gas cleaning system, fire hydrant systems, domestic use, gardening etc. For fire hydrant systems, water will be required once initially for filling of fire water tanks, during mock

[3] Jalkal Vibhag – The water works department has been entrusted the work of operation and maintenance of city water supply and sewerage system

drills and in case on any fire incident/accident. Breakup of the water required during operations is provided below:

Project Component	Required Quantity of Water (KLD)
Process water requirement (Feedstock Preparation, Anaerobic Digestion, Hot water generation, Gas cleaning system, etc.)	186
Domestic usage	20
Total water Requirement	**206**

It is expected that approximately 127 KLD process waste water will be generated during project operation. Output slurry from the digester will be sent to Solid Liquid Separator (SLS) where it will be dewatered and converted into compost/manure that will be sold off. Separated water from the process shall be resent to process and excess 127 KLD waste water will be treated in ETP of capacity 140 KLD, provided within the plant. The ETP is designed to treat and recycle waste water generated from various processes within the plant, it will consist of a MBR system integrated with PVDF membranes, offering advanced filtration. Water requirement for some of the activities such as gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads will be met through treated water from the ETP.

2.4.4. Power Requirement

During the construction phase, one DG set of approximately 125 kVA capacity will be installed at the Project Site. As reported, based on the project design, a 33kV reliable power source will be required at the Project Site; hence, PMC has applied for a permanent power connection at the Site.

During operations, the BioCNG plant shall require approximately 24,155 kWH power supply.

2.4.5. Sewage

During construction phase, adequate number of portable toilets will be provided for workers and employees at site and a septic tank with soak pit will be provided for disposal of domestic wastewater generated.

During the operation phase, domestic wastewater will be limited to domestic wastewater discharged from the site office. Domestic wastewater generated at the site office will be disposed of in septic tanks/soak pits.

2.4.6. Waste Management

Solid waste

Solid waste generation during the construction phase will consist primarily of scrapped building materials, excess concrete and cement, rejected components and materials, packing and shipping materials (pallets, crates, styrofoam, plastics etc.). The waste will be disposed by the Company through local waste disposal agencies.

During operation phase, the in-house waste generated will be limited to municipal waste from workers which will consist of paper, plastic waste and food waste from the site office. The waste shall be collected in designated bins at site and disposed at a regular interval by the Company through local waste disposal agencies.

Liquid Waste

It is expected that approximately 127 KLD process waste water will be generated during project operation, which will be treated in ETP of capacity 140 KLD, provided within the plant. The ETP is designed to treat and recycle waste water generated from various processes within the plant, it will consist of a MBR system integrated with PVDF membranes, offering advanced filtration. Treated water shall be utilized in for gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads, etc., remaining treated water shall be discharged to nearby STP of 42 MLD, for

further treatment and final disposal. The Plant shall install necessary pipeline/drains and ensure necessary permissions from concerned authorities and agreement with STP administration for discharge of treated water to the STP.

Hazardous Waste

Hazardous waste such as used oil from diesel generator (DG) sets, oil lined containers, paints, etc. will be generated at the site, during construction and operational phases. The hazardous waste will be disposed through a State Pollution Control Board (SPCB) authorized hazardous waste recycler.

2.5 CURRENT STATUS OF SITE AND PROJECT

Concession agreement for development of 200 TPD capacity compressed Bio-CNG (CBG) Plant was signed on 22nd November 2022. The plant will be based on SSO Fraction of MSW, paddy straw, Cattle dung and chicken litter. It is intended to utilize SSO as feedstock along with other available feedstocks and generate 21.5 ton CBG per day.

EverEnviro has engaged Thermax Bioenergy Solutions Private Limited for establishment of the project in a phased manner. The contract has been awarded to Thermax to design, engineer, supply, construct, transport, deliver, install, test and commission the Plant for production of BioCNG based on organic fraction of municipal solid waste and mix feeds at Prayagraj, UP. Thermax, in turn, has hired two (2) sub-contractors, namely M/s Jagdamba and M/s RP Udyog, for provision of workers at the Project Site.

PMC has involved Information, Education and Communication (IEC) Teams for creation of awareness regarding segregation of waste at source, conduction of door-to-door training campaigns, nukkad nataks (Street plays), etc.

3. ENVIRONMENT AND SOCIAL REGULATORY FRAMEWORK

Primary environmental legislation in India is in the form of Acts and Rules which provides a framework for protection, control and management of environmental aspects of the facilities. As most of the Acts and Rules are at the National level, the State Governments have been authorized to enact stricter rules depending on the sensitivity of a particular activity in the context of the regional environmental scenario and/or any other community/ecological sensitivities. This section highlights the various environmental and social regulations applicable to this Project. At the outset, it should be emphasized that this administrative framework focuses on the following:

- Applicable E&S regulations and policies in India and the State of Uttar Pradesh;
- Green Growth Equity Fund (GGEF) ESGMS;
- ESGMS of EverEnviro;
- International Finance Corporation's (IFC's) Performance Standards 2012 for E&S sustainability;
- The World Bank Group (WBG) General EHS Guidelines 2007;
- The WBG EHS Guidelines for Waste Management Facilities 2007;
- Relevant International Labour Organization (ILO) Conventions;
- Good International Industry Practice (GIIP) Guidance.

3.1. NATIONAL, STATE AND REGIONAL ENFORCEMENT AUTHORITIES

A brief description of the relevant National and Regional Enforcement authorities concerning the institutional framework is elaborated in ***Table 5***.

Table 5: National, State and Regional Enforcement Authorities with respect to the institutional framework

Authority	Functions
National Level	
Ministry of Environment, Forest and Climate Change (MoEF&CC)	The MoEF&CC is the nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes. The specific functions of MoEF&CC are as follows: - Environmental policy planning; - Effective implementation of legislation; - Monitoring and control of pollution; - Environmental Clearances for industrial and development projects covered under *Environment Impact Assessment (EIA) Notification 2006*; - Promotion of environmental education, training and awareness; and - Forest conservation, development, and wildlife protection.
Central Pollution Control Board (CPCB)	The CPCB has been constituted to control of water, air and noise pollution, land degradation and hazardous material and waste management. The specific functions of CPCB are as follows: - Prevent pollution of streams and wells; - Advise the Central Government on matters concerning prevention, control and abatement of water and air pollution; - Co-ordinate the activities of State Pollution Control Board's (SPCB) and provide them with technical and research assistance; - Establish and keep under review quality standards for surface and groundwater and for air quality; - Planning and execution of national programme for the prevention, control and abatement of pollution through the Water and Air Acts.
National Green Tribunal (NGT)	The Tribunal has jurisdiction over all civil cases relating to implementation of the following regulations: - *The Water (Prevention and Control of Pollution) Act 1974* (as amended); - *The Forest Conservation Act 1980* (as amended); - *The Air (Prevention and Control of Pollution) Act 1981* (as amended); - *The Environment Protection Act (EPA) 1986* (as amended); - *The Public Liability Insurance Act 1991* (as amended); and - *The Biological Diversity Act 2002* (as amended).

	The *Acts* provide for Relief and compensation to the victims of pollution and other environmental damage arising under the enactment of the above acts.
Ministry of New and Renewable Energy (MNRE)	The MNRE is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the Ministry is to develop and deploy new and renewable energy to supplement the energy requirements of the country. The Ministry facilitates research, design, development, manufacture and deployment of new and renewable energy systems/devices for transportation, portable and stationary applications in rural, urban, industrial and commercial sectors.
Ministry of Road Transport and Highways (MoRTH)	MoRTH is entrusted with the task of formulating and administering, in consultation with other Central Ministries/Departments, State Governments/UT Administrations, organizations and individuals, policies for road transport to increase the mobility and efficiency of road transport system in the country. The main responsibilities of MoRTH are as follows: • Motor vehicle legislation; • Compulsory insurance of motor vehicles; • Evolves road safety standards • Serves as a repository of technical knowledge on roads and bridges, etc.
Petroleum and Explosives Safety Organization (PESO)	PESO, formerly known as Department of Explosives, has been serving the nation as a nodal agency for regulating safety of hazardous substances such as explosives, compressed gases and petroleum. PESO's major work is to administer the responsibilities delegated under the Explosives Act 1884 and *Petroleum Act 1934* and the Rules made thereunder with the motto "Safety First."
Central Electricity Authority (CEA)	CEA is a Statutory Body constituted under the erstwhile Electricity (Supply) Act 1948, thereafter replaced by the Electricity Act 2003, where similar provisions exist. The CEA is responsible for the technical coordination and supervision of programmes and is also entrusted with several statutory functions.
Central Electricity Regulatory Commission (CERC)	CERC intends to promote competition, efficiency and economy in bulk power markets, improve the quality of supply, promote investments and advise government on the removal of institutional barriers to bridge the demand supply gap and thus foster the interests of consumers.
Central Ground Water Authority (CGWA)	CGWA has been constituted under *Section 3(3)* of *EPA 1986*, to regulate and control development and management of ground water resources in the country. The Authority has been conferred with the following powers: • Exercise of powers under *Section 5* of the *EPA 1986* for issuing directions and taking such measures in respect of all the matters referred to in *Sub-section (2)* of *Section 3* of the said Act. • To resort to penal provisions contained in *Sections 15* to *21* of the said Act. • To regulate and control, management and development of ground water in the country and to issue necessary regulatory directions for the purpose. • Exercise of powers under *Section 4* of the *EPA 1986* for the appointment of officers.
State Level	
UP Pollution Control Board (UPPCB)	UP Water Pollution Prevention and Control Board, constituted on 3rd February 1975, was consequently rechristened as UPPCB on 13th July 1982. The Board was entrusted with the powers and functions under the Water Act along with other responsibilities under the EPA 1986. The principal functions of the Board is the prevention, control and abatement of water and air pollution and to assist the industries and entrepreneurs to discharge their daily basic obligations to safeguard environment.
UP New and Renewable Energy Development Agency	In April 1983, UP Government created Non- Conventional Energy Development Agency (NEDA) under the department of additional energy sources as an autonomous institution. The institute has been renamed as "Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA)". From the beginning, the agency is also functioning as nodal agency for implementation of various schemes in the state. Efforts are being made to develop the capacity in renewable energy sources such as solar energy, small-scale hydroelectricity and biomass-based electricity production in the state.

UP Power Corporation Limited (UPPCL)	UPPCL is state government company supplying reliable and cost-efficient electricity to every citizen of the State through highly motivated employees and state of art technologies, providing an economic return to our owners and maintaining leadership in the country.
Labour Department, UP	Policies, Rules and Programs for the matters related to the Labour Welfare, Employment, Training and Human Empowerment are looked after by this Department. Welfare Measures are taken and Programs for Employment Creation for workers are also prepared. The Principal Secretary is the head of the Labour & Employment Department. The Policies, Rules and Orders formulated by the Government are executed by Heads of the Departments under the administrative control of the Department.
Regional Level	
Prayagraj Municipal Corporation (PMC)	The mission of Nagar Nigam is to cultivate a city distinguished by its cleanliness and aesthetic charm, while conscientiously fulfilling the obligations outlined in the *Municipal Act 1959*. By steadfastly adhering to legal mandates and prioritizing service delivery, PMC aspire to elevate the quality of life for all residents of the city.
Jalkal Vibhag Prayagraj	Jalkal Vibhag has been entrusted with the work of operation and maintenance of city water supply and sewerage system. The working / administrative set up of JalKal Vibhag is decentralised in Five (5) Zones. Each zone is headed by Executive Engineer who is responsible for water supply, sewerage, Billing & Collection. Each Zone has its own separate administrative office.

3.2. APPLICABLE NATIONAL AND REGIONAL E&S REGULATIONS AND POLICIES

3.2.1. Constitutional Provisions

Initially, the Constitution of India had no direct provision for environmental protection. Global consciousness for the protection of environment in the seventies, Stockholm Conference and increasing awareness of the environmental crisis prompted the Indian Government to enact 42nd Amendment to the Constitution in 1976. The Constitution was amended to introduce direct provisions for protection of environment. This 42nd Amendment added Article 48-A to the Directive Principles of State Policy.

Article 48-A: "The State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country."
Article 51-A: "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures."

3.2.2. National Electricity Policy 2005[4]

The National Electricity Policy was formulated in accordance with the *Section 3(1)* of the *Electricity Act 2003* that requires the Central Government to formulate, inter alia, the National Electricity Policy in consultation with CEA and State Governments. The National Electricity Policy aims at laying guidelines for accelerated development of power sector, providing supply of electricity to all areas and protecting interests of consumers and other stakeholders keeping in view the availability of energy resources, the technology available to exploit these resources, the economics of generation using different resources and energy security issues.

3.2.3. National Environment Policy 2006[5]

The National Environment Policy 2006 is a response to our national commitment to a clean environment, mandated in the Constitution in *Articles 48 A* and *51 A (g)*, strengthened by judicial interpretation of *Article 21*. It is recognized that maintaining a healthy environment is not the state's responsibility alone, but also that of every citizen. The Policy briefly describes the key environmental challenges currently and prospectively facing the country, the objectives of environment policy, normative principles underlying policy action, strategic themes for intervention, broad indications of

[4] For more information, please refer to the following link: https://powermin.gov.in/en/content/national-electricity-policy.
[5] For more information, please refer to the following link: https://ibkp.dbtindia.gov.in/DBT_Content_Test/CMS/Guidelines/20190411103521431_National%20Environment%20Policy,%202006.pdf.

the legislative and institutional development needed to accomplish the strategic themes, and mechanisms for implementation and review.

3.2.4. National Bioenergy Programme[6]

The MNRE has notified the National Bioenergy Programme from 1st April 2021 to 31st March 2026 with an outlay of Rs.858 crore under Phase-I. The National Bioenergy Programme comprises the following sub-schemes:

1. **Waste to Energy Programme**: Programme for recovery of energy in the form of Biogas/BioCNG/Power from urban, industrial, agricultural wastes and municipal solid waste.
2. **Biomass Programme**: Main objective of promoting cogeneration for optimum use of the country's biomass resources through cogeneration technology in sugar mills and other industries (rice, paper mills, etc.).
3. **Biogas Programme:** To promote the installation of small biogas plants to provide clean gaseous fuel mainly for cooking and lighting purposes in rural areas.

3.2.5. National Policy on Biofuels 2018 with Amendment in 2022[7]

The Policy aims to increase usage of biofuels in the energy and transportation sectors of the country during the coming decade. The Policy aims to utilize, develop and promote domestic feedstock and its utilization for production of biofuels thereby increasingly substitute fossil fuels while contributing to National Energy Security, Climate Change mitigation, apart from creating new employment opportunities in a sustainable way. Simultaneously, the policy also encourages the application of advance technologies for generation of biofuels.

3.2.6. Sustainable Alternative Towards Affordable Transportation (SATAT) Scheme[8]

SATAT Scheme on Compressed Bio Gas (CBG) was launched by the Hon'ble Minister, Petroleum & Natural Gas on 1st October 2018. The scheme envisages to target production of 15 MMT (million tons) of CBG by 2023 from 5,000 Plants. The CBG Plants shall be set up by independent entrepreneurs. The CBG Plant Owner shall be responsible for planning, preparation, engineering and execution of the project, including storage of raw material, operation and maintenance of the plant, maintaining final product output quantity and quality and managing the by-products & wastes from the plant as per existing central / state norms.

3.2.7. CPCB Environmental Guidelines for Compressed Biogas/BioCNG Plants[9]

CPCB revised the categorization of Compressed Bio-Gas (CBG) plants in light of the notifications issued by the Ministry of Agriculture and Farmers Welfare through Notification#2051 dated 14th July 2020 and Notification#1972 dated 1st June 2021, regarding inclusion of Fermented Organic Manure (FOM) and Liquid Fermented Organic Manure (LFOM) under *Fertilizer (Inorganic, Organic or Mixed) (Control) Act 1985*. CBG plants producing FOM & LFOM as by-products not conforming with requirements of aforementioned Notifications are to be categorized based on the type of feed-stocks being used. CBG plants based on animal waste and crop residue as feedstock are categorized under green category. CBG plants based on Municipal Solid Waste (MSW) and process waste as feedstock are categorized under Orange Category.

3.2.8. Uttar Pradesh Bioenergy Policy 2022[10]

Under this policy, Bio-Energy units will be established by the construction, operation and ownership through private investors/developers based on attraction by various facilities and incentives provided by the state government. The period of this policy should be for five (5) years from the date of notification and the bio-energy units registered and commissioned under this policy will get the benefits and facilities admissible under the policy for the entire life of the projects. The main thrust of this policy

[6] For more information, please refer to the following link: https://mnre.gov.in/en/bio-energy-overview/.
[7] For more information, please refer to the following link: https://mopng.gov.in/en/page/11.
[8] For more information, please refer to the following link: https://satat.co.in/satat/#/.
[9] For more information, please refer to the following link: https://cpcb.nic.in/uploads/Categorization_Environmental_26102023.pdf.
[10] For more information, please refer to the following link: https://invest.up.gov.in/wp-content/themes/investup/sector-assets/policies_schemes/Uttar_Pradesh_State_Bio_Energy_Policy_2022.pdf.

is to promote production of Bio-CNG and Bio-Coal etc., through waste-based Bio-Energy enterprises but in the seasonal reduction of the availability of waste or as an alternative arrangement of feed stock for bio-energy plants, non-edible oil seeds/plantation of crops like karanj, neem, castor, jatropha etc. will be encouraged.

3.2.9. Uttar Pradesh Solid Waste Management Policy[11]

This policy aims to pursue a healthy, prosperous and resource-efficient society, in which wastes are prevented, reduced, reused and recycled wherever feasible and beneficial and disposed off in environmentally safe manner. The policy is based on the following principles:

- Reduction and reuse at source;
- Waste recycling;
- Waste to composting;
- Waste-to-energy;
- Waste disposal;
- Effective segregation at source;
- Implementation of ban on plastic carry bags;
- Integration of informal sector; etc.

3.2.10. Other relevant E&S legislations in India

The E&S regulations, legislations, policy guidelines and control for the proposed project are governed by various Government agencies. The ***Table 6*** below summarizes the key regulations that are relevant to the project across its lifecycle.

[11] For more information, please refer to the following link: https://urbandevelopment.up.nic.in/data/GO-2017/SWM-Policy-Eng.pdf.

Table 6: List of applicable regulations on EverEnviro's BioCNG Plant

Applicable E&S Laws	Objectives	Responsible Authority	Applicability
Environment (Protection) Act 1986 (as amended)	The *Environment (Protection) Act (EPA) 1986* is an umbrella act designed to provide a framework for the coordination of central and state authorities established under Water and Air Act. This Act is established by the Government of India (GoI) to fulfil its commitment to protect and improve the human environment and is applicable to the entire country. From time to time, the GoI issues notifications under this act for the protection of ecologically sensitive areas or issues guidelines for matters under the EPA. It empowers GoI to take necessary measures for the purpose of protecting and improving environmental quality and preventing, controlling and abating environmental pollution. Important powers of the GoI include laying down standards for environmental quality and emission/discharge of environmental pollution from various sources. This power defines procedures and establishes safeguards for handling hazardous substances, and establishes rules to regulate environmental pollution.	MoEF&CC CPCB UPPCB	Permissible limits for ambient air quality, water quality, noise limits have been laid down by CPCB under EPA 1986 which requires to be complied with.
Indian Forest Act 1927 ***Forest (Conservation) Act 1980*** ***Forest Conservation Rules 1981 (as amended)***	The regulations are provided for prevention of diversion of any forest land for non-forest purposes. In all such cases, prior Forest Clearance is required from Central and State government depending upon the type and extend of forest land required for non-forest purposes.	MoEF&CC Forest Department Prayagraj	This project does not require Forest NOC as there is no designated forest area lying within the project Boundary.
EIA Notification 2006	Ministry of Environment, Forests and Climate Change (MoEF&CC) has stipulated new Environment Impact Assessment (EIA) Notification on 14th September 2006 (EIA 2006) replacing the EIA Notification of 27th January 1994 and its various amendments. All new projects and activities listed in Schedule I of this notification, including expansion or modernization of the existing projects and any change in product - mix in an existing manufacturing plant shall require prior environmental clearance from the concerned regulatory authority.	SEIAA UP MoEF&CC	BioCNG plants are not listed in Schedule I of the EIA notification. Hence, as per EIA notification, setting up BioCNG plant does not require EIA study and environmental clearance from MoEF&CC or State Department of Environment and Forest.
The Wild Life (Protection) Act 2002 (as amended)	This overarching Act provides for protection to wild animals, birds, plants and matters connected with habitat protection, processes to declare protected areas, regulation of wildlife trade, constitution of state and national board for wildlife, zoo authority, tiger conservation authority, penalty clauses and other important regulations. EverEnviro needs to abide by the rules stated in the law.	MoEF&CC Forest Department Prayagraj	The project site is not in proximity to any wildlife sanctuary hence, this act is not applicable for the Project. Any impacts

Applicable E&S Laws	Objectives	Responsible Authority	Applicability
	All the applicable rules and regulations shall be followed as provided in the Act towards planning of activities in the project area.		anticipated on avian fauna during construction stage would be managed by the Environment & Social Management Plan.
The U.P. Protection of Trees Act 1976	This Act provides for the regulation of felling of trees and replanting of trees in U.P.	Forest Department, U.P.	Shall be applicable if the Company intends to cut any trees on project Site. However, as informed, no such activity has been planned.
Air (Prevention and Control of Pollution) Act 1981 (as amended) Air (Prevention and Control of Pollution) Rules 1982 (as amended)	This Act requires industries, local bodies and agencies engaged in any trade to obtain consent from the SPCB before emitting air pollutants. SPCBs have the authority to enforce this Act. All Diesel Generator (DG) sets manufactured on or after 1st July 2003 have to comply with these regulations. Project activities do not generate air emissions during operational phase and hence the project complies with the Air Act. Furthermore, any impacts during construction activity are minimal and have a short-term effect. Separate Noise regulations for DG sets of various capacities were introduced through MoEF&CC's Notification dated 17th May 2002 under the *Environmental (Protection) Second Amendment Rules 2002*. This required that all DG sets should be provided with an exhaust muffler with insertion loss of minimum 25 dB (A).	MoEF&CC CPCB UPPCB	Applicable. Consent to Establish (CTE) has been obtained by the project on 15th July 2024, the same is noted to be valid till 14th July 2029. The project shall obtain CTO before commencing operation.
Water (Prevention and Control of Pollution) Act 1974 (as amended) Water (Prevention and Control of Pollution) Rules 1975 (as amended)	The Act, enforced on 23rd March 1974, aims to control and prevent water pollution and maintain the quality of water in India. This Act establishes central and state pollution control boards to enforce the Act and oversee its implementation. The Act also aims to prevent pollutants from being released into water bodies and ensure that water is safe for drinking, irrigation and industrial use.	MoEF&CC CPCB UPPCB	Applicable. Consent to Establish (CTE) has been obtained by the project on 15th July 2024, the same is noted to valid till 14th July 2029. The project shall obtain CTO before commencing operation.
CGWA Guidelines to regulate and control ground water extraction in India 2020	The Central Ground Water Authority (CGWA) has been regulating ground water development and management by way of issuing 'No Objection Certificates' for ground water extraction to industries or infrastructure projects or Mining Projects etc., and framed guidelines (the recent being Consolidated Guidelines to regulate and control groundwater extraction in India 2020 with amendment notification dated 29th March 2023) in this connection from time to time	CGWA Jalkal Vibhag Prayagraj	Not applicable as water is being supplied by Jalkal Vibhag. However, the Jalkal Vibhag has installed a borewell within the project site, hence proper documents with

Applicable E&S Laws	Objectives	Responsible Authority	Applicability
	applicable in 19 States (including Gujarat) and two (2) Union territories[12], where ground water development is not being regulated by the State Government and Union territory administration concerned. Therefore, any industry willing to extract groundwater has to first obtain permission from CGWA.		respect to water supply from Jalkal Vibhag is to be ensured by Company.
Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 (as amended)	These rules were notified on 4th April, 2016, under the EPA 1986. They aim at controlling the generation, collection, treatment, transportation, and disposal of hazardous wastes. Hazardous waste generated during construction & operation phases like unused and damaged batteries comes under purview of this Act. The generated hazardous waste will be handled and disposed to authorized SPCB dealers as per the Hazardous Waste Management Rules 2016.	UPPCB	Generation of waste oil and transformer oil at site attracts the provisions of HW&OW Rules 2016. An authorization from UPPCB shall be obtained and generated hazardous wastes shall be disposed through approved recyclers only.
Noise (Regulation and Control) Rules 2000 (as amended) Ambient Noise Standards	The Rules stipulate ambient noise limits during day time and night time for industrial, commercial, residential and ecologically sensitive areas. The rules apply both during the construction and operation of the project. Violation of the standards for assessing the noise quality due to the project will lead to penalty as under the EPA Act 1986. The rules will be applicable during construction and operation phase, periodical noise monitoring will be done as per the monitoring plan.	MoEF&CC UPPCB CPCB	As per the Act, ambient noise levels are to be maintained as stipulated in the rules for different categories of areas such as residential, commercial, and industrial and silence zones.
Solid Waste Management Rules 2016 (as amended)	The rules define municipal solid waste as any waste generated from households, commercial establishments, and institutions that is solid or semi-solid in nature. The primary objective of the rules is to establish a comprehensive framework for waste management, including segregation, collection, disposal, and treatment of waste to reduce health hazards and promote recycling and resource recovery.	UPPCB Local municipal bodies	All bio-degradable, non-biodegradable and domestic hazardous wastes generated from the project will be managed in accordance to the relevant provision of this Rule.
Construction and Demolition (C&D) Waste Management Rules 2016 (as amended)	These rules define C&D waste as the waste produced during the construction, refurbishment, and demolition of structures. The primary objective is to promote the recovery, recycling, and reuse of such waste, thereby minimizing its environmental impact and enhancing resource efficiency in the construction sector.	UPPCB Local municipal bodies	All C&D waste generated from the project will be managed in accordance to the relevant provision of this Rule.

[12] The numbers of states & union territories are dynamic in nature and any addition/ deletion in this regard is being communicated to the states/UTs, project proponents including industries by CGWA through its official web portal.

Applicable E&S Laws	Objectives	Responsible Authority	Applicability
Plastic Waste Management Rules 2016 (as amended)	The Plastic Waste Management Rules 2016 are regulations in India designed to manage plastic waste effectively to protect the environment and public health. These rules define plastic waste as any plastic discarded after use, including various forms of plastic products, packaging, and materials. The primary objective is to promote the reduction, recycling, and safe disposal of plastic waste, requiring producers, importers, and consumers to adopt responsible practices.	MoEF&CC Local municipal bodies	The plastic wastes have to disposed through registered waste pickers, registered recyclers or waste collection agencies.
Explosives Act 1884	This Acct regulates the manufacture, possession, use, sale, transport, import and export of explosives.	Petroleum and Explosives Safety Organization	Applicable. BioCNG shall be stored and transported in compressed form through cylinders. EverEnviro shall obtain license and ensure the vessels are certified by competent persons recognized by Chief Controller.
Petroleum Act 1934 ***Petroleum Rules 2002 (as amended)***	The rules apply for storage, transport and import of petroleum, as well as precautions against accidents.		
Static and Mobile Pressure Vessels (Unfired) Rules 2016 (as amended)	These regulations governing the design, manufacture, storage, transport and use of unfired pressure vessels (containers not heated by fire) like gas cylinders, storage tanks and transport containers, outlining detailed safety standards for their construction, inspection, testing and maintenance with the Chief Controller of Explosives as the primary regulatory authority responsible for enforcing these rules. These rules essentially ensure safe handling of compressed gases in static (fixed) and mobile (transportable) containers across the country.		
Gas Cylinder Act 2004 ***Gas Cylinder Rules 2016 (as amended)***	The rules apply to companies operating in India under certain conditions, ensuring compliance with the legal framework governing gas cylinders, their storage, use, and transportation. These rules are part of the broader *Gas Cylinder Act, 2004*. The rules apply to all companies in India regardless of their type, as long as they are involved in activities listed under the Act. **PESO license** As per *Rule 43* (relating to "*License for filling and possession*") of *Gas Cylinder Rules 2016*, no person shall fill any cylinder with compressed gas and no cylinder filled with compressed gas shall be possessed by anyone except under and in accordance with the conditions of a license granted under these rules.		
Motor Vehicles Act 1988 ***Central Motor Vehicles Rules 1989 (as amended)***	The ***Motor Vehicles Act, 1988*** is the primary legislation in India governing road transport, vehicle registration, driving licensing, and road safety standards. It aims to regulate traffic, reduce accidents, and ensure motor vehicle compliance with safety norms. The ***Central Motor Vehicles Rules, 1989***, framed under this Act, provide detailed procedural guidelines, including vehicle certification, emissions control, driver eligibility, and transport operations. Amendments to these laws introduce stricter penalties, encourage digitization, and promote sustainable fuel adoption. Compliance requirements under these regulations are provided below:	Transportation Department, UP	These regulations are applicable on EverEnviro's BioCNG plant as it will involve various type of vehicles for its operation such as transportation of

Applicable E&S Laws	Objectives	Responsible Authority	Applicability
	▪ All drivers of vehicles should hold a valid driving license authorizing him to drive the vehicle. ▪ The vehicles shall be registered and carry a registration mark displayed in the prescribed manner. ▪ "Certificate of Fitness" in Form 38 shall be carried in the transport vehicle, issued by prescribed authority/ authorized testing stations and renewed annually (in case of four wheelers). ▪ A valid "Pollution Under Control Certificate (PUC)" shall be carried in the vehicle and the vehicle shall be maintained in such a condition to comply with the prescribed emission norms. ▪ "Certificate of Insurance" in Form 51 issued by an authorized insurer shall be obtained on annual basis. ▪ Vehicles carrying goods inter-city or between different centers should have goods carriage permit containing particulars as per the Act (type and capacity of vehicles, area/route, nature of goods it is carrying etc.)		feedstocks, finished products, etc.
Electricity Act 2003 (as amended) ***CEA (Measures relating to safety and electric supply) Regulations 2023 (as amended)***	▪ The *Electricity Act 2003* consolidates the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies, constitution of CEA, Regulatory Commissions and establishment of Appellate Tribunal. ▪ *CEA (Measures related to Safety and Electric Supply) Regulations 2023* defines the general safety criteria for building, installation, protection, operation and maintenance of electric supply lines and apparatus. These regulations define the requirements for usage and supply of electricity.	Electrical Inspector, UP	Applicable both during construction and operation phase. EverEnviro shall ensure that the health and safety requirements under the regulations are complied.
Public Liability Insurance Act 1991 (as amended)	The *Public Liability Insurance Act 1991* is a legislation in India aimed at providing immediate relief to victims of accidents occurring in hazardous industries. The Act mandates that owners of industries obtain public liability insurance to cover liabilities arising from accidents resulting in death or injury to third parties, as well as property damage.	Central Government MoEF&CC State Government	EverEnviro shall provide for public liability- insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance.
Factories Act 1948 (as amended) ***UP Factories Rules 1950 (as amended)***	The Act defines a "factory" as any premises where 10 or more workers are employed in a manufacturing process with the aid of power, or 20 or more workers without power. The Act provides provisions regarding working hours, rest periods, health standards, and penalties for non-compliance, thereby enhancing worker protection in industrial settings.	Chief Inspector of Factories	EverEnviro will need to comply with all requirements of factories rules, obtain factory license and participate in periodic

Applicable E&S Laws	Objectives	Responsible Authority	Applicability
			inspection during the Operations Phase.
Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 (as amended)	The Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 are regulations in India aimed at managing the handling of hazardous chemicals to ensure safety and environmental protection. These rules define hazardous chemicals as substances with properties that can pose risks to health and safety if not managed properly during manufacturing, storage, or import processes.	Chief Inspector of Factories	Rules will be applicable during construction and operation phases if chemicals stored at site satisfy the criteria laid down in the Rules.
Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 ***Inter-state Migrant Workmen (Regulation of Employment and Conditions of Service) Act 1979*** ***Contract Labour (Regulation and Abolition) Act 1970***	▪ The *Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996* regulates the employment and conditions of service of building and other construction workers and provides for their safety, health and welfare measures. ▪ The *Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act 1979* aims to regulate the employment of migrant workers who travel between states and to protect their interest**. (Not applicable to this project**) ▪ The *Contract Labour (Regulation and Abolition) Act 1970* regulates the employment of contract labour in certain establishments and to provide for its abolition in certain circumstances. It applies to every establishment in which 20 or more workmen, are employed or were employed on any day of the preceding 12 months as contract labour.	Labour Department UP	EverEnviro, its contractors and sub-contractors will need to comply with the requirements of the regulations.
Child Labour (Prohibition and Regulation) Act 1986 ***Bonded Labour (Abolition) Act 1976*** ***Minimum Wages Act 1948*** ***Equal Remuneration Act 1976***	▪ The *Child Labour (Prohibition and Regulation) Act 1986* defines a "child" as any person below the age of 14 years. The Act prohibits the employment of children in any occupation or process, with certain exceptions allowed for family-owned businesses and child actors. ▪ The primary objective of the *Bonded Labour System (Abolition) Act 1976* is to prohibit the practice of bonded labour, ensuring freedom and equality for all individuals involved in labour contracts. ▪ The *Minimum Wages Act 1948* is a law enacted in India designed to ensure that workers receive fair wages for their labour by establishing minimum wage rates for various industries and regions. ▪ The *Equal Remuneration Act 1976* aims to provide for the payment of equal remuneration to men and women workers, thus prohibiting discrimination based on sex in matters of employment.	Labour Department UP	EverEnviro, its contractors and sub-contractors will need to comply with the requirements of the regulations.

Applicable E&S Laws	Objectives	Responsible Authority	Applicability
Workmen's Compensation Act 1923 ***Maternity Benefit Act 1961 and as amended*** ***Employees' Provident Funds and Miscellaneous Provisions Act 1952***	▪ The *Workmen's Compensation Act 1923* is a legislation in India that provides for compensation to workers for injuries, disabilities, or death resulting from accidents that occur in the course of their employment. ▪ The *Maternity Benefit Act 1961* is a legislation in India that regulates the employment of women during pregnancy and provides for maternity benefits. ▪ The *Employees' Provident Funds and Miscellaneous Provisions Act 1952* is an Indian legislation that provides for the institution of provident funds for employees in the organized sector, thereby ensuring financial security for workers post-retirement.		

3.3. GGEF'S ESG POLICY AND ESG MANAGEMENT SYSTEM[13]

Green Growth Equity Fund (GGEF)[14] has a target size of INR 45,000 million with an anchor investment of approximately INR 23,800 million from India's National Investment and Infrastructure Fund (NIIF) and the United Kingdom Government through Department for International Development (together the "Anchor Investors") and the Investment Manager. EverSource Capital Private Limited is the Investment Manager for GGEF.

EverSource Capital recognizes that its role as an Investment Manager offers it a unique opportunity to promote sustainable development through its activities and investments while avoiding or minimizing negative impacts on climate, ecosystems and communities. EverSource Capital is committed to ensure that the companies and projects financed by GGEF are managed in a manner reflecting sound environmental, social and governance management practices.

This Environment, Social and Governance (ESG) Policy and ESG Management System (ESGMS) sets out a framework to identify potential ESG risks of potential investee companies prior to fund disbursement and to institute monitoring mechanisms to supervise the ESG performance of these companies during the term of the investment. EverSource Capital has adopted the following ESG Policy for the Fund:

- Seek to invest in companies which have systems to assess ESG risks and adopt mitigation measures; and /or are committed to the formulation of systems to identify, monitor and manage ESG risks;
- Seek to invest in companies which are committed to fairness, inclusion and development opportunities for all relevant stakeholders;
- Seek to invest in companies which are committed to prohibit bribery and corruption;
- Uphold transparency to the Fund's investors on management of ESG aspects of all investments. Where appropriate, actively engage with stakeholders to understand challenges and take remedial steps to address issues;
- Contribute to the United Nations Sustainable Development Goals (UNSDGs) that align with the Funds' investment themes.

3.4. EVERENVIRO'S ESGMS

EverEnviro is a rapidly growing waste management company with pan India footprint, providing end to end solutions for sustainable management of various types of waste covering but not limited to MSW, agricultural waste and residues, construction & demolition waste, and industrial waste. Leveraging on technological advancement across the waste management value chain, EverEnviro is committed to make positive contributions.

Everenviro's ESGMS has been formulated as per the requirements of GGEF's ESG policy and ESGMS requirements. The Everenviro ESGMS is aligned with the ESGMS of GGEF and applicable Indian E&S legal requirements.
ERMPL believes that ESG issues can influence investment risk and return and, therefore, incorporates ESG considerations throughout the business cycle to ensure compliance, lower risks, add value and enhance sustainability in all its business operations and projects. Towards these, EverEnviro commits to:

- Ensure compliance with applicable Indian E&S legal requirements and standards on Governance on a proactive basis;
- Endeavour that the companies under EverEnviro go beyond compliance and provide good working conditions that are gender-responsive, safe, and healthy and that mechanisms are placed for timely and satisfactory redressal of grievances;
- Proactively promote resource conservation, enhancing resource use efficiency and resource recovery across the business operations;

[13] Please refer to the following link for GGEF's ESGMS: https://eversourcecapital.com/wp-content/uploads/2023/07/ESG-Policy-ESGMS_GGEF_FINAL-Ver-2.pdf.
[14] GGEF is a Category II Alternative Investment Fund (AIF) registered under *Securities and Exchange Board of India (AIF) Regulations 2012*.

- Require the companies under EverEnviro to operate with integrity and the highest ethical standards through the implementation of comprehensive governance structures and practices;
- Contribute to the achievement of the targets of the relevant UNSDGs having alignment to EverEnviro's business operations and be in line with GGEF's investment themes and impact strategy;
- Aim to ensure that the companies under EverEnviro abide by its ESG policy and Principles.

3.5. APPLICABLE INTERNATIONAL FRAMEWORK

3.5.1. International Finance Corporation (IFC) Performance Standards 2012

IFC is part of World Bank Group which deals in the business development in developing nations by providing financial related investment aid. IFC's PS are widely recognized as good practice in the business community. They are directed towards clients, providing guidance on how to identify risks and impacts and designed to avoid, mitigate, manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities.

The PS is made up of one (1) overarching standard (PS1) and seven (7) standards (PS2 – PS8), each of which addresses a specific issue area. The components covered in PS1 are those that must be in place to help ensure that the remaining seven (7) standards are put into practice. A summary and applicability of IFC-PS on this project is provided in ***Table 7***.

Table 7: Overview of the IFC-PS and their applicability

Performance Standards	Applicability on the Project
PS1: Assessment and Management of E&S Risks and Impacts	**APPLICABLE**
PS1 establishes the importance of integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; the client's management of environmental and social performance throughout the lifecycle of the project.	PS1 is applicable as the BioCNG Project is waste management project and will have E&S impacts that need to be managed as per PS 1 requirements. ***Requirements*** In line with PS1, EverEnviro has developed an ESGMS at the corporate level which is applicable to all of its projects, including this Plant. Further, this ESIA study is being conducted to assess E&S Risks and Impacts associated with this project and an ESMP is formulated for implementation during project execution.
PS 2: Labour and Working Conditions	**APPLICABLE**
PS2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The objectives of the PS2 are: - To promote the fair treatment, non-discrimination, and equal opportunity of workers. - To establish, maintain, and improve the worker management relationship. - To promote compliance with national employment and labour laws. - To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. - To promote safe and healthy working conditions, and the health of workers. - To avoid the use of forced labour.	The PS2 is applicable for the Project during the entire project lifecycle, as it governs the working conditions of employees and workers engaged for project-related activities. It applies to the Company's employees (direct workers), EPC Contractors and sub-contractors as well as suppliers of feedstock (supply chain workers). ***Requirements*** The project activities will involve hiring of skilled, semi-skilled and unskilled labour during the construction and operation phase. The project will have to develop a human resource policy and ensure non-discrimination and equal opportunity, protection of the workforce and occupational health and safety. - EverEnviro shall take measures to prevent child labour, forced labour and discrimination at site.

Performance Standards	Applicability on the Project
	▪ Wages, work hours and other benefits as per national labour and employment regulations shall be ensured. ▪ EverEnviro shall provide a grievance mechanism for workers (and their organisations, where they exist) to raise workplace concerns and ensure that issues are brought to the management's attention and addressed expeditiously. EverEnviro shall document all grievances and follow up on any corrective actions. ▪ EverEnviro shall extend a safe and healthy work environment to contracted workers and to any other workers who provide project related work and services. ▪ EverEnviro to ensure that training is provided to all workers on relevant aspects of OHS associated with their daily work, including emergency arrangements and OHS briefing for visitors and other third parties accessing the premises. All occupational injuries, illnesses and fatalities are to be documented.
PS3: Resource Efficiency and Pollution Prevention PS3 recognizes that increased economic activity and urbanization often generate increased levels of pollution in air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. The objectives of the PS3 are: ▪ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. ▪ To promote more sustainable use of resources, including energy and water. ▪ To reduce project-related Green House Gases (GHG) emissions.	**APPLICABLE** PS3 is applicable as the Project is a waste-to-energy project. The construction phase shall result in generation of air emissions, wastewater, waste oil and construction debris. The operation phase will entail generation of waste such as liquid effluent, solid waste, transformer oil, domestic sewage, municipal waste, etc. ***Requirements*** EverEnviro shall plan and implement pollution control measures right from the initial stage of the project. Practices such as minimal release of waste, handling of hazardous waste, safe disposal of waste, wastewater management, etc. shall be considered before each phase. EverEnviro shall monitor and manage waste to ensure that the requirements of PS3 are met.
PS4: Community Health & Safety PS4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. Its main stress is to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.	**APPLICABLE** PS4 is applicable to the Project as it will involve transportation of construction material and movement of construction machinery/ large trailers/vehicles which may pose safety risks (accident and injury) to the affected communities along the route of operations as well as the labour engaged in the construction work. ***Requirements*** EverEnviro shall establish the applicability of this PS during the ESIA process, resulting in preparation of an Action Plan to be disclosed to the community, if required. The applicability will be limited to traffic problems caused due to transportation of construction materials during construction phase and transportation of feedstock during operation phase. The Action Plan and any other relevant project-related information is to enable the communities and relevant government agencies to understand these risks and impacts and will engage the influenced communities and agencies on an ongoing basis consistent with the requirement of PS1.

Performance Standards	Applicability on the Project
PS5: Land Acquisition & Involuntary Resettlement	**NOT APPLICABLE**
PS5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. The main objectives of PS5 include: • To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs. • To avoid forced eviction. • To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost[15] and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. • To improve, or restore, the livelihoods and standards of living of displaced persons. • To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure[16] at resettlement sites.	PS5 is not applicable to this Project as the land for the Project has neither been acquired by the government nor does it involve any privately-owned land. The land was taken up in chakbandi process and belongs to PMC. The land for the Project has been obtained from PMC on lease for a period of 25 years. No expropriation of land has been envisaged and no physical or economic displacement has been expected to be caused by the Project.
PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	**APPLICABLE**
PS6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. This standard aims to promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.	PS6 is applicable to the Project as Yamuna river is present across the northern boundary of the Project Site which attracts many avian species. Therefore, PS6 is applicable to this Project.
PS7: Indigenous Peoples	**NOT APPLICABLE**
PS 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development.	PS7 is not applicable for the project as it is neither set up in a Schedule V area nor has Indigenous population, that is being impacted due to land procurement or other project activities. No material degradation or adverse impact is expected on land resources on which indigenous peoples are dependent.
PS8: Cultural Heritage	**NOT APPLICABLE**
PS8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention concerning the Protection of the World Cultural and Natural Heritage, the PS aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this PS on a project's use of	Though various religious and cultural sites are located in proximity of the project site, no sites bearing cultural, historical, religious or spiritual significance is impacted by the project.

[15] Replacement cost is defined as the market value of the assets plus transaction costs.
[16] Security of tenure means that resettled individuals or communities are resettled to a site that they can legally occupy and where they are protected from the risk of eviction.

Performance Standards	Applicability on the Project
cultural heritage are based in part on standards set by the Convention on Biological Diversity.	

3.5.1.1. IFC Categorization of Project

As part of the review of E&S risks and impacts of a proposed investment, IFC uses a process of E&S categorization to reflect the magnitude of risks and impacts. These categories are:

a) ***Category A***: Business activities with potential significant adverse E&S risks and/or impacts that are diverse, irreversible, or unprecedented.
b) ***Category B***: Business activities with potential limited adverse E&S risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
c) ***Category C***: Business activities with minimal or no adverse E&S risks and/or impacts.
d) ***Category FI***: Business activities involving investments in financial institutions (FIs) or through delivery mechanisms involving financial intermediation.

The BioCNG Project has been recommended to be categorized as Category B as per the IFC categorization criteria. Selection of Category B is based on the following reasoning:

- ***Project***: BioCNG is a clean technology project that uses waste for converting it into energy. The land has been leased from PMC for a period of 25 years therefore no land acquisition has taken place for this project.
- ***Waste generation***: A small proportion of the waste generated during construction phase will be hazardous that may include waste fuel, grease and waste oil containing rags. Used transformer oil which is also categorised as hazardous waste will be generated from the plant. If not properly managed, solid waste could create impacts on soil quality. However, the impact magnitude has been assessed as low as such impacts are manageable through effective hazardous and other waste management measures.
- ***Wastewater discharge***: Approximately 20 KLD domestic sewage and 127 KLD process wastewater is expected to be generated from the Plant. Therefore, impact significance on water quality has been assessed as high without mitigation measures. However, the Plant shall discharge its domestic sewage through septic tanks and soak pits, and ETP of capacity 140 KLD shall be provided for treatment of process wastewater. Treated water shall be utilized in for gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads, remaining treated water shall be discharged to nearby STP of 42 MLD, for further treatment and final disposal. The Plant shall install necessary pipeline/drains and ensure necessary permissions from concerned authorities and agreement with STP administration for discharge of treated water to the STP.
- ***Air quality***: Construction activities will increase fugitive dust emissions during site clearance and other activities such as levelling, grading, excavation works, piling and increased plying of vehicles will increase vehicular emissions, and therefore, impact significance on air quality has been assessed as medium without mitigation measures. The air emissions during operation phase of the project are expected to be limited to occasional use of DG sets and plying of vehicles.
- ***Noise quality***: Construction will cause increased noise levels due to activities such as grading, excavating and drilling for foundations, concrete batching, construction of ancillary structures, and operation of diesel generators, material movement and site clean-up, and construction equipment like dozer, scrapers, concrete mixers, generators, pump, drills, etc., therefore noise during construction phase has been assessed as medium without mitigation measures. Noise during operation phase is expected to be limited to plying of vehicles to and from the site for transportation of waste and feedstock and running of project-related utilities.
- ***Ecology***: The site is located nearby Yamuna River which attracts variety of avian species, including migratory birds. However, no significant impact is envisaged on ecology and biodiversity of the area due to the project activities.
- ***Indigenous People:*** There are no indigenous communities that are being impacted due to the project in the study area.

3.5.2. The World Bank Group General EHS Guidelines 2007[17]

The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)[18]. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in facilities by existing technology at reasonable costs. The general guidelines available in each E&S aspect have been enlisted in ***Table 8***.

Table 8: Overview of WB General EHS aspects covered

S. No.	EHS Aspects covered	
1.	***Environmental***	Air emissions and ambient air quality Energy Conservation Wastewater and ambient water quality Water conservation Hazardous materials management Waste management Noise Contaminated land
2.	***Occupational Health & Safety***	General facility design and operation Communication and training Physical hazards Chemical hazards Biological hazards Radiological hazards Personal Protective Equipment Special Hazard Environments Monitoring
3.	***Community Health & Safety***	Water quality and availability Structural safety of project infrastructure Life and Fire Safety Traffic Safety Transport of hazardous materials Disease Prevention Emergency preparedness and response
4.	***Construction and decommissioning***	Environment Occupational health & safety Community health & safety

3.5.3. The World Bank Group Guidelines for Waste Management Facilities 2007[19]

The EHS Guidelines for Waste Management cover facilities or projects dedicated to the management of MSW and industrial waste, including waste collection and transport; waste receipt, unloading, processing, and storage; landfill disposal; physico-chemical and biological treatment; and incineration projects. Industry-specific waste management activities applicable, for example, to medical waste, municipal sewage, cement kilns, and others are covered in the relevant industry-sector EHS Guidelines, as is the minimization and reuse of waste at the source.

Details of International Conventions and Treaties ratified by India are provided as ***Annexure-1*** and Good International Industry Practice (GIIP) Guidance Note (Stakeholder Engagement, Workers' Accommodation) are provided as ***Annexure-2.***

[17] Please refer to the following link for WBG General EHS Guidelines: https://documents1.worldbank.org/curated/zh/157871484635724258/pdf/112110-WP-Final-General-EHS-Guidelines.pdf.

[18] Defined as the exercise of professional skill, diligence, prudence and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

[19] Please refer to the following link for WBG Guidelines for Gas Distribution Systems: https://www.ifc.org/content/dam/ifc/doc/2000/2007-waste-management-facilities-ehs-guidelines-en.pdf.

4. ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE

This section of the report presents information on the baseline condition of the physical, chemical, biological and social environment within the project area. Primary baseline information was collected on site from project area and its area of influence. Existing information sourced from scientific literature (both published and unpublished), engineering studies, technical reports and community socio-economic studies were used wherever available. Activities that facilitated establishment of the baseline data in the report include site survey, ecological survey, social consultations and interviews, baseline environmental monitoring, processing of satellite imagery and secondary data review from established sources such as Indian Meteorological Department (IMD), Central Ground Water Board (CGWB) and Census of India amongst others.

4.1. ENVIRONMENTAL BASELINE

Area within the 5-kilometre (km) radius from the centre of the project site is considered as Area of Influence (AoI) of the project, for primary data collection. Nearby villages which fall under AoI are predominantly within PMC of Prayagraj District in the state of Uttar Pradesh. Primary data was collected for one (01) week duration between 19th to 25th November 2024. Environmental baseline monitoring was undertaken in November 2024 through an external laboratory, M/s Enviro Tech Services, which is accredited through National Accreditation Board for Testing and Calibration Laboratories (NABL) for ambient air quality, soil quality, surface water quality, drinking water quality, ambient noise levels, traffic survey and the results are incorporated in sections below.

Table 9: Environmental Parameters Monitored for Baseline Data Collection

S. No.	Aspect	Details
1	***Ambient Air Quality***	Collection of ten (10) samples through monitoring of ambient air quality for 24 hrs continuous, twice a week at five (5) different locations measuring parameters as per NAAQS 2009 and H_2S.
2	***Soil Quality***	Collection of seven (7) soil samples from seven (7) locations (4 within project site and 3 outside project site) for analysis of following parameters: Moisture content, pH of 20% suspension, EC of 20% suspension, Carbonates (CO_3^-), Chlorides (as Cl^-), Sulphates (as SO_4^{2-}), Phosphorus (as PO_4), Total Nitrogen, Total Organic Carbon, Potassium (as K), Iron (as Fe^{2+} & Fe^{3+}), Manganese (as Mn), Zinc (as Zn), Copper (as Cu^{2+}), Volatile Organic Compounds, Arsenic (as As^{2+}), Cadmium, Total Chromium (as Cr), Mercury, Nickel, Lead
3	***Ambient Noise Quality***	Ambient noise quality was monitored to determine hourly equivalent noise levels. The noise sampling was done once during the study period continuously for 24 hours, from five (5) locations selected on the basis of the site sensitivities within the study area. The results of the findings were analysed to work out Leq hourly, Leq day and Leq night.
4	***Surface Water Quality***	Collection of three (3) samples of surface water for analysing the General parameters, Bacteriological parameters, Organoleptic and physical parameters.
5	***Drinking Water Quality***	Collection of three (3) samples of surface water for analysing the General parameters, Bacteriological parameters, Organoleptic and physical parameters.
6	***Traffic Monitoring Analysis***	Traffic data was monitored for 24 hrs. Monitoring was performed for the vehicles using the site access road for construction materials, waste carrying and products to and from the site respectively.

The Map Showing Baseline Monitoring Locations are given in ***Figure 6*** below.

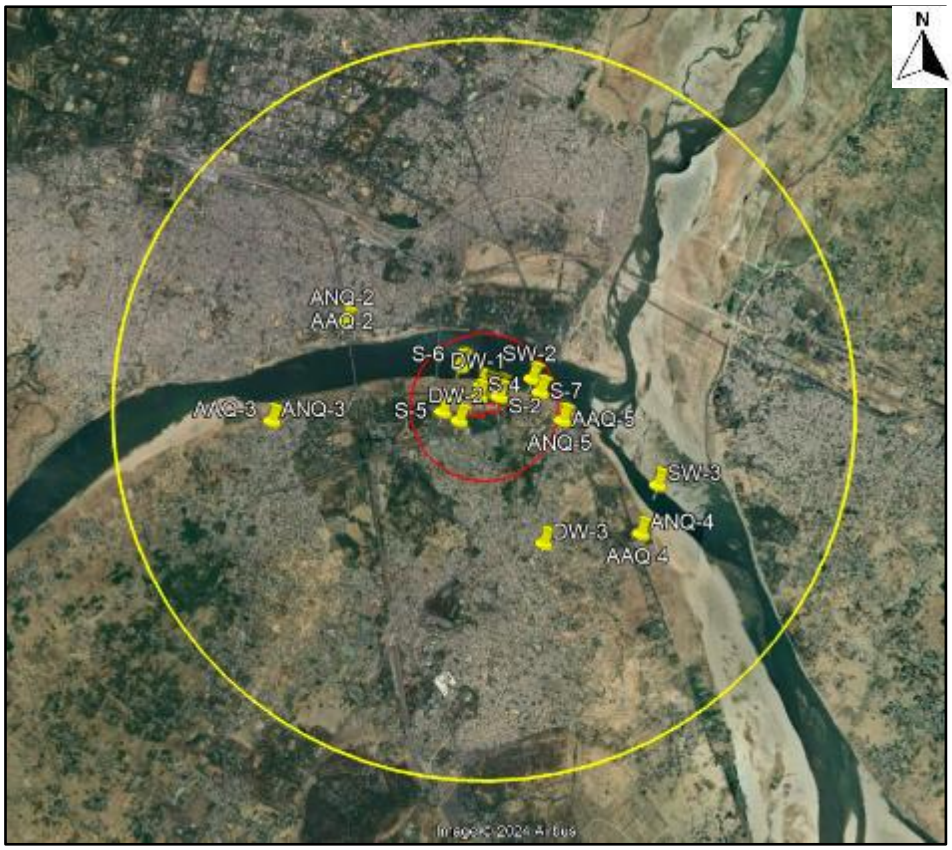

Figure 6: Map Showing Baseline Monitoring Locations

AAQ- Ambient Air Quality and Noise Quality Monitoring Location; S- Soil Quality Sampling Location SW- Surface Water Sampling Location; DW- Drinking / Ground Water Quality Sampling Location

Data regarding climate, geomorphology and soil types, geology, hydrogeology and land use/land cover of the region where Project Site is located, has been primarily sourced from "Aquifer Map and Management Plan, Prayagraj District, Uttar Pradesh State" published by the Government of India Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation Central Ground Water Board in the year 2019[20] in addition to other secondary sources.

4.1.1. Climate and Rainfall

Prayagraj has a typical humid subtropical climate, which is common in cities across north-central India. The hot season (summer) lasts from March to June, followed by the southwest monsoon that occurs from mid-June to September and the cold season or winter, extends from December to February.

The average monthly maximum temperature is 32.8°C, while the average monthly minimum temperature is 19.5°C. January is the coldest month, with a mean daily minimum temperature of 9.1°C and a mean daily maximum temperature of 23.7°C. In contrast, May is the hottest month, featuring a mean daily maximum temperature of 42.1°C and a mean daily minimum temperature of 27.4°C. When the southwest monsoon arrives in mid-June, daytime temperatures decrease significantly, although night-time temperatures remain slightly higher compared to those in May. Approximately 90% of the annual rainfall occurs during the monsoon season, which spans from mid-June to September, with an average annual rainfall of 1207.00 mm. Humidity decreases progressively following the onset of the monsoon season, which is characterized by very humid air. The average morning relative humidity is 64%, while the average evening relative humidity is 48%. Winds are generally strong throughout the year, with increased intensity during the summer and monsoon seasons. The mean wind velocity is 5.1 km/h. The potential evapotranspiration in the region is 1537.5 mm. The average annual rainfall in Prayagraj District during 2010-2020 is given in ***Figure 7*** below.

[20] Source: CGWB Report (https://cgwb.gov.in/old_website/AQM/NAQUIM_REPORT/UP/Prayagraj%20Final,%20UP.pdf)

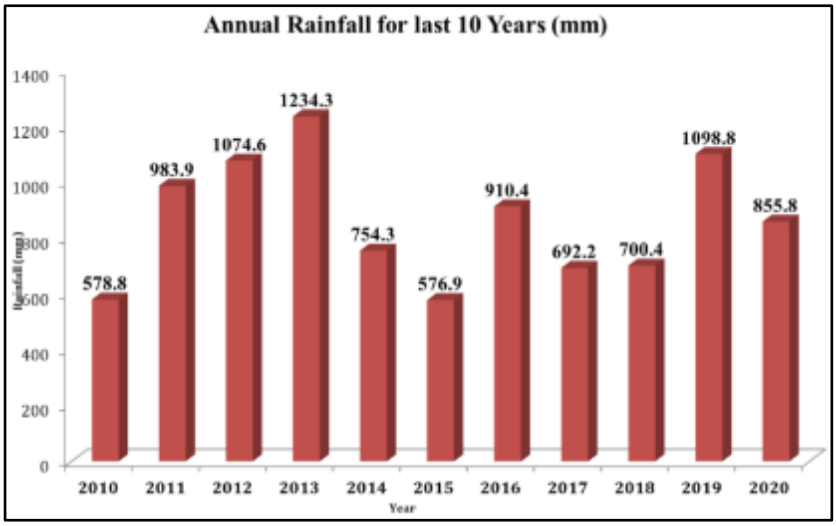

Figure 7: Average Annual Rainfall (mm) in Prayagraj District

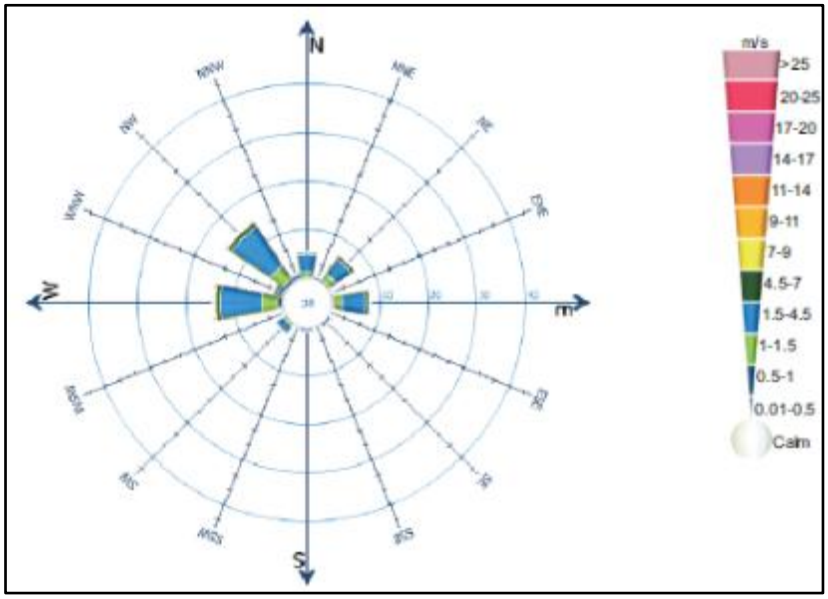

Figure 8: Windrose Diagram of Allahabad IMD Station (1970-2000)

The historical annual windrose diagram during the period 1970-2000 of Allahabad IMD Station in Uttar Pradesh as per the Indian Metrological Department (IMD) is shown in ***Figure 8***. From the figure, it can be inferred that winds are calm 38% of the time. The wind rose above shows that during the period wind blew from the West and NW 25% of the time.

4.1.2. Geomorphology and Soil types

Geomorphologically the Prayagraj district is drained by river Ganga and its right bank tributary Yamuna and broadly represents the following geomorphic units:

a) Ganga alluvial plains
b) Yamuna alluvial plains
c) Vindhyan plateau

The map describing soil types of Prayagraj District is shown in ***Figure 9*** from which it can be inferred that the project site is located in Chaka Block which is sandy in texture. The geomorphological map of Chaka Block of Prayagraj District is shown in ***Figure 10*** below and it can be observed that the **project site is located in Alluvial Plain along the Yamuna River.**

Figure 9: Soil Map of Prayagraj District

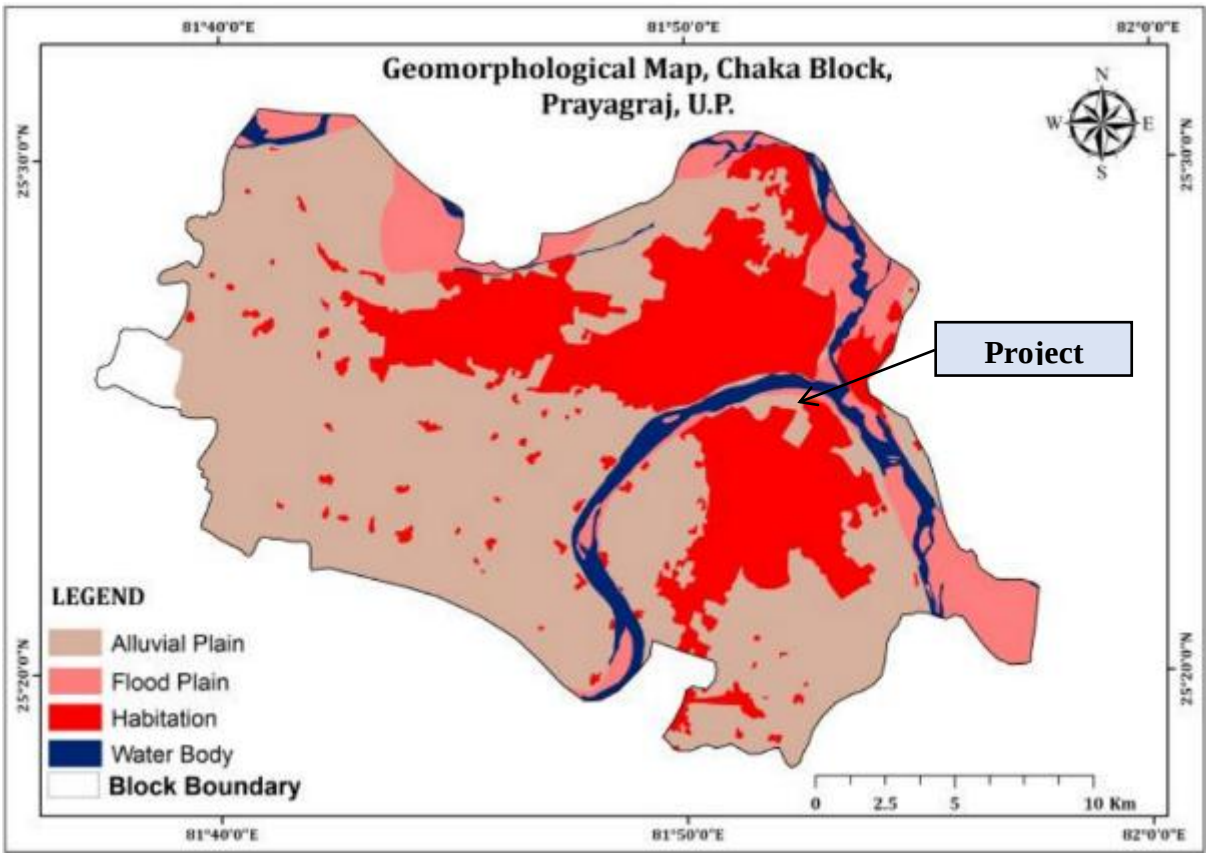

Figure 10: Geomorphological Map of Chaka Block, Prayagraj District

4.1.3. Hydrogeology

The district has two (2) main hydrogeological units: unconsolidated (alluvium) deposits and consolidated (hard rock) formations. Primarily groundwater is found in the alluvial deposits, and further in the weathered and jointed sandstone areas that are situated above the hard rock layers.

The project site is located in the Chaka Block with Alluvium deposits comprising a mixture of sand, silt and clay of maximum thickness of more than 300 metres. The dug well yield in the area ranges between 300 to 400 litres per minute (lpm) and that of tube well ranges between 2000 to 3000 lpm. The depth to water in general between 2 to 15 meters below ground level. The map showing the major aquifers in Prayagraj district is shown in ***Figure 11***.

Some of the salient features & Aquifer details of Chaka Block are as follows:

- Geographical area: 135.75 Sq.Km.
- Basin/ Sub-basin: Ganga, Yamuna and Tons.
- Principal Aquifer System: Alluvium.
- Major Aquifer System: Alluvium.
- Normal Annual Rainfall: 1042 mm.

Aquifer Details:

a) Aquifer Disposition: There are three aquifer groups up to 200 meters deep. Aquifer Group I extend up to 115 m, while Aquifer Group II ranges from 122 to 200 m. The transmissivity is 2790 m^2/day, and the storability is 4.13×10^{-4}. The discharge rate is 3600 lpm.

b) Groundwater Quality: Suitable for domestic use, drinking, irrigation, and industrial purposes.

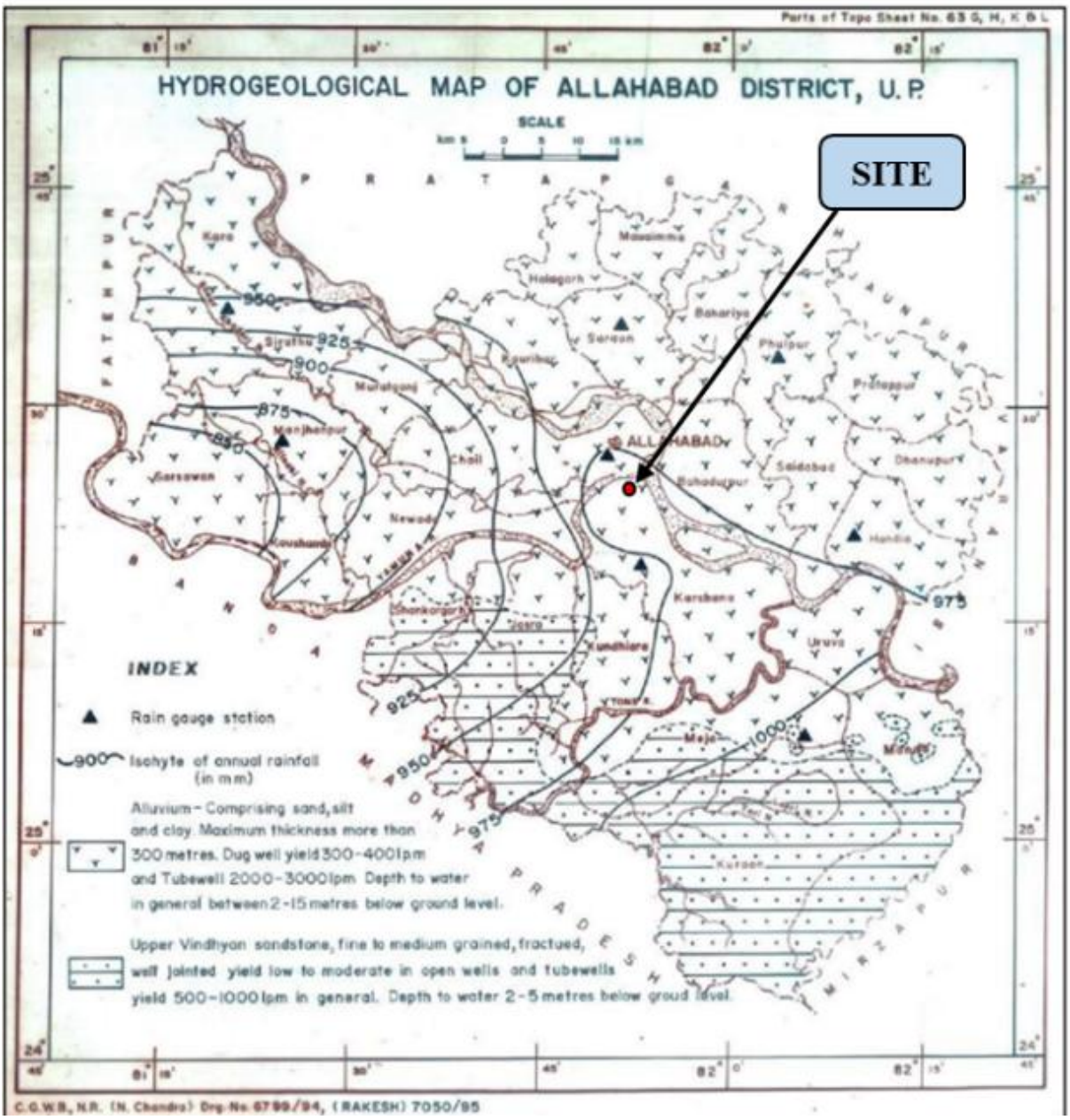

Figure 11: Hydrogeological map of Prayagraj District

4.1.4. Drainage

The Ganga enters the district in the Kaurihar block, maintaining a meandering course. The Yamuna, the district's second major river, enters from the extreme west in the Sankargarh block. It flows in a narrow channel before merging with the Ganga at Sangam. The Yamuna has a more consistent channel and steeper banks compared to the Ganga. Its current is swifter, as it flows down a steeper gradient. The Drainage Map of Prayagraj District is given as ***Figure 12*** below.

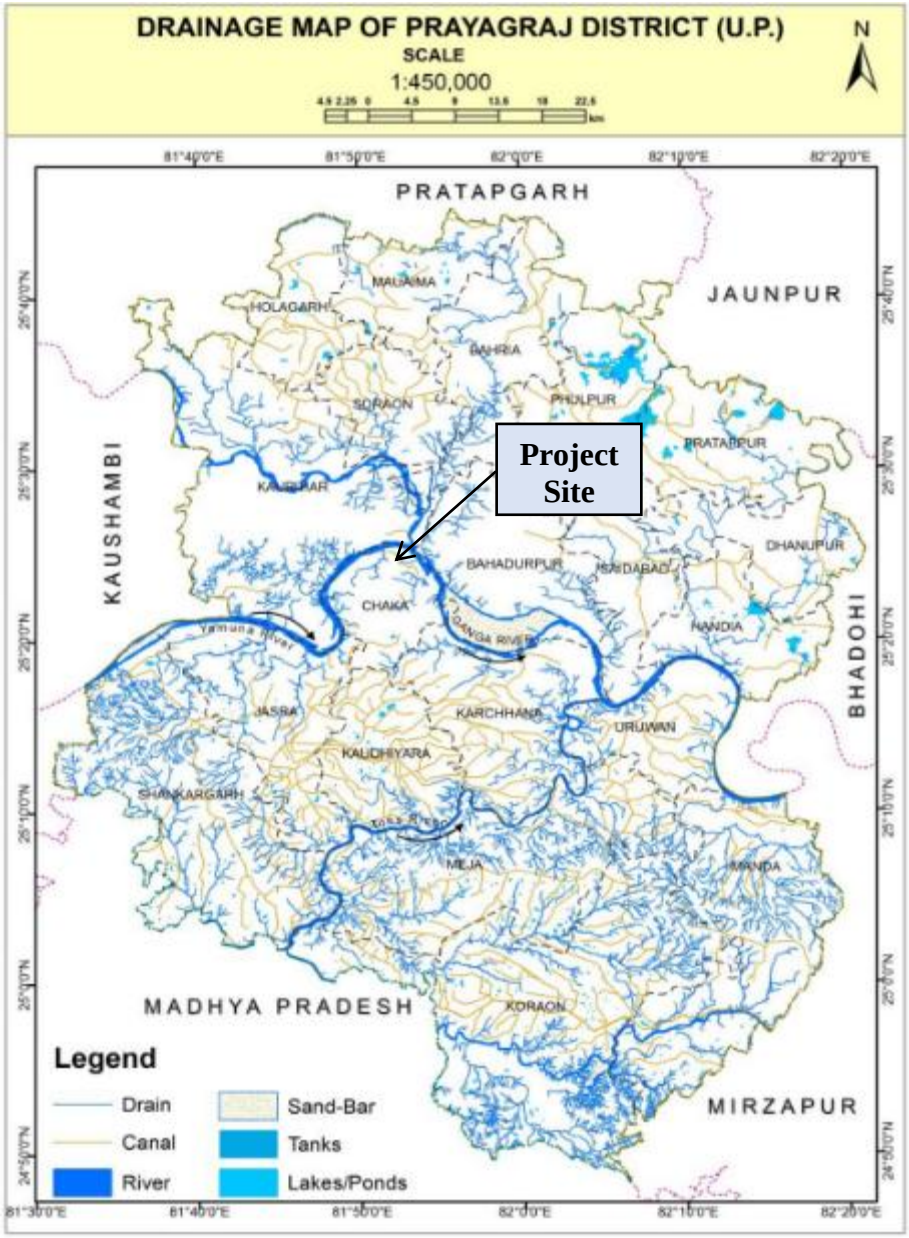

Figure 12: Drainage Map of Prayagraj District

In the 5 km study area, there are Yamuna and Ganga streams. The project site is located on the northern side along Arail Road, with the Yamuna River flowing parallel to the site at a distance of approximately 0.25 km. The Yamuna River eventually joins the Ganga at the Sangam (located ~1.9 km in eastern direction from the site). The site is separated from the Yamuna River by the main Arail Road, which runs along the northern boundary of the site and is positioned at a higher elevation. This elevation significantly reduces the risk of flooding from the river. However, the site is at a lower elevation compared to Arail Road, and its general slope directs water towards the north. As a result, during heavy rainfall, the plant may face an increased risk of waterlogging and flooding. To mitigate this risk, a proper stormwater drainage system shall be required to ensure efficient water flow and prevent any adverse impacts from potential flooding. The drainage map of Study Area is represented below.

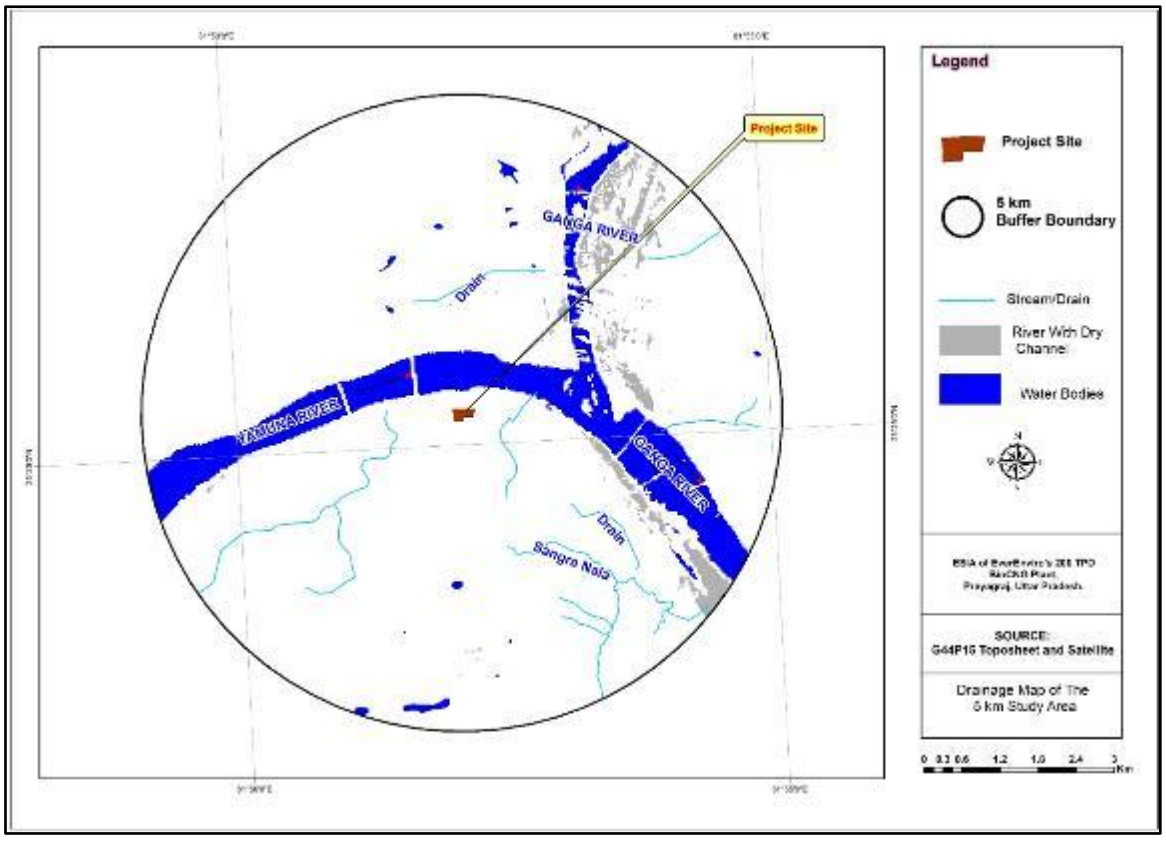

Figure 13: Drainage Map of Project Site

4.1.5. Groundwater Levels

Ground water in the district occurs under phreatic to semi confined and confined conditions. The near surface aquifer is under unconfined / water table condition. The shallow phreatic aquifer is tapped by dugwells. The depth to water level of the CGWB monitoring stations ranges from 1.32 to 20.36 mbgl during pre-monsoon whereas it ranges from 0.59 to 15.69 mbgl in post monsoon. The pre & post monsoon water level fluctuation varies from 0.46 to 7.54 m. Depth to water level trend for long term for 10 years average water level rise 0.492 cm/year and fall 0.3658 cm/year during pre-monsoon and rise 0.5156 cm/year and fall 0.91cm/year during post-monsoon. Annual rise rate 0.3587cm/year and fall 0.7232 cm/yr.

The Pre-Monsoon & Post Monsoon Depth to Water Level Map of Prayagraj District during 2019 is shown in where it can be inferred that in partial portion of Chaka Block where the project site is located, the Pre-Monsoon Water Level in the project site was in the range of 10-20 meters bgl whereas the Post Monsoon Water Level in the project site was in the range of 5-10 meters bgl.

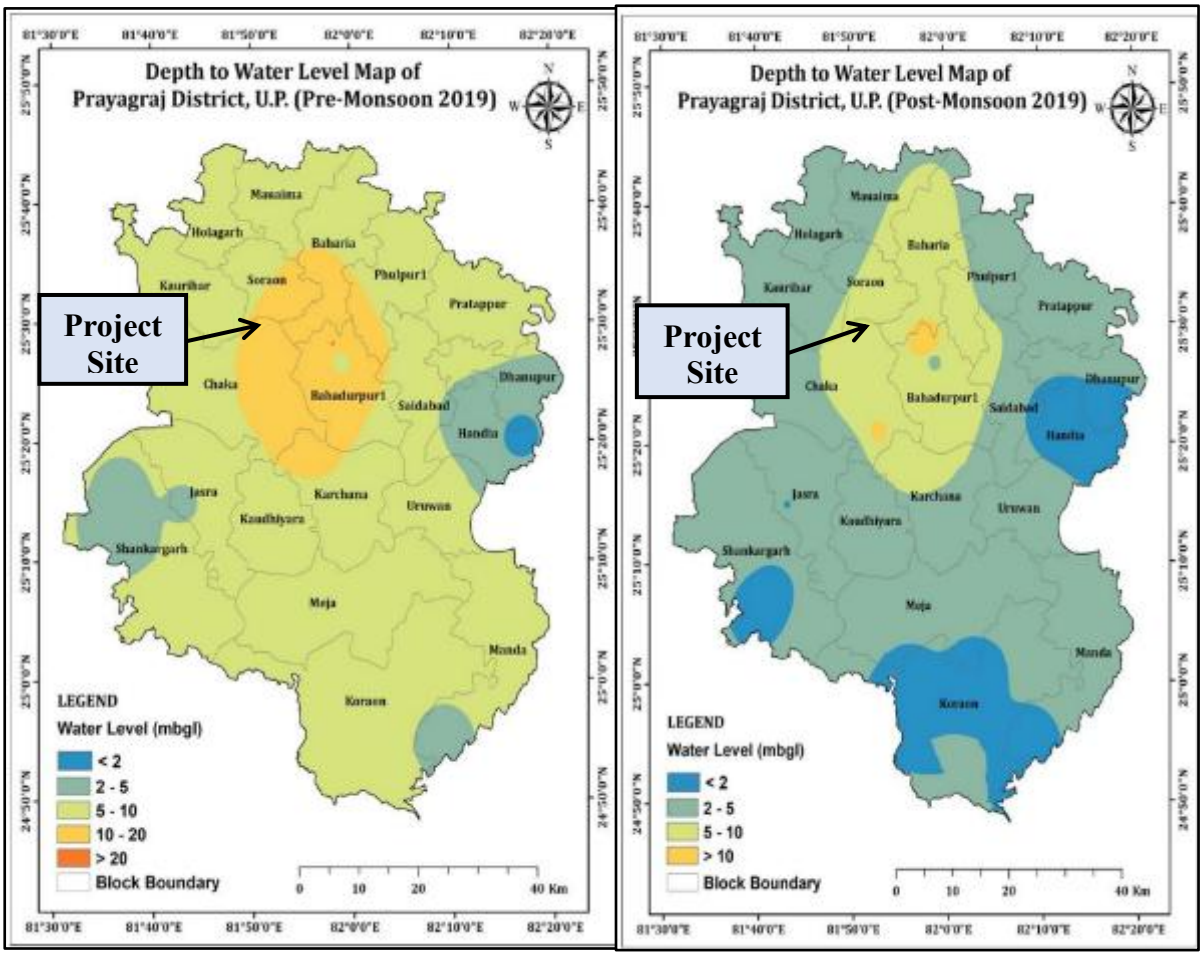

Figure 14: Pre-Monsoon & Post Monsoon Depth to Water Level Map of Prayagraj District

4.1.6. Land Use and Land Cover

The Land Use/Land Cover Map of Prayagraj District is shown in ***Figure 15***. The major part of the land in the district is utilized for agriculture purpose. The district covers a total area of about 5,57,074 ha. and its detailed use is tabulated in ***Table 10*** below. From the table it can be inferred that majority of land in the district is used for agricultural activities followed by forest cover, barren land, cultivable waste land and rest are trees and grasses.

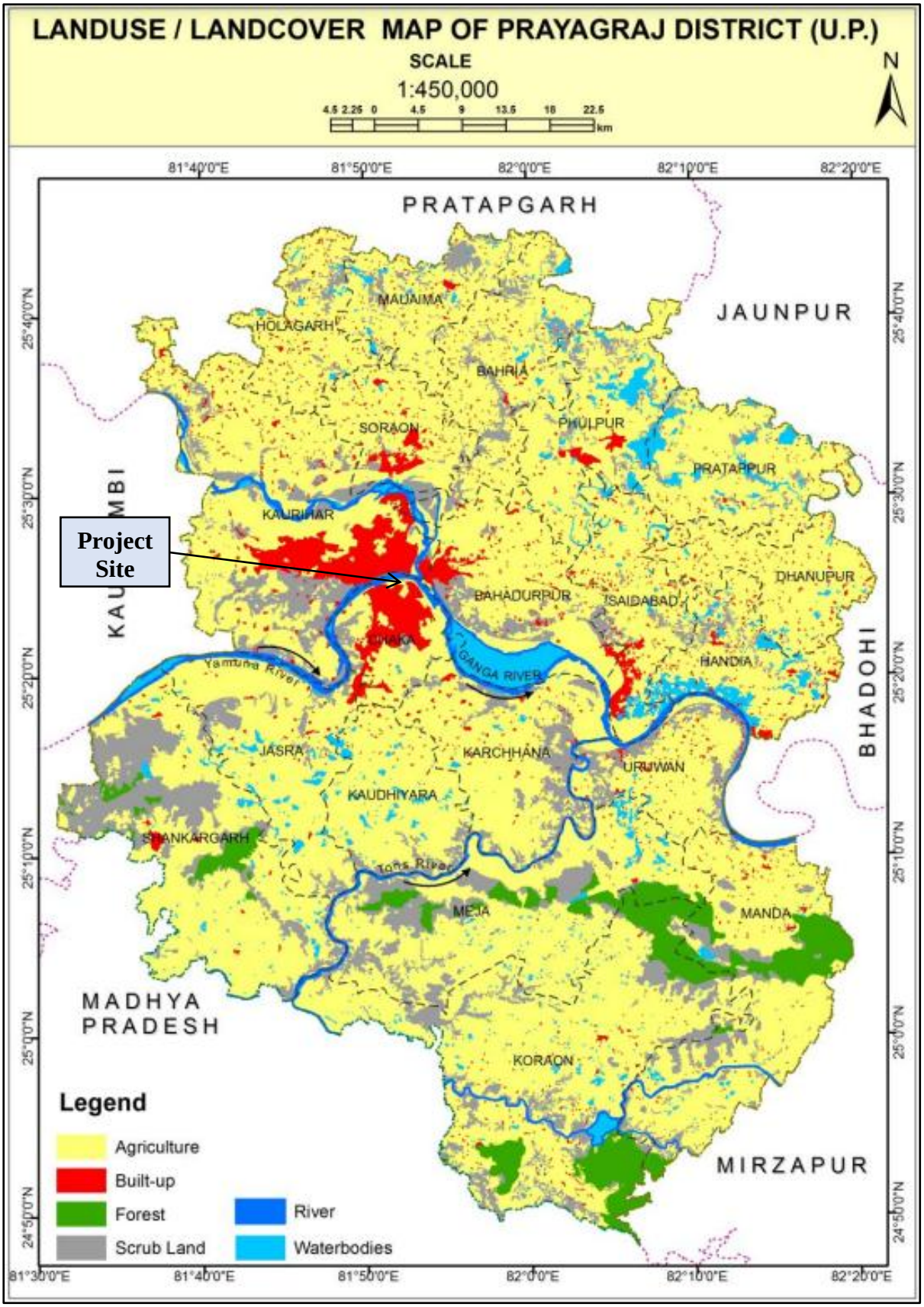

Figure 15: Land Use and Land Cover Map of Prayagraj District

Table 10: Land use pattern of Prayagraj District & Chaka Block

Name	Area under each land use in hectare									
	Agriculture	Forest	Cultivable Waste Land	Current Fallow	Another Fallow	Barren	Other than agriculture	Grassland	Garden, trees & shrubs	Total Land
Prayagraj District	352690	21476	11340	33910	20728	14947	94690	1639	5654	557074
Chaka Block	9399	0	293	397	360	1603	3677	58	231	16018

The total geographic area of the study area (within 5 km) is 7880.93 ha. The Land Use and Land Cover Map of Study Area is shown in ***Figure 16*** below.

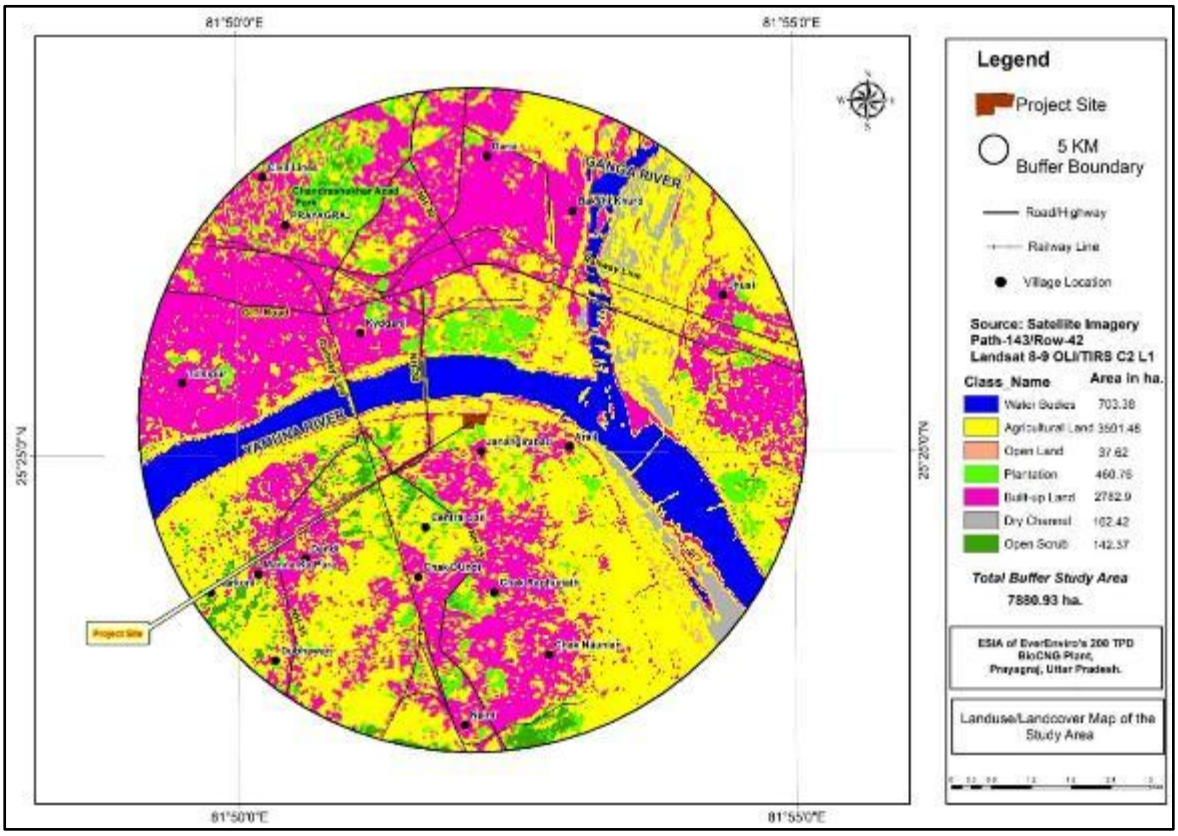

Figure 16: Land Use and Land Cover Map of Study Area

Based on the observations from Land use and Land Cover Map (*Error! Reference source not found.**19***), the total study area is spread across ~7880.93 ha. wherein ~45.57 % of land is agricultural, ~35.31% of land is built-up land, ~8.93% of land is covered with water bodies, ~5.85% of land for plantation area, ~2.06% of land as dry channel, ~1.81% of land as open scrub and ~0.48% of land remain is open land. The land use breakup of study area is shown in ***Table 11*** below.

Table 11: Land use within the study area of 5km

LU/LC Class	Area (Ha)	%
Built-up Land	2782.9	35.31
Water Bodies	703.38	8.93
Dry Channel	162.42	2.06
Open Land	37.62	0.48
Open Scrub	142.37	1.81

Plantation	460.76	5.85
Agricultural Land	3591.48	45.57
Total Study Area	***7880.93***	***100.00***

4.1.7. Risk of Natural Hazards

The Uttar Pradesh State Disaster Management Plan (UPSDMP), 2023[21] identifies floods as the primary natural hazard, closely followed by risks associated with heat waves, droughts, earthquakes, lightning, and cold waves. This section includes data from UPSDMP and other secondary sources. The increasing frequency and intensity of these hazards necessitate comprehensive disaster preparedness and response strategies to mitigate their impacts and protect the community in Prayagraj where the project site is located.

4.1.7.1. Seismic Hazard

The map is based on the amount of damage suffered in different regions of India because of the earthquakes. Colour coded in different shades of RED colour; the map shows four (4) distinct seismic zones of India.

Zone-II	This is said to be the least active seismic zone
Zone-III	It is included in the moderate seismic zone
Zone-IV	This is considered to be the high seismic zone
Zone-V	It is the extreme seismic zone

The Bureau of Indian Standards [IS-1893 – part – 1: 2002] has also grouped the Country into same four (4) seismic zones viz. Zone-II, III, IV and V. Of these, Zone-V is rated as seismically most active region while Zone-II is the least.

The State of Uttar Pradesh is situated near two (2) high-risk zones known for their seismic activity: Nepal and Uttarakhand. As per UPSDMP, 2023, Uttar Pradesh has a total of 75 districts, of which 19 are located in areas classified as Zone IV, 15 are located in areas partly in Zone IV & III, 19 are located in areas classified as Zone III, 14 are located in areas partly in Zone III & II and 8 are located in areas classified as Zone II. Prayagraj district is located in areas partly in Zone III & II which is vulnerable to seismic events due to its geographical location along tectonic boundaries. This region is influenced by the Indo-Australian tectonic plate, although it is not as directly prone to earthquakes as other areas in the state.

The last significant earthquake that impacted the entire state occurred on 26th April 2015. It was measured at 7.3 on the Richter scale with its epicentre near Barpak, Nepal. This event occurred approximately 420 km to the northeast of Prayagraj. On 3rd October 2024, an earthquake measuring 3.4 on the Richter scale was recorded about 170 km southeast of Prayagraj.

As per the data released by Uttar Pradesh State Disaster Management Authority (UPSDMA) the project area falls in Low Damage Risk Zone (MSK VI) i.e., Zone II as shown in ***Figure 17*** below.

[21] Source: UP State Disaster Management Plan Report 2023 (https://upsdma.up.nic.in/2023/SDMP-Plan-Part-1.pdf)

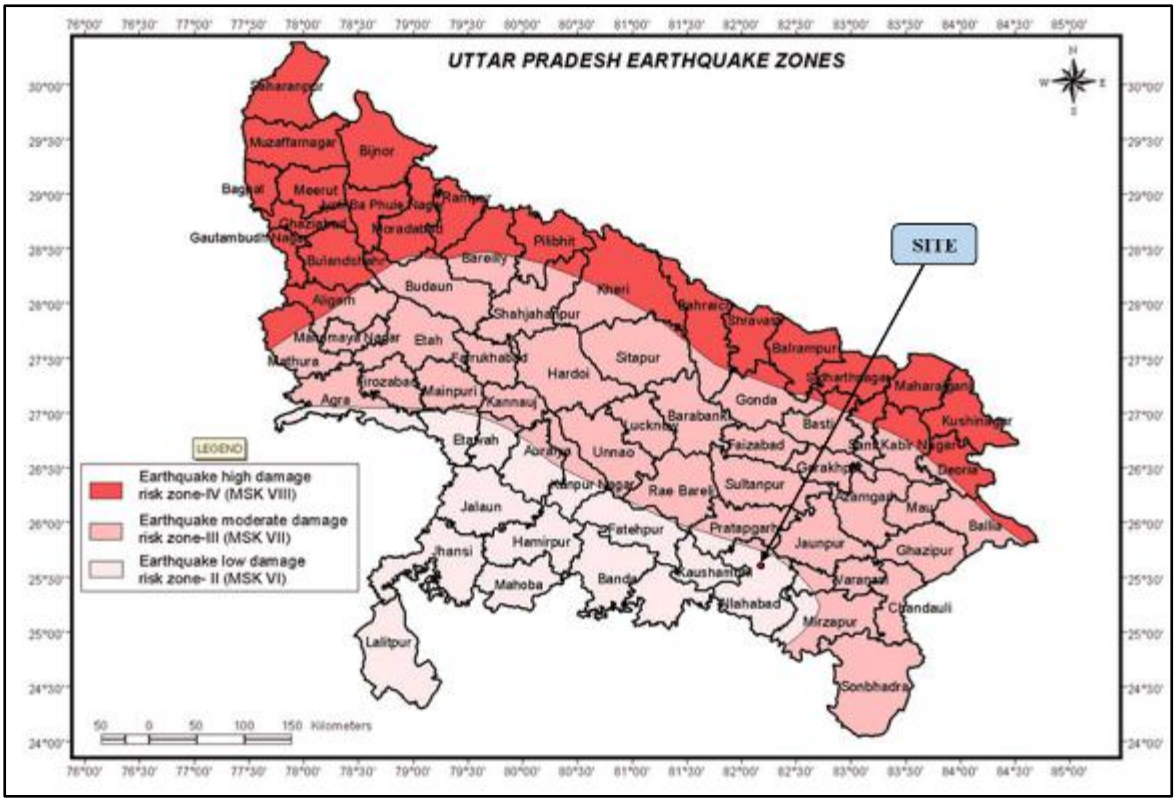

Figure 17: Map of Uttar Pradesh indicating earthquake seismic zones

4.1.7.2. Flooding

Floods are the most frequently occurring natural disasters in Uttar Pradesh, affecting various parts of the state almost every year. The major rivers that cause flooding in the region include Ganga, Yamuna, Ramganga, Gomti, Sharda, Ghaghra, Rapti, and Gandak. The Ganga River basin receives an average rainfall ranging from 60 cm to 190 cm, with more than 80% of this precipitation occurring during the southwest monsoon. Rainfall tends to increase from west to east and from south to north, which similarly affects the pattern and intensity of flooding.

Out of the total geographical area of 2,40,930 sq. km. in the state, approximately 73,060 sq. km. are considered flood-prone. According to estimates by the Irrigation Department, only about 58,720 sq. km. can be effectively protected from flooding. As of March 2004, only 16,010 sq. km. had received some protection. The eastern districts and those in the Terai region bordering Nepal are the most severely impacted by floods. On average, floods affect about 26,890 sq. km. each year, resulting in estimated losses of around Rs. 432 crores to crops, houses, and livestock. Additionally, the loss of human life also occurs due to flooding.

As per the flood hazard map of Uttar Pradesh released by The Building Materials and Technology Promotion Council (BMTPC), the Project site falls in an area which is prone to flooding incidents as shown in ***Figure 18*** below.

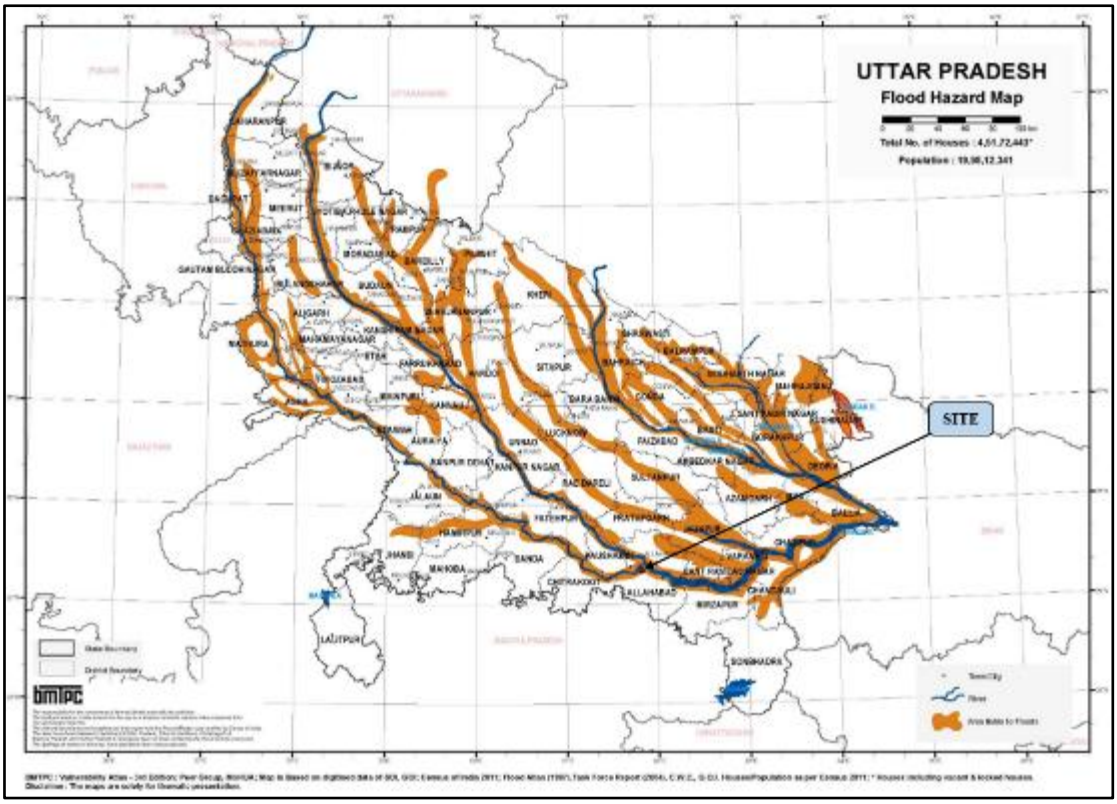

Figure 18: Map of Uttar Pradesh indicating flood prone areas

4.1.7.3. Drought

Drought significantly affects Uttar Pradesh, which produces about 21% of India's food grains. The state has a total sown area of 25,300 sq. km. with 17,690 sq. km. (66%) irrigated. Irrigation sources include canals (25%) and tube wells (67%). One-third of the irrigated area, along with all rain-fed areas, depends on monsoon rains, which provide 70-80% of the region's annual rainfall. The state is divided into U.P. East and U.P. West, with highly deficient rainfall recurrences of 6 to 8 years and 10 years, respectively. Recent severe droughts in 2002 and 2004 caused losses of Rs. 7,540 crores and Rs. 7,292 crores in crops, livestock, and property.

As per the data released by Uttar Pradesh State Disaster Management Authority (UPSDMA) the project area falls in Moderate category i.e., Drought-affected district experiencing drought five times between 2002 and 2018 as shown in ***Figure 19*** below.

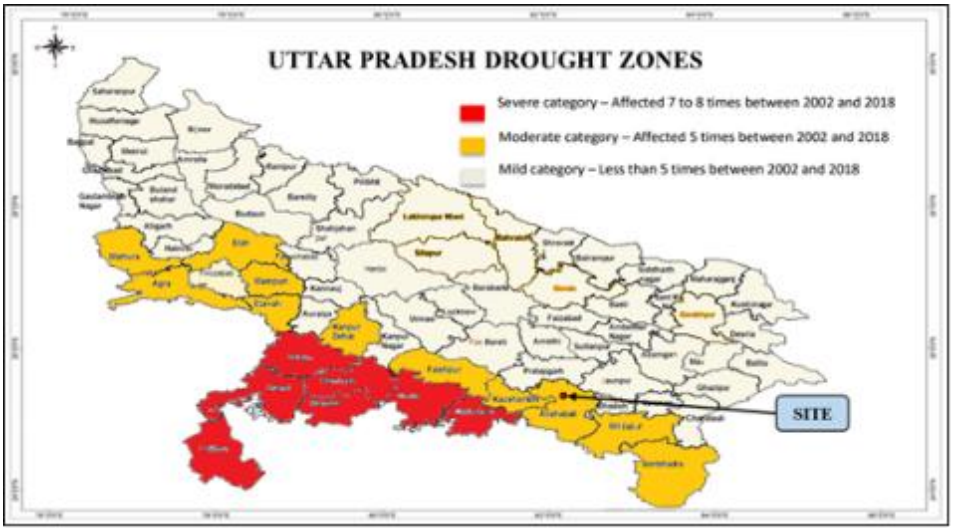

Figure 19: Map of Uttar Pradesh indicating drought zones

4.2. Air, Water, Noise and Soil Baseline

In order to evaluate the environmental baseline of the study area, baseline environmental monitoring was carried out for one (1) week in the month of November 2024. Photographs of baseline environmental monitoring is provided as ***Annexure-3*****.**

4.2.1. Ambient Air Quality

Ambient air was monitored in the project area in the month of November 2024 to estimate the quality of ambient air in and around the project site. The air quality was analysed at five (05) locations as mentioned in the table below. From each location, two (2) samples were taken in a 24-hourly, twice a week to estimate the concentration of primary pollutants in the ambient air. The sampling locations were selected considering the presence of habitation nearby, their accessibility, upwind and downwind directions, electricity availability and security of equipment.

Table 12: Ambient Air Quality Monitoring Locations

Location Code	Location Name	GPS Coordinates
AAQ1	Project Site	25°25'18.57"N 81°52'2.54"E
AAQ2	Mutthi Ganj	25°25'38.13"N 81°50'53.18"E
AAQ3	Mahewa East	25°24'50.96"N 81°50'24.78"E
AAQ4	Shri Someshwar Mahadev Mandir, Arail	25°24'24.17"N 81°53'28.86"E
AAQ5	Adhyapak Colony	25°25'8.57"N 81°52'44.07"E

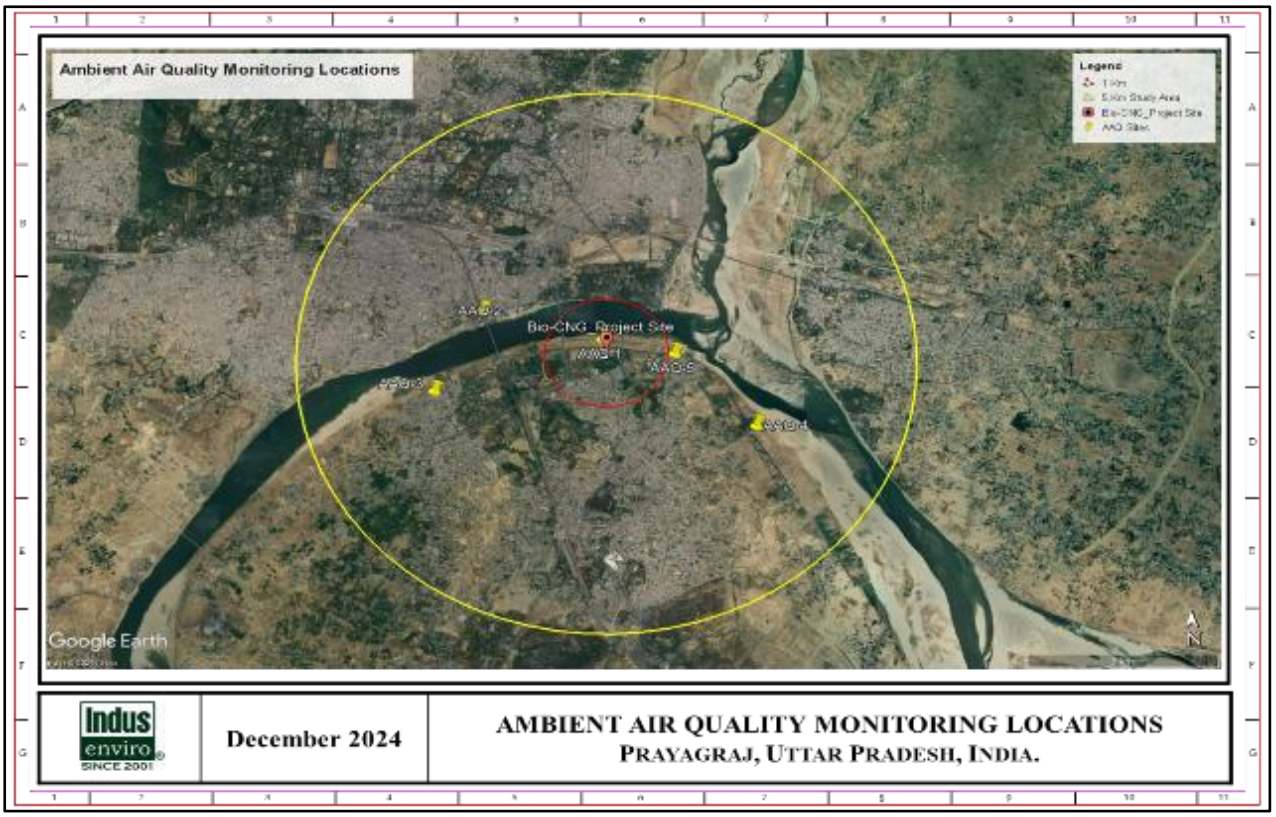

Figure 20: Satellite Image of Ambient Air Quality Monitoring Locations

The ambient air quality results were compared to the National Ambient Air Quality Standards (NAAQS, 2009) for rural and residential area (provided in ***Annexure-4***) and the analysis results of air quality have been presented below.

Table 13: Results of Ambient Air Monitoring

Pollutant	Project Site		Mutthi Ganj		Mahewa East		Shri Someshwar Mahadev		Adhyapak Colony		Specification/ Limit (As per CPCB)	Test Method
	19-20 Nov 2024	22-23 Nov 2024	19-20 Nov 2024	22-23 Nov 2024	19-20 Nov 2024	22-23 Nov 2024	19-20 Nov 2024	22-23 Nov 2024	19-20 Nov 2024	22-23 Nov 2024		
Sulphur Dioxide (SO_2) µg/m³	8.9	11	10.3	8.7	8.2	9.8	8.8	10.6	10.5	9.4	**For 24 Hrs.=80**	**IS: 5182 (Part-2)**
Nitrogen Dioxide (NO_2) µg/m³	13.5	14.5	12.6	12.3	12.7	13.9	16.7	18.2	14.7	16.1	**For 24 Hrs.=80**	**IS: 5182 (Part-6)**
Particulate Matters (PM_{10}) µg/m³	89.6	84.9	94.6	82.4	85.8	86.7	85.1	92.1	91.5	81.4	**For 24 Hrs.=100**	**IS 5182 (Part-23)**
Particulate Matters ($PM_{2.5}$) µg/m³	52	48.8	53.1	44.1	45.3	49.6	48.9	52.3	52.6	46.6	**For 24 Hrs.=60**	**IS 5182 (Part-24)**
Ozone (O_3) µg/m³	10.21	8.31	6.8	7.78	6.91	9.15	8.5	9.85	12.1	14.4	**For 1 Hr.=180**	**IS: 5182 (Part-9)**
Lead (Pb) µg/m³	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**For 24 Hrs.=1**	**IS 5182 (Part-22)**
Carbon Monoxide (CO) µg/m³	0.44	0.82	0.49	0.57	0.56	0.6	0.72	0.69	0.69	0.59	**For 1 Hr.=4**	**IS 5182 (Part-10)**
Ammonia (NH_3) µg/m³	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	**For 24 Hrs.=400**	**IS 5182 (Part-25)**
Benzene (C_6H_6) µg/m³	1.96	1.82	2.5	1.76	3.23	2.07	1.75	2.45	2.99	2.66	**For Annual=5**	**IS 5182 (Part-11)**
Benzo a Pyrene (BaP) ng/m³	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**For Annual=1**	**IS 5182 (Part-12)**
Arsenic (As) ng/m³	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**For Annual=6**	**IS 5182 (Part-22)**
Nickel (Ni) ng/m³	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**For Annual=20**	**IS 5182 (Part-22)**
Hydrogen Sulphide (H_2S) mg/m³	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.		**IS: 5182 (Part-7)**

Source: Test Report form Enviro-Tech Services 28th November 2024

Inference

The project site is located in Naini (also known as Naini Industrial Area), which is a satellite neighbourhood and a twin city of Prayagraj in Prayagraj district, Uttar Pradesh, India. The parameters measured for ambient air quality were noted to be well within the permissible limits of the National Ambient Air Quality Standards (NAAQS), 2009, as notified by MoEF&CC.

4.2.2. Ambient Noise Quality

Ambient noise level was monitored continuously for 24 hours at five (5) locations around the project area using Sound Level Meter at the identified receptor locations mentioned in table below. The noise levels obtained were analysed to arrive at the equivalent continuous noise level (Leq) for day and night-time. The day and night-time hours ranged from 06:00 to 22:00 hrs and 22:00 to 06:00 hrs respectively.

Table 14: Ambient Noise Quality Monitoring Locations

Location Code	Location Name	GPS Coordinate
ANQ1	Project Site	25°25'18.57"N 81°52'2.54"E
ANQ2	Mutthi Ganj	25°25'38.13"N 81°50'53.18"E
ANQ3	Mahewa East	25°24'50.96"N 81°50'24.78"E
ANQ4	Shri Someshwar Mahadev Mandir, Arail	25°24'24.17"N 81°53'28.86"E
ANQ5	Adhyapak Colony	25°25'8.57"N 81°52'44.07"E

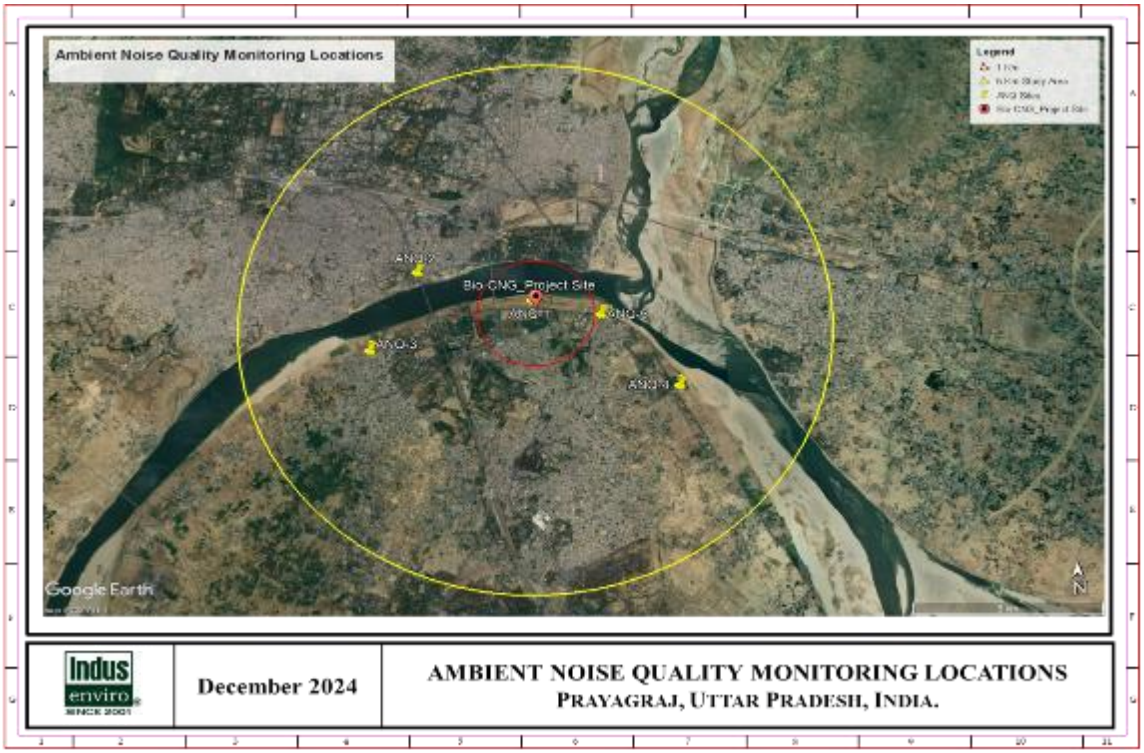

Figure 21: Satellite Image of Ambient Noise Quality Monitoring Locations

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The sampling locations can be categorised as residential area. The results of the ambient noise level monitoring are compared with National Ambient Air Quality Standards (NAAQS) in respect of noise

limits for daytime and night-time for residential area (Standards for ambient noise quality are explained in ***Annexure-4***).

Table 15: Results of Ambient Noise level Monitoring

S. No.	Test Parameter	Unit	Monitoring Results										Specification/ Limits (as Per CPCB): Leq dB(A)		
			Project Site		Mutthi Ganj		Mahewa East		Shri Someshwar Mahadev Mandir, Arail		Adhyapak Colony				
			Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Category of Area	Day Time	Night Time
1	*Average (dB;A)*	dB (A)	61.5	53	50.9	42.5	48.8	40.4	48.2	39.8	46.7	38.3	Industrial Area	75	70
2	*Lmax*	dB (A)	66.1	56.6	55.6	46.1	53.5	44	52.9	43.4	51.4	41.9	Commercial Area	65	55
3	*Lmin*	dB (A)	55.4	49.7	44.9	39.2	42.8	37.1	42.2	36.5	40.7	35	**Residential Area**	**55**	**45**
4	*Leq (dB;A)*	dB (A)	**62.1**	**53.4**	**51.6**	**42.9**	**49.5**	**40.8**	**48.9**	**40.2**	**47.4**	**38.7**	Silence Area	50	40
5	*L90*	dB (A)	63.7	54.6	53.2	44.1	51.1	42	50.5	41.4	49	39.9	Remarks:		
6	*L50*	dB (A)	61.8	53.3	51.1	42.8	49	40.7	48.4	40.1	46.9	38.6	Day time is reckoned in between 06.00 A.M. and 10.00 P.M.		
7	*L10*	dB (A)	58.2	50.6	47.7	40.1	45.6	38	45	37.4	43.5	35.9	Night time is reckoned in between 10.00 P.M. and 06.00 A.M.		

Source: Test Report form Enviro-Tech Services 28th November 2024

Inference

The ambient noise level of all the locations except the project site were noted to be in the permissible standards of noise levels prescribed by with National Ambient Air Quality Standards (NAAQS) in respect of noise limits for day and night-time. The noise level of the project site is note to be exceeding the permissible limits. The permissible limit (as Per CPCB) is 55 Leq dB(A) at day time and 45 Leq dB(A) at night time in the residential area, but the results of the project site noise level monitoring show the day time noise is 62.1 dB(A) and night time noise is 53.4 dB(A). The existing high noise level can be attributed to vehicular movements, and developmental activities near the project site.

4.2.3. Drinking / Ground Water Quality

Samples of drinking water from nearby area of project site were collected and analysed for physico-chemical, heavy metals and biological parameters and compared to drinking water standards. The figure below show location of samples and ***Table 16*** below show the GPS coordinates of sample collection.

Table 16: Drinking / Ground Water Monitoring Locations

Location Code	Location Name	GPS Coordinate
DW-1	Project Site	25°25'18.75"N 81°52'2.80"E
DW-2	Mahewa Patti Purab Uparhar	25°25'2.23"N 81°51'54.47"E
DW-3	Shiv Nagar	25°24'14.11"N 81°52'43.00"E

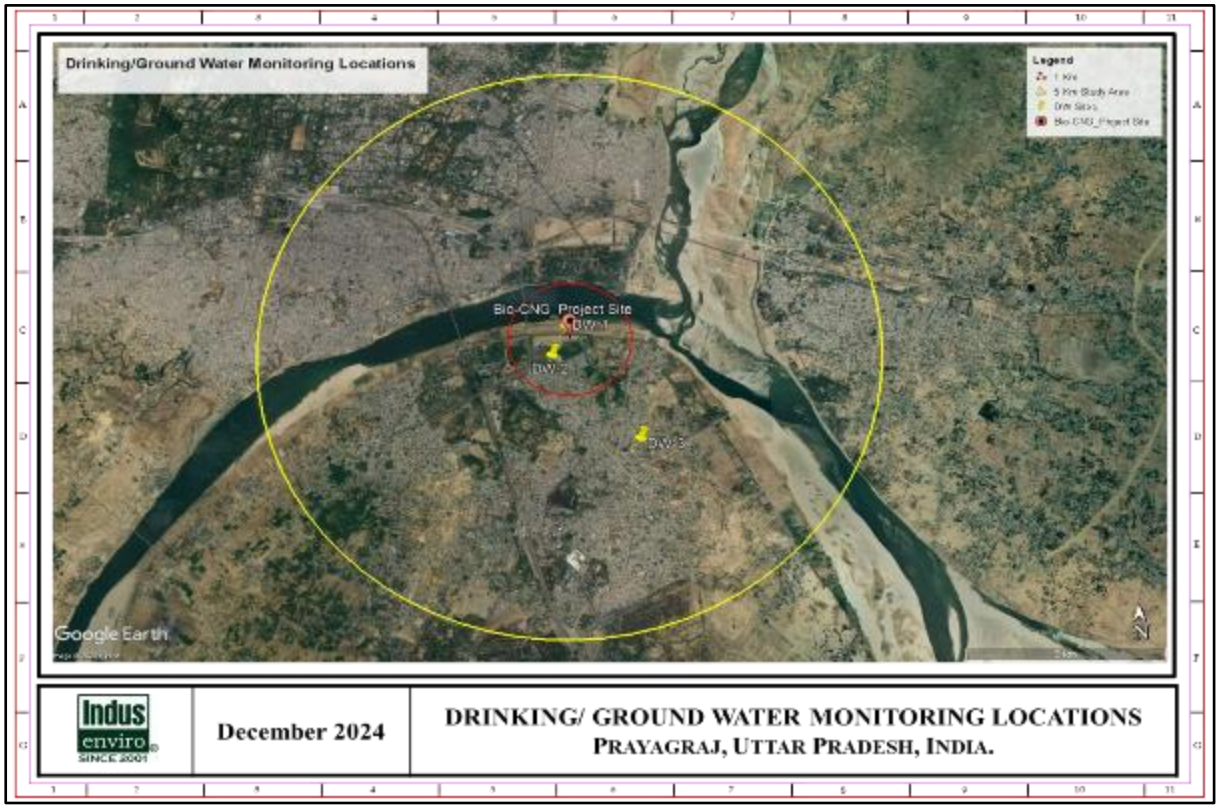


Figure 22: Satellite Image of Drinking/Ground Water Monitoring Locations

Drinking Water Quality- Indian Drinking Water Standard (IS 10500: 2012)

Table 17: Results of Drinking Water Quality Analysis

S. No.	Test Parameters	Unit	DW1	DW2	DW3	Specification/Limit (As per IS:10500: 2012)		Test Methods
						Acceptable	Permissible	
1	***Colour***	Hazen	<5.0	<5.0	<5.0	5	15	APHA 2120-B
2	***Odour***	Qualitative	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	APHA 2150-B
3	***Taste***	Qualitative	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	APHA 2160-C
4	***pH***	…	7.31	7.34	7.28	6.5 - 8.5	No relaxation	APHA 4500-H+

S. No.	Test Parameters	Unit	DW1	DW2	DW3	Specification/Limit (As per IS:10500: 2012)		Test Methods
						Acceptable	Permissible	
5	***Turbidity***	NTU	<1.0	<1.0	<1.0	1	5	APHA 2130-B
6	***Total Dissolved Solids (TDS)***	mg/L	329	334	329.8	500	2000	APHA 2540-C
7	***Biological Oxygen Demand (BOD)***	mg/L	Nil	Nil	Nil	--	--	IS: 3025 (Part-44
8	***Chemical Oxygen Demand (COD)***	mg/L	Nil	Nil	Nil	--	--	APHA 5220-B
9	***Fluoride (F)***	mg/L	0.16	0.2	0.18	1	1.5	APHA 4500:(F-)-D
10	***Total Alkalinity ($CaCO_3$)***	mg/L	182.8	183.5	189.3	200	600	APHA 2320-B
11	***Total Hardness ($CaCO_3$)***	mg/L	117	132.1	138.3	200	600	APHA 2340-C
12	***Calcium (Ca)***	mg/L	40.7	41.8	42.6	75	200	APHA 3500:(Ca)-B
13	***Chloramines (Cl2)***	mg/L	N.D.	N.D.	N.D.	4	No relaxation	IS 3025 (Part 26)
14	***Chloride (Cl)***	mg/L	74.6	74.9	74.3	250	1000	APHA 4500:(Cl-)-B
15	***Magnesium (Mg)***	mg/L	3.64	6.65	7.64	30	100	APHA 3500:(Mg)-B
16	***Nitrate (NO_3)***	mg/L	1.26	1.24	1.26	45	No relaxation	APHA 4500:(NO3-)-B
17	***Sulphate (SO_4)***	mg/L	52	53.2	55	200	400	APHA 4500:(SO4)-E
18	***Boron (B)***	mg/L	<0.01	<0.01	<0.01	0.5	1	APHA 4500:(B)-C
19	***Aluminium (Al)***	mg/L	<0.01	<0.01	<0.01	0.03	0.2	APHA-3120B
20	***Ammonia (total ammonia-N)***	mg/L	N.D.	N.D.	N.D.	0.5	No relaxation	IS 3025 (Part34)
21	***Anionic detergents (MBAS)***	mg/L	N.D.	N.D.	N.D.	0.2	1	APHA 5540-C
22	***Barium (Ba)***	mg/L	<0.01	<0.01	<0.01	0.7	No relaxation	APHA 3120B
23	***Arsenic (As)***	mg/L	<0.01	<0.01	<0.01	0.01	No relaxation	APHA-3120B

S. No.	Test Parameters	Unit	DW1	DW2	DW3	Specification/Limit (As per IS:10500: 2012)		Test Methods
						Acceptable	Permissible	
24	***Cadmium (Cd)***	mg/L	<0.001	<0.001	<0.001	0.003	No relaxation	APHA 4500:(NH3)-C
25	***Chromium (Cr)***	mg/L	<0.01	<0.01	<0.01	0.05	No relaxation	APHA 4500:(P)-D
26	***Cyanide (CN)***	mg/L	N.D.	N.D.	N.D.	0.05	No relaxation	APHA 4500:(CN-)-D
27	***Copper (Cu)***	mg/L	<0.01	<0.01	<0.01	0.05	1.5	APHA 2520B
28	***Iron (Fe)***	mg/L	<0.05	<0.05	<0.05	0.3	No relaxation	APHA-3120B
29	***Lead (Pb)***	mg/L	<0.01	<0.01	<0.01	0.01	No relaxation	APHA-3120B
30	***Manganese (Mn)***	ug/L	<0.01	<0.01	<0.01	0.1	0.3	APHA-3120B
31	***Mercury (Hg)***	mg/L	<0.001	<0.001	<0.001	0.001	No relaxation	APHA-3114C
32	***Phosphorus (P)***	mg/L	1.1	0.66	0.87	--	--	APHA 4500:(P)-D
33	***Selenium (Se)***	mg/L	<0.01	<0.01	<0.01	0.01	No relaxation	APHA-3120B
34	***Zinc (Zn)***	mg/L	<0.01	1.5	2.8	5	15	APHA-3120B
35	***Total Coliform Count***	per 100mL	Absent	Absent	Absent	Shall Not Be Detectable		IS 15185
36	***Escherichia coli***	per 100mL	Absent	Absent	Absent	Shall Not Be Detectable		IS 15185
37	***Free residual chlorine***	mg/L	<0.01	<0.01	<0.01	0.2	1	APHA 4500:(Cl)-B
38	***Silver (Ag)***	mg/L	<0.01	<0.01	<0.01	0.1`	No relaxation	APHA-3120B
39	***Sulphide (H_2S)***	mg/L	<0.5	<0.5	<0.5	200	400	APHA 4500:(S2-)-D
40	***Molybdenum (Mo)***	mg/L	N.D.	N.D.	N.D.	0.07	--	APHA 3120B
41	***Nickel (Ni)***	mg/L	<0.01	<0.01	<0.01	0.02	No relaxation	APHA 3120B
42	***Pesticide***	…	N.D.	N.D.	N.D.	0	No relaxation	USEPA
43	***Polychlorinated biphenyls***	mg/L	N.D.	N.D.	N.D.	0.005	No relaxation	USEPA

Source: Test Report form Enviro-Tech Services 28th November 2024

Inference

As observed in the above table, all the parameters of ground water for all the three (3) locations were found to be within the permissible limits specified as per IS:10500: 2012. Hence the water is portable and safe to be used for drinking purpose.

4.2.4. Surface Water Quality

Sample of surface water taken from the situated river Yamuna, 0.3 Km in north direction from the project site and Triveni Sangam, 1.3 Km in east direction (one sample taken before the Sangam and the other sample was taken after the Sangam) of project site was collected. The table of coordinates location of the sample collected is present below.

Table 18: Surface Water Monitoring Locations

Location Code	Location Name	GPS Coordinates
SW-1	Near Yamuna Bridge	25°25'27.16"N 81°51'51.89"E
SW-2	Before Triveni Sangam	25°25'24.84"N 81°52'26.83"E
SW-3	After Triveni Sangam	25°24'46.27"N 81°53'33.88"E

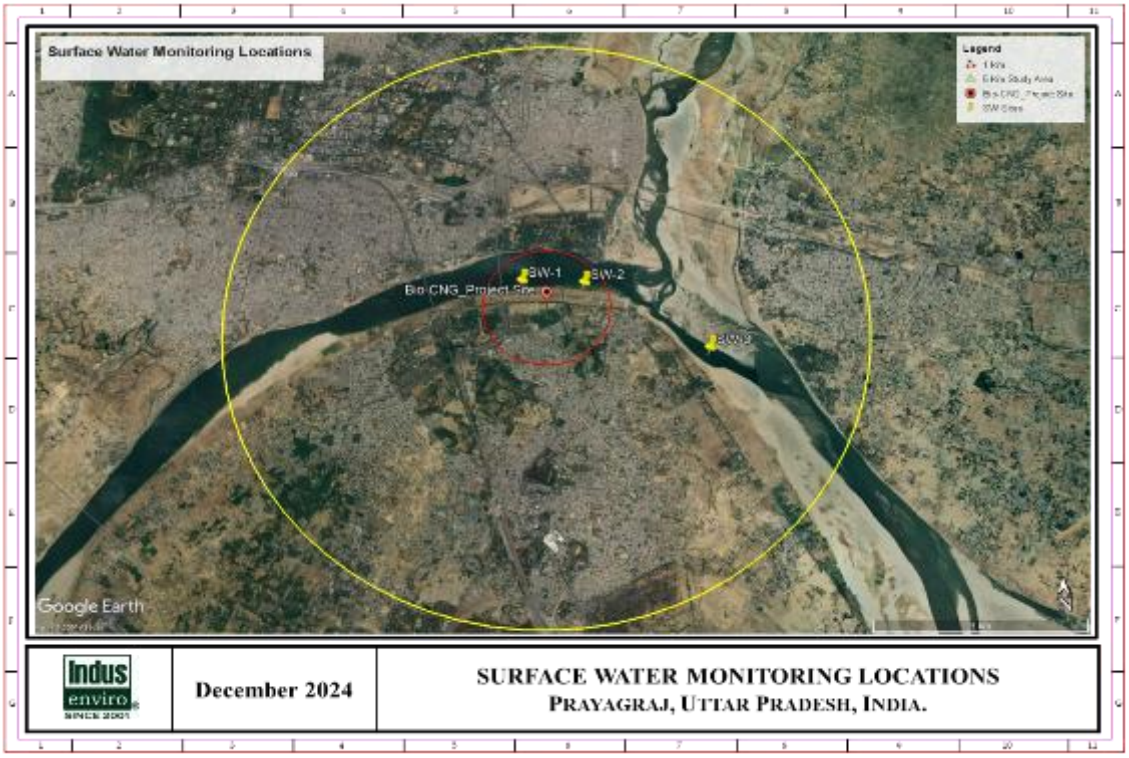


Figure 23: Satellite Image of Surface Water Monitoring Locations

Surface water quality- Indian Standard (IS 2296: 1992)

Class A – Drinking water without conventional treatment but after disinfection. Class B – Water for outdoor bathing. Class C – Drinking water with conventional treatment followed by disinfection. Class D – Water for fish culture and wild life propagation. Class E – Water for irrigation, industrial cooling and controlled waste disposal. (Unobj = Unobjectionable).

Table 19: Results of Surface Water Quality Analysis

S. No.	Test Parameters	Unit	SW1	SW2	SW3	Specification/Limit (As per IS 2296: 1992)		Test Methods
						Class C	Class D	
1	***Colour***	Hazen	7	8	7	--	--	APHA 2120-B
2	***Odour***	Qualitative	Odourless	Odourless	Odourless	300	--	APHA 2150-B
3	***Taste***	Qualitative				--	--	APHA 2160-C

S. No.	Test Parameters	Unit	SW1	SW2	SW3	Specification/Limit (As per IS 2296: 1992)		Test Methods
						Class C	Class D	
4	*pH*	…	7.65	7.69	7.74	8.5	8.5	APHA 4500-H+
5	*Turbidity*	NTU	7.65	7	8.65	--	--	APHA 2130-B
6	*Total Dissolved Solids (TDS)*	mg/L	841.5	865.1	714.4	1500	--	APHA 2540-C
7	*Biological Oxygen Demand (BOD)*	mg/L	5.7	6.2	5.05	3	--	IS: 3025 (Part-44
8	*Chemical Oxygen Demand (COD)*	mg/L	52.4	56.6	46.1	--	--	APHA 5220-B
9	*Fluoride (F)*	mg/L	0.27	0.2	0.37	1.5	--	APHA 4500:(F-)-D
10	*Total Alkalinity ($CaCO_3$)*	mg/L	191.3	192.3	193.5	--	--	APHA 2320-B
11	*Total Hardness ($CaCO_3$)*	mg/L	397.8	429.6	350.1	--	--	APHA 2340-C
12	*Calcium (Ca)*	mg/L	80.3	86.8	70.7	--	--	APHA 3500:(Ca)-B
13	*Chloramines (Cl2)*	mg/L	N.D.	N.D.	N.D.	0.05	--	IS 3025 (Part 26)
14	*Chloride (Cl)*	mg/L	43	46.4	37.8	600	--	APHA 4500:(Cl-)-B
15	*Magnesium (Mg)*	mg/L	47.3	51.1	41.6	--	--	APHA 3500:(Mg)-B
16	*Nitrate (NO_3)*	mg/L	2.47	2.67	2.17	50	--	APHA 4500:(NO3-)-B
17	*Sulphate (SO_4)*	mg/L	26.9	29.1	23.7	400	--	APHA 4500:(SO4)-E
18	*Boron (B)*	mg/L	<0.01	<0.01	<0.01	--	--	APHA 4500:(B)-C
19	*Aluminium (Al)*	mg/L	<0.01	<0.01	<0.01	--	--	APHA-3120B
20	*Ammonia (total ammonia-N)*	mg/L	N.D.	N.D.	N.D.	--	--	IS 3025 (Part 34)
21	*Anionic detergents (MBAS)*	mg/L	N.D.	N.D.	N.D.	1	--	APHA 5540-C
22	*Barium (Ba)*	mg/L	<0.01	<0.01	<0.01	--	--	APHA 3120B
23	*Arsenic (As)*	mg/L	<0.01	<0.01	<0.01	0.2	--	APHA-3120B
24	*Cadmium (Cd)*	mg/L	<0.01	<0.01	<0.01	0.01	--	APHA 4500:(NH3)-C
25	*Chromium (Cr)*	mg/L	<0.01	<0.01	<0.01	0.05	--	APHA 4500:(P)-D
26	*Cyanide (CN)*	mg/L	N.D.	N.D.	N.D.	0.05	--	APHA 4500:(CN-)-D
27	*Copper (Cu)*	mg/L	<0.01	<0.01	<0.01	1.5	--	APHA 2520B
28	*Iron (Fe)*	mg/L	1.95	1.82	2.72	50	--	APHA-3120B

S. No.	Test Parameters	Unit	SW1	SW2	SW3	Specification/Limit (As per IS 2296: 1992)		Test Methods
						Class C	Class D	
29	*Lead (Pb)*	mg/L	<0.01	<0.01	<0.01	0.1	--	APHA-3120B
30	*Manganese (Mn)*	ug/L	<0.01	<0.01	<0.01	--	--	APHA-3120B
31	*Mercury (Hg)*	mg/L	<0.001	<0.001	<0.001	--	--	APHA-3114C
32	*Phosphorus (P)*	mg/L	2.1	2.8	1.8	--	--	APHA 4500:(P)-D
33	*Selenium (Se)*	mg/L	<0.01	<0.01	<0.01	0.05	--	APHA-3120B
34	*Zinc (Zn)*	mg/L	1.29	1.47	1.31	15	--	APHA-3120B
35	*Total Coliform Count*	per 100mL	Absent	Absent	Absent	Shall Not Be Detectable		IS 15185
36	*Escherichia coli*	per 100mL	Absent	Absent	Absent	Shall Not Be Detectable		IS 15185
37	*Free residual chlorine*	mg/L	0.52	0.62	0.31	--	--	APHA 4500:(Cl)-B
38	*Silver (Ag)*	mg/L	<0.01	<0.01	<0.01	--	--	APHA-3120B
39	*Sulphide (H2S)*	mg/L	<0.5	<0.5	<0.5	400	--	APHA 4500:(S2-)-D
40	*Molybdenum (Mo)*	mg/L	N.D.	N.D.	N.D.	--	--	APHA 3120B
41	*Nickel (Ni)*	mg/L	<0.01	<0.01	<0.01	--	--	APHA 3120B
42	*Pesticide*	…	N.D.	N.D.	N.D.	--	--	USEPA
43	*Polychlorinated biphenyls*	mg/L	N.D.	N.D.	N.D.	--	--	USEPA

Source: Test Report form Enviro-Tech Services 28th November 2024

Inference

Surface water samples collected were analysed and found that the physical/chemical parameters were observed not to meet surface water quality criteria for class C, and not suitable to use as drinking water with conventional treatment followed by disinfection, as limit specified for BOD is exceeded in all surface water samples, However, all samples meet water quality criteria for class D and suitable for fish culture and wild life propagation.

4.2.5. Soil Environment

Soil samples were collected from four (4) locations within project site, one sample each at 2.5m below ground surface or until refusal, whichever was encountered earlier. Two locations were selected from the clear area and other two locations were selected from the waste dumping area. Additionally, (3) three soil samples were collected (1 upstream and 2 downstream of the site). In total, seven (7) soil samples within and outside of the site were collected and were analysed. The results of soil quality analysis are presented in below.

Table 20: Soil Quality Sampling Locations

Location Code	Location Name	GPS Coordinates
S-1	Project Site	25°25'18.09"N 81°52'11.82"E
S-2	Project Site	25°25'15.08"N 81°52'12.06"E

S-3	Project Site	25°25'17.87"N 81°52'6.93"E
S-4	Project Site	25°25'13.88"N 81°52'2.24"E
S-5	Mahewa Patti Purab Uparhar	25°25'5.13"N 81°51'45.98"E
S-6	Near Yamuna River	25°25'26.09"N 81°51'51.25"E
S-7	Near Aril /Triveni Sangam	25°25'19.45"N 81°52'31.56"E

Figure 24: Satellite Image of Soil Quality Sampling Locations

The results of the assessment are incorporated in the following ***Table 21***.

Table 21: Results of Soil Quality Analysis

S. No.	Test Parameters	Unit	S1	S2	S3	S4	S5	S6	S7	Test Method
1	***pH***	…	7.05	7.13	6.87	7.11	6.82	7.14	7.19	IS 2720 (Part-26)
2	***Calcium Carbonate***	mg/kg	37.4	46.5	31.9	48.7	44.5	42.1	37.6	IS 2720 (Part-23)
3	***Water Holding Capacity (WHC)***	%	29.8	37.1	35.7	29.2	22.2	25.3	36.8	IS 2720 (Part-2)
4	***Sodium (Na)***	mg/kg	77.9	77.1	75.2	80.3	78.1	87.8	82.8	USEPA-3050A
5	***Potassium (K)***	mg/kg	84.6	92.7	123.7	135.1	95.5	135.7	129.4	USEPA-3050A
6	***Total Nitrogen (N)***	mg/kg	176.3	187.5	2.75	4.27	5.46	8.57	6.47	ETS/STP/SOIL-15
7	***Chloride (Cl)***	mg/kg	6.7	8.9	8.2	10.7	5.8	6.9	8.6	BS 1377 -3
8	***Total Soluble Sulphate***	%	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	IS 2720 (Part-27)

9	***Total Organic Carbon (TOC)***	%	0.63	0.86	0.55	0.36	0.75	0.71	0.5	IS 2720 (Part-22)
10	***Arsenic (As)***	mg/kg	0.35	0.36	0.34	0.36	0.34	0.36	0.43	USEPA-3050A
11	***Cadmium (Cd)***	mg/kg	0.44	0.43	0.47	0.49	0.58	0.61	0.56	USEPA-3050A
12	***Chromium (Cr)***	mg/kg	0.28	0.34	0.3	0.29	0.27	0.29	0.29	USEPA-3050A
13	***Copper (Cu)***	mg/kg	1.41	1.5	1.51	1.49	1.91	2.07	1.87	USEPA-3050A
14	***Iron (Fe)***	mg/kg	123.4	117.6	116.8	117.3	129.6	137.8	135.9	USEPA-3050A
15	***lead (Pb)***	mg/kg	0.28	0.31	0.32	0.3	0.33	0.41	0.47	USEPA-3050A
16	***Manganese (Mn)***	mg/kg	1.48	1.64	1.85	1.42	1.84	2	3.67	USEPA-3050A
17	***Zinc (Zn)***	mg/kg	1.62	1.64	1.58	1.64	1.91	2.07	2.37	USEPA-3050A
18	***Nickel (Ni)***	mg/kg	212.9	215.3	207.5	214.7	259.2	235.6	230.1	USEPA-3050A
19	***Mercury (Hg)***	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	USEPA-3050A
20	***Phosphorus (PO4)***	mg/kg	30.3	28.5	22	32.7	32.7	25.7	34.5	ETS/STP/SOIL-19
21	***Volatile Organic Compound VOC)***	%	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	GC-MS/ GC
22	***Electrical Conductivity (EC)***	dS/cm	5.2	6.6	7.7	4.1	7.6	5.43	7.55	IS 14767
23	***Carbonates (CO_3)***	%	37.4	46.5	31.9	48.7	44.5	42.1	37.8	IS 2720 (Part-23)
25	***Moisture Content***	%	29.8	37.1	35.7	29.2	22.2	25.3	36.8	IS 4332 (Part 2)

Source: Test Report form Enviro-Tech Services 28th November 2024

Inference

The results indicate that the soil samples exhibit varying characteristics. Soil sample collected from seven (7) different locations (S1, S2, S3…S7). Samples collected from these seven locations generally show similar characteristics. The soil samples from the project site (S1-S4) have pH levels between 6.87 and 7.13. Additionally, the water holding capacity for these project site locations ranges from 29.2% to 37.1%. Overall, the soil fertility is low at both sampling locations, with organic matter content ranging from 0.50% to 0.70%.

4.2.6. Traffic

The project will involve transportation of construction material and other unit components on trucks/trailers through village roads during peak construction phase. During the operation phase, traffic movement for the project activities will be restricted only to the movement of project vehicles and materials for maintenance.

Assessment of existing traffic conditions in the project area was undertaken to identify the problems with respect to traffic movement and to formulate the possible alternative solutions and the need for organizing the same in an efficient and economical manner. A traffic volume count survey was conducted at a junction which connects the road accessed by waste carrying vehicles. The traffic monitored has been divided into the following four (4) categories/classes:

i. Two wheelers (Bi-cycle, motor cycle, scooters);
ii. Three wheelers (Auto, Electrical Auto Rickshaw, Battery Auto Rickshaw, etc.…);
iii. Four wheelers (Car, Taxi, Van, Jeep, Bus, etc…);
iv. Heavy vehicles (Trucks, lodder, etc…).

Table 22: Results of Traffic Survey

Hourly Traffic Volume (Passenger Car Units @ 24 Hours Date 21st Nov 2024 to 22nd Nov 2024)

S. No.	Time	Two (2) Wheeler Vehicles	Three (3) Wheeler Vehicles	Four (4) Wheeler Vehicles	Heavy Vehicles	Vehicles/ Hr
1	06 to 07 AM	105.0	126	79	140.6	450.6
2	07 to 08 AM	114.8	182	70	210.9	577.7
3	08 to 09 AM	132.0	234	80	292.3	738.3
4	09 to 10 AM	147.0	334	86	340.4	907.4
5	10 to 11 AM	153.0	270	94	418.1	935.1
6	11 to 12 PM	168.0	262	71	451.4	952.4
7	12 to 01 PM	222.0	296	86	518	1122.0
8	01 to 02 PM	240.8	394	98	458.8	1191.6
9	02 to 03 PM	207.8	312	93	436.6	1049.4
10	03 to 04 PM	247.5	358	92	392.2	1089.7
11	04 to 05 PM	259.5	372	74	384.8	1090.3
12	05 to 06 PM	240.8	440	83	277.5	1041.3
13	06 to 07 PM	201.8	376	72	262.7	912.5
14	07 to 08 PM	165.0	294	104	192.4	755.4
15	09 to 10 PM	134.3	248	95	133.2	610.5
16	10 to 11 PM	99.0	200	82	96.2	477.2
17	11 to 12 AM	49.5	116	87	96.2	348.7
18	12 to 01 AM	27.0	92	74	125.8	318.8
19	01 to 02 AM	18.0	56	65	107.3	246.3
20	02 to 03 AM	12.8	54	54	103.6	224.4
21	03 to 04 AM	47.3	70	50	151.7	319.0
22	04 to 05 AM	69.8	106	53	133.2	362.0
23	05 to 06 AM	93.0	146	52	144.3	435.3
24	06 to 07 AM	120.8	162	70	177.6	530.4

Source: Traffic Survey Report from Enviro-Tech Services dated 28th November 2024

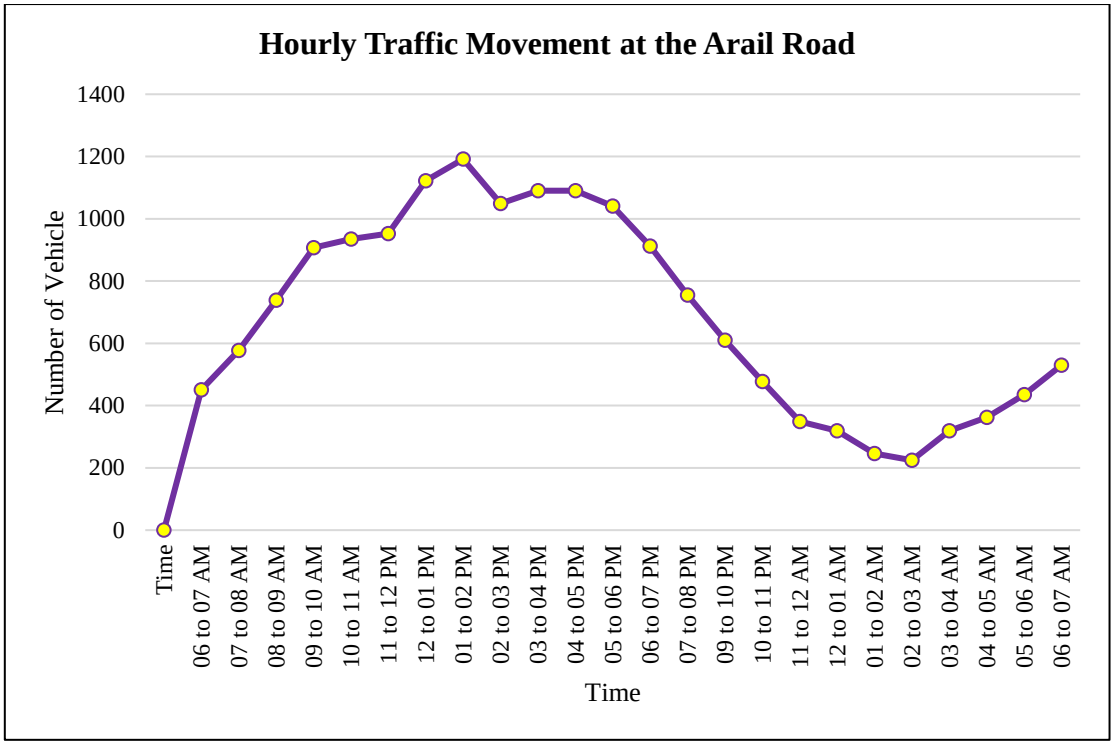


Figure 25: Line graph of Hourly Traffic Monitoring at the Arail Road

4.3. ECOLOGY AND BIODIVERSITY PROFILE

This section of the report summarizes the ecology & biodiversity baseline study carried out towards the ESIA. It delineates the study area covered by the assessment, describes the methodology used for the assessment and establishes a biodiversity baseline which covers the species, habitats, and ecosystem services of the study area, any invasive alien species present in the study area and the designated areas in closest proximity to the study area. This biodiversity baseline forms the basis for predicting the potential impacts of the project on the biodiversity of the study area and suggesting mitigation measures to manage the predicted impacts.

4.3.1. Delineation of the Study Area

This sub-section delineates the study area covered by the biodiversity assessment. It also briefly describes the geographical and ecological status of the delineated study area. The overall area covered by the assessment includes the following constituent areas:

a) **Area of Direct Influence**: The area coinciding with the footprint of the Project (estimated to contain the potential receptors of any direct Project-related ecological impacts), hereafter referred to as the 'Project Site'; and

b) **Area of Indirect Influence**: The area extending 5 km outward from the project site boundary (estimated to contain the potential receptors of any indirect Project-related ecological impacts), hereafter referred to as the 'Buffer Area').

The Area of Direct Influence and the Area of Indirect Influence are collectively termed 'Study Area'.

4.3.2. Location of the Study Area

The project site is located at the Latitude 25°25'16.36"N and Longitude 81°52'6.72"E. The study area is located in Prayagraj District in the state of Uttar Pradesh. Yamuna River (a major waterbody) is located within the study area. Geographically, the study area is part of the Ganga-Yamuna Doab (at the mouth of the Yamuna). The terrain here is predominantly flat.

4.3.3. Approach and Methodology

This section outlines the approaches used to address the different components of the Study and the methodologies applied to achieve the objective of each.

4.3.3.1. Desk-based Assessment

The approach adopted for the establishment of the biodiversity baseline involved the following strategy:

a) Conducting a generic assessment using the Integrated Biodiversity Assessment Tool (IBAT) to obtain numbers of IUCN Red List-assessed species potentially occurring within 50 km radius of the Project Site.
b) Extracting the corresponding list of IUCN Red List assessed species having ranges overlapping the Study Area to obtain a master-list of species potentially occurring within the Study Area.
c) Conducting a brief visit to the Study Area to verify the habitat profile therein, as also, the presence of any significant natural habitat, through walk -through and/or drive-through surveys.
d) Consulting the local Forest Department officials, as well as local community, to verify occurrence of endangered or threatened species and habitats in the Study Area.
e) Establishing a habitat baseline consisting of those habitat types, as recognized by the IUCN Habitat Classification Scheme, noted through primary observations during the visit to the Study Area.
f) Establishing a species baseline consisting of those species for which suitable habitat-types are present within the Study Area, as verified during the visit to the Study Area.

The approach adopted for screening of habitats involved the following strategies:

a) Use of satellite imagery of the Study Area, as available in Google Earth, in conjunction with governmental maps of the Land Use Land Cover (LULC) of the corresponding area to characterize the habitat types therein.
b) Use of governmental maps of notified Protected Areas and Eco-sensitive Zones, as available in governmental notifications, to identify boundaries of the nearest designated areas that are legally protected.
c) Use of the Integrated Biodiversity Assessment Tool (IBAT), along with Key Biodiversity Areas (KBA) maps to identify boundaries of the nearest designated areas that are internationally recognized, but not legally protected.

The methodology applied for setting an ecology and biodiversity baseline for the Study Area involved the following steps:

i) Establishing a habitat baseline consisting of those habitat types, as recognized by the IUCN Habitat Classification Scheme, noted through primary observations during the visit to the Study Area.
ii) Establishing a species baseline consisting of those species for which suitable habitat-types are present within the Study Area, as verified during the visit to the Study Area.

4.3.3.2. Field-based Assessment

Approach

The approach to the field-based assessment involved collection of primary data through walk -over surveys at accessible locations within the Study Area and collection of secondary data through opportunistic, informal interviews with local Project personnel, government officials and community members.

Methodology

The Study Area was visited during month of October 2024 and November 2024. Primary data on species and habitats was collected through sampling of floral and faunal species. The timings of the primary data collection covered the diurnal faunal activity - period, from early morning till late evening, but excluded the nocturnal faunal activity -period.

Qualitative data on floral and faunal species was recorded through the visual encounter method. Records were based on direct sightings of species, as well as, indirect evidence, such as flowers, pods, calls, nests, burrows, droppings, scats, moults and tracks. Figure below presents the locations of the ecology and biodiversity sampling sites and the Study Area.

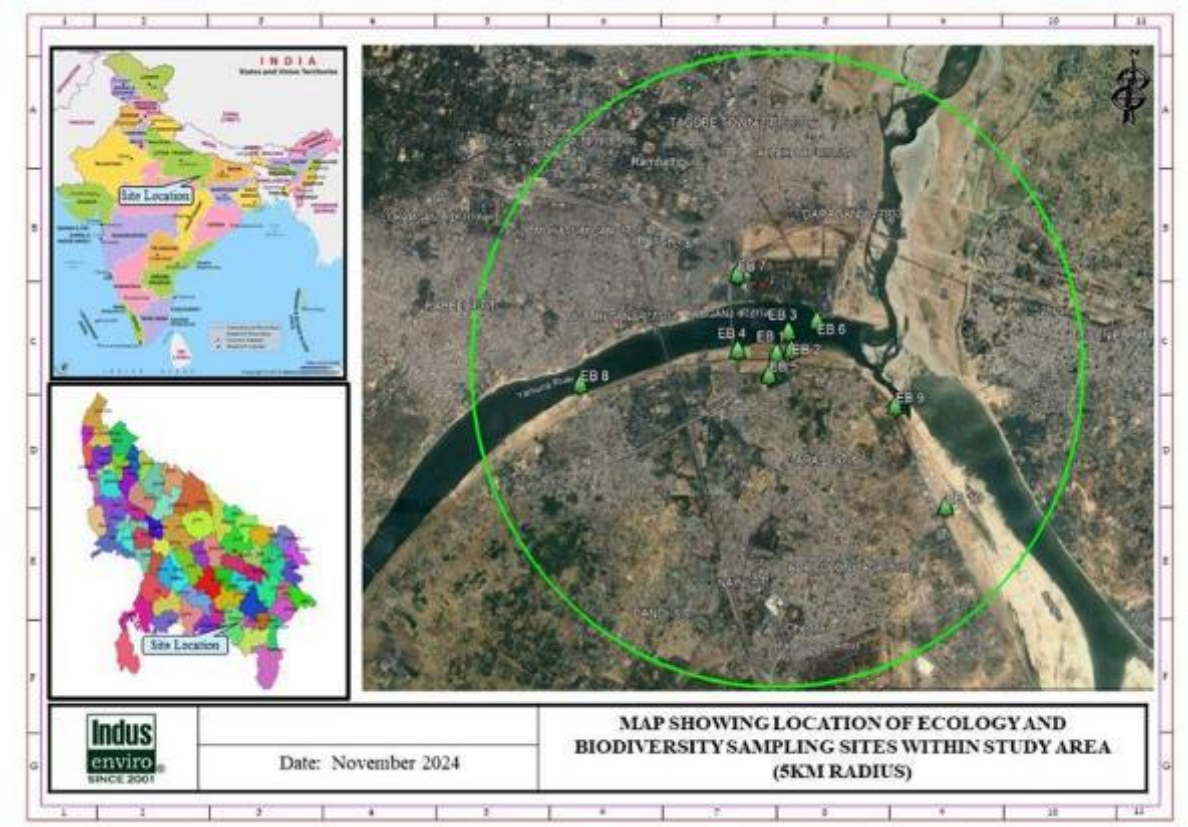


Figure 26: Map indicating the study area and biodiversity sampling sites

Table below provides the details of the ecology and biodiversity sampling sites within the Study Area.

Table 23: Details of Ecology and Biodiversity Sampling Sites

Sr. No.	Site Code	Site Description	Site Coordinate	Distance and Direction from Project Site
1.	***EB 1***	Project Site	25°25'16.13"N, 81°52'7.45"E	Within Project Site
2.	***EB 2***	Road running parallel to Yamuna River	25°25'17.93"N, 81°52'16.19"E	0.27 km East
3.	***EB 3***	Yamuna River Bank	25°25'27.27"N, 81°52'14.25"E	0.4 km North
4.	***EB 4***	Urban area	25°25'17.75"N, 81°51'44.55"E	0.65 km West
5.	***EB 5***	Plantation	25°25'4.99"N, 81°52'3.01"E	0.37km South
6.	***EB 6***	Yamuna River (Aquatic Habitat)	25°25'32.53"N, 81°52'31.04"E	0.85 km Northeast
7.	***EB 7***	City Park (Urban Forest)	25°25'56.39"N, 81°51'44.34"E	1.41 km Northwest
8.	***EB 8***	Yamuna River Bank	25°25'0.28"N, 81°50'12.03"E	3.3 km West
9.	***EB 9***	Road running parallel to Yamuna River	25°24'49.04"N, 81°53'16.98"E	2.06 km East
10.	***EB 10***	Road running parallel to Yamuna River	25°23'57.93"N, 81°53'46.27"E	3.7 km Southeast

**EB: Ecological and Biodiversity Site*

Study Area-specific secondary data was collected through formal consultations with the following sources:

1) Forest Department Officials
   - Mr. Akbar Ali, DFO Office, Prayagraj
   - Ms. Aesha, DFO office, Prayagraj
   - Mr Rajnish Kumar, RO, Karchana
2) Prayagraj Municipal Corporation

- Mr. Uttam Kumar, Environmental Engineer, Prayagraj Municipal Corporation

3) Project Personnel
   - Mr. Himanshu, Project Manager, EverEnviro
   - Mr. Vivek Kumar, Safety Officer

In addition, opportunistic informal consultations were conducted with a few members of the local community.

4.3.4. Habitat Profile of the Study Area

Habitat is defined as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment. For the purposes of implementation of this Performance Standard, habitats are divided into modified, natural, and critical. Critical habitats are a subset of modified or natural habitats. The habitat profile of the Study Area represents a mosaic of natural and modified habitats, while the Project Site itself is situated in modified habitat. The chief habitat consists of vegetation area around.

4.3.4.1. Natural Habitats

Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition such as natural forests.

The project site, including its constituent parts, does not overlap with or encompass any natural habitats.

4.3.4.2. Modified Habitats

Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.

The entire project site was previously used for agricultural activities, classifying it as a modified habitat. Surrounding the project site are other modified habitats, including, **North**: Road and urban plantations; **South and West**: Agricultural fields; **East**: A combination of road and agricultural fields.

A visual representation of the modified habitats within the study area, such as urban plantations, roads, and roadside plantations, is provided in the figure below.

	
View of tree Plantation in Minto park (An Urban Forest) in the Study Area	*View of road side plantation of Yellow cassia on both sides of the Arail road*

4.3.4.3. Critical Habitats

Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

The presence of a significant number of migratory birds in the Triveni Sangam area, which is within the study region, raises the possibility that the area might qualify as a Critical Habitat. The migratory species observed in the study area, the Black-headed Gull (*Chroicocephalus ridibundus*) and Brown-headed Gull (*Chroicocephalus brunnicephalus*), are both classified as *Least Concern (LC)* in the IUCN Red List. However, there is insufficient data on the numbers of these species occurring regularly or cyclically within the study area.

4.3.5. Flora and Fauna of the Study Area

This sub-section describes the reported and recorded floristic and faunal species of the Study Area.

4.3.5.1. Recorded Floral Species

The table below presents the details of these floral species, including the scientific, common name of each species, its habit or morphological form and the conservation status assigned to it as per the IUCN Red List.

Table 24: Details of floral species in study area

S. No	Scientific Name	Common Name	Habit	IUCN Status
1	***Ficus glomerata***	Guler	Tree	NE
2	***Azadirachta indica***	Neem	Tree	LC
3	***Holoptelea integrifolia***	Chilbil	Tree	NE
4	***Annona squamosa***	Sharifa	Tree	LC
5	***Ailanthus excelsa***	Arru	Tree	NE
6	***Bombax ceiba***	Semal	Tree	LC
7	***Bauhinia variegata***	Bauhinia	Tree	LC
8	***Dalbergia sissoo***	Shisham, Indian Rosewood	Tree	LC
9	***Grevillea robusta***	Silver Oak	Tree	NE
10	***Saraca asoca***	Ashok	Tree	NE
11	***Ficus racemosa***	Wild fig	Tree	LC
12	***Ficus religiosa***	Peepal	Tree	LC
13	Arecaceae ***family***	Palm	Tree	NE
14	***Aegle marmelos***	Bel	Tree	LC
15	***Feronia limonia***	Kaitha	Tree	NE
16	***Cordia dichotoma***	Lasoda	Tree	NE
17	***Alstonia scholaris***	Chitvan	Tree	NE
18	***Mangifera indica***	Aam, Mango	Tree	LC
19	***Phoenix sylvestris***	Silver Date Palm	Tree	NE
20	***Phyllanthus emblica***	Amla, Indian Gooseberry	Tree	LC
21	***Polyalthia longifolia***	Ashok	Tree	LC
22	***Artocarpus heterophyllus***	Kathal	Tree	LC
23	***Ricinus communis***	Ricinus	Tree	NE
24	***Calotropis gigantea***	Madaar	Tree	LC
25	***Tectona grandis***	Saag	Tree	NE

26	*Prosopis juliflora*	Vilayati Babool	Tree	LC

Status assigned by the International Union for Conservation of Nature and Natural Resources, where DD - Data Deficient, LC –Least Concern and NE - Not Evaluated.

Source: Primary Survey; IUCN 2024-2. The IUCN Red List of Threatened Species and http://www.theplantlist.org/

The photolog below presents photos of some of the tree species observed in the Project Site and the Study Area.

View of Peepal tree inside the boundary of Project Site

View of a Teak tree inside the boundary of Project Site

View of an Amla tree in the Study Area

View of Sharifa tree in the Study Area

Figure 27: Trees observed in the study area

4.3.5.2. Recorded Faunal Species

This section of the report presents the higher faunal species, namely vertebrates, comprising mammals, birds, reptiles, amphibians and fish, having recorded ranges that include the Study Area. The detailed species-tables are provided in this report. Each table gives the scientific and common names of each species, the conservation status assigned to it by the International Union for Nature and Natural Resources (IUCN) and the Schedule of the Wildlife Protection Act, 1972 (WPA) under which it is listed. Names of the species recorded during the field studies appear in bold font in each table.

Mammals

At least 8 species of mammals have been reported that fully or partially overlap the Study Area. The following Table lists the mammal species of the Study Area.

Table 25: List of mammals found in the study area

S. No.	Biological Name	Common Name	Family	IUCN	WPA Schedule
1	*Oryctolagus cuniculus*	Rabbit	Leporidae	LC	IV
2	*Sorex araneus*	Shrew	Soricidae	LC	I
3	*Rattus rattus*	Rat	Muridae	LC	IV
4	*Mus musculus*	House mouse	Muridae	LC	IV
5	***Funambulus palmarum***	**Squirrel**	**Sciuridae**	**LC**	**IV**
6	*Sus scrofa*	Wild boar	Suidae	LC	I
7	***Boselaphus tragocamelus***	**Nilgai**	**Bovidae**	**NT**	**II**
8	*Lutrogale perspicillata*	Smooth-coated Otter	Mustelidae	VU	I
9	***Semnopithecus entellus***	**Bengal Sacred Langur**	**Cercopithecidae**	**LC**	**II**
10	***Macaca mulatta***	**RhesusMacaque**	**Cercopithecidae**	**LC**	**II**
11	*Hystrix indica*	Indian Crested Porcupine	Hystricidae	LC	IV
12	*Antilope cervicapra*	Blackbuck	Bovidae	NT	I
13	*Cynopterus sphinx*	Greater Short-nosed Fruit Bat	Pteropodidae	LC	IV

Status assigned by the International Union for Conservation of Nature and Natural Resources, where NT- Near Threatened, LC –Least Concern and VU- Vulnerable, CR- Critically Endangered, WPA – Wildlife Protection Act 1972 (as amended); *Source: Primary Survey, Consultation, Citizen Science Portals such as inaturalist.*

Birds

At least 108 species of birds have reported ranges that fully or partially overlaps the Study Area.
In this some of them are reported as Migratory Birds also. Seasonal species exhibit behaviors or physical changes that help them survive seasonal transitions. Migratory species, like certain birds, move between different regions to take advantage of shifts in food availability and climate. Here the Seagulls have been observed in the Primary Survey of the Study Area. Two species of Gulls the *Chroicocephalus brunnicephalus* and *C. ridibundus* were both recorded. The stable population of Gulls during the month of May indicate the species are resident to the region and some choose not migrate during the summers (*Mark Menezes et al., 2021)*. A The following table lists the bird species of the Study Area, with the names of any species recorded during the primary survey appearing in **bold font.**

Table 26: List of birds found in the study area

S.no	Scientific Names	Common Names	IUCN	Migratory Status
1	*Vanellus indicus*	Red-wattled Lapwing	LC	R
2	*Tringa nebularia*	Common Greenshank	LC	R
3	***Chroicocephalus ridibundus***	**Black-headed Gull**	**LC**	**WV/R**
4	***Chroicocephalus brunnicephalus***	**Brown-headed Gull**	**LC**	**WV/R**
5	*Nycticorax nycticorax*	Black-crowned Night Heron	LC	R
6	*Athene brama*	Spotted Owlet	LC	R
7	*Pavo cristatus*	Indian Peafowl	LC	R
8	*Ortygornis pondicerianus*	Gray Francolin	LC	R
9	*Streptopelia decaocto*	Eurasian Collared-Dove	LC	R
10	*Centropus sinensis*	Greater Coucal	LC	R
11	***Eudynamys scolopaceus***	**Asian Koel**	**LC**	**R**
12	*Gallinula chloropus*	Eurasian Moorhen	LC	R
13	*Amaurornis phoenicurus*	White-breasted Waterhen	LC	R

14	*Vanellus malabaricus*	Yellow-wattled Lapwing	NT	R
15	*Vanellus indicus*	Red-wattled Lapwing	LC	R
16	*Ocyceros birostris*	Indian Gray Hornbill	LC	R
17	*Cinnyris asiaticus*	Purple Sunbird	LC	R
18	*Merops orientalis*	Asian Green Bee-eater	LC	R
19	*Halcyon smyrnensis*	White-throated Kingfisher	LC	R
20	*Psilopogon haemacephalus*	Coppersmith Barbet	LC	R
21	*Psilopogon zeylanicus*	Brown-headed Barbet	LC	R
22	*Psittacula krameri*	Rose-ringed Parakeet	LC	R
23	*Dicrurus macrocercus*	Black Drongo	LC	R
24	*Rufous Treepie*	Dendrocitta vagabunda		R
25	***Corvus splendens***	**House Crow**	**LC**	**R**
26	*Orthotomus sutorius*	Common Tailorbird	LC	R
27	*Prinia socialis*	Ashy Prinia	LC	R
28	*Pycnonotus jocosus*	Red-whiskered Bulbul	LC	R
29	*Pycnonotus cafer*	Red-vented Bulbul	LC	R
30	***Argya striata***	**Jungle Babbler**	**LC**	**R**
31	*Gracupica contra*	Indian Pied Starling	LC	R
32	*Acridotheres tristis*	Common Myna	LC	R
33	*Copsychus fulicatus*	Indian Robin	LC	R
34	*Copsychus saularis*	Oriental Magpie-Robin	LC	R
35	***Himantopus himantopus***	**Black-winged stilt**	**LC**	**R**
36	***Columba livia***	Kabootar/Pigeon	LC	**R**
37	*Passer domesticus*	House Sparrow	LC	R
38	*Lonchura punctulata*	Spotted Munia	LC	R
39	*Lonchura malacca*	Black-headed Munia	LC	R
40	*Euodice malabarica*	Indian Silverbill	LC	R
41	*Prinia socialis*	Ashy Prinia	LC	R
42	*Prinia inornata*	Plain Prinia	LC	R
43	*Prinia sylvatica*	Jungle Prinia	LC	R
44	*Dicaeum agile*	Thick-billed Flowerpecker	LC	R
45	*Zosterops palpebrosus*	Oriental White-eye	LC	R
46	*Dicaeum erythrorhynchos*	Pale-billed Flowerpecker	LC	R
47	*Oenanthe fusca*	Brown Rock Chat	LC	R
48	*Gracupica contra*	Pied Starling	LC	R
49	*Sturnia pagodarum*	Brahminy Starling	LC	R
50	*Apus affinis*	Little Swift	LC	R
51	*Cypsiurus balasiensis*	Asian Palm Swift	LC	R
52	*Riparia paludicola*	Plain Martin	LC	R
53	*Treron phoenicopterus*	Yellow Footed Green Pigeon	LC	R
54	*Amaurornis phoenicurus*	White-breasted Waterhen	LC	R
55	*Porphyrio porphyrio*	Purple Swamphen	LC	R
56	*Ixobrychus cinnamomeus*	Cinnamon Bittern	LC	R
57	*Ardeola grayii*	Indian Pond Heron	LC	R
58	*Nycticorax nycticorax*	Black-crowned Night Heron	LC	R

59	*Ardea purpurea*	Purple Heron	LC	R
60	*Ardea cinerea*	Grey Heron	LC	WV/R
61	*Bubulcus ibis*	Cattle Egret	LC	R
62	*Egretta garzetta*	Little Egret	LC	R
63	*Ardea intermedia*	Intermediate Egret	LC	R
64	*Ardea alba*	Great Egret	LC	R
65	*Microcarbo niger*	Little Cormorant	LC	R
67	*Phalacrocorax fuscicollis*	Indian Cormorant	LC	R
68	*Phalacrocorax carbo*	Great Cormorant	LC	R
69	*Anhinga melanogaster*	Common Darter	LC	R
70	*Anastomus oscitans*	Open-billed Stork	LC	R
71	*Sternula albifrons*	Little Tern	LC	R
72	*Gelochelidon nilotica*	Gull-billed Tern	LC	R
73	*Dendrocygna javanica*	Lesser whistling duck	LC	R
74	*Anas querquedula*	Garganey	LC	WV
75	*Tachybaptus ruficollis*	Little Grebe	LC	R
76	*Calidris minuta*	Little Stint	LC	WV
77	*Clamator jacobinus*	Pied Cuckoo	LC	SV
78	*Cuculus canorus*	Indian Cuckoo	LC	R
79	*Hierococcyx varius*	Common-Hawk Cuckoo	LC	R
80	*Oriolus kundoo*	Eurasian Golden Oriole	LC	R
81	*Oriolus xanthornus*	Black Hooded Oriole	LC	R
82	*Dendrocitta vagabunda*	Rufous Treepie	LC	R
83	*Corvus corax*	Common Raven	LC	R
84	*Alauda gulgula*	Paddyfield Pipit	LC	R
85	*Anthus rufulus*	Oriental Skylark	LC	R
86	*Falco tinnunculus*	Common Kestrel	LC	R
87	*Accipiter badius*	Shikra	LC	R
88	*Pernis ptilorhynchus*	Oriental Honey Buzzard	LC	R
89	*Elanus axillaris*	Black-shouldered Kite	LC	R
90	*Milvus migrans*	Black Kite	LC	R
91	*Motacilla maderaspatensis*	White-browed Wagtail	LC	R
92	*Coracias benghalensis*	Indian Roller	LC	R
93	*Merops philippinus*	Blue-tailed Bee eater	LC	R
94	*Merops orientalis*	Green Bee-eater	LC	R
95	*Psittacula cyanocephala*	Plum-headed Parakeet	LC	R
96	*Psittacula krameri*	Ring-necked Parakeet	LC	R
97	*Psittacula eupatria*	Alexandrine Parakeet	LC	R
98	*Alaudala raytal*	Sand Lark	LC	R
99	*Plocealauda assamica*	Bengal Bushlark	LC	R
100	*Ardea alba*	Great Egret	LC	R
101	*Neophron percnopterus*	Egyptian Vulture	LC	R
102	*Anastomus oscitans*	Asian Openbill	LC	R
103	*Tringa ochropus*	Green Sandpiper	LC	R
104	*Calidris minuta*	Little Stint	LC	R
105	*Anarhynchus alexandrines*	Kentish Plover	LC	R

106	*Galerida cristata*	Crested Lark	LC	R
107	*Rynchops albicollis*	Indian Skimmer	EN	R
108	*Sterna aurantia*	River Tern	VU	R

Status assigned by the International Union for Conservation of Nature and Natural Resources, where DD - Data Deficient, LC –Least Concern and VU- Vulnerable, EN- Endangered, LC –Least Concern, NE - Not Evaluated, R – Resident, and Winter Visitor

Source: Primary Survey, Consultation, IUCN Red Data List 2024-02, Citizen Science Portals such as eBird, inaturalist, Mark Menezes and M. Jayashankar (2021), impact of urbanisation on avian diversity in and around different eco-habitats of Prayagraj.

Reptiles

At least 9 species of Reptiles have reported ranges that fully or partially overlap the Study area. The following table lists the reptile species of the Study Area.

Table 27: List of reptiles found in the study area

S. No.	Biological Name	Common Name	Family	IUCN	WPA Schedule
1	***Calotes versicolor***	Garden lizard	Agamidae	LC	I
2	***Uromastyx hardwickii***	Spiny tailed lizard	Agamidae	NT	IV
3	***Hemidactylus flaviviridis***	House gecko	Gekkonidae	LC	I
4	***Naja naja***	Indian Cobra	Elapidae	LC	I
5	***Bungarus caeruleus***	Krait	Elapidae	LC	
6	***Eryx johnii***	Red Sand Boa	Boidae	LC	I
7	***Varanus bengalensis***	Indian Monitor Lizard	Varanidae	VU	I
8	***Gavialis gangeticus***	Gharial/ Fish-eating Crocodile	Gavialidae	CR	I
9	***Crocodylus palustris***	Mugger / Marsh crocodile	Crocodylidae	VU	I
10	***Python molurus***	Indus Python	Pythonidae	NT	I
11	***Subfamily Trionychinae***	Softshell Turtles	Trionychidae	EN	I
12	***Lissemys punctata***	Indian Flapshell Turtle	Trionychidae	LC	I
13	***Chequered keelback***	Fowlea piscator	Colubridae	LC	II
14	***Ptyas mucosa***	Oriental Rat Snake	Colubridae	LC	II

Status assigned by the International Union for Conservation of Nature and Natural Resources, where NT- Near Threatened, LC –Least Concern and VU- Vulnerable, CR- Critically Endangered, WPA – Wildlife Protection Act 1972 (as amended); *Source: Primary Survey, Consultation, IUCN Red Data List 2024-02, Citizen Science Portals such as eBird, inaturalist, etc.*

Amphibians

At least 2 species of amphibians have reported ranges that fully or partially overlap the Study Area. The following table lists the amphibian species of the Study Area.

Table 28: List of amphibians in the study area

S.No.	Biological Name	Common Name	Family	IUCN	WPA
1	***Hoplobatrachus tigerinus***	Indian bullfrog	Dicroglossidae	LC	II
2	***Duttaphrynus melanostictus***	Common Indian toad	Bufonidae	LC	I

Status assigned by the International Union for Conservation of Nature and Natural Resources, where LC –Least Concern, WPA – Wildlife Protection Act 1972 (as amended); *Source: Primary Survey, Consultation, IUCN Red Data List 2024-02, Citizen Science Portals such as inaturalist, etc.*

Fishes

At least 12 species of fish have reported ranges that fully or partially overlap the Study Area. Provided table lists the fish species of the Study Area.

Table 29: List of fishes in the study area

S.No.	Biological Name	Common Name	Family	IUCN
1	***Catla catla***	Bhakur	Cyprinidae	LC
2	***Labeo rohita***	Rohita	Cyprinidae	LC
3	***Labeo calbasu***	Karanchuh	Cyprinidae	VU
4	***Cyprinus carpio***	Common carp	Cyprinidae	LC
5	***Cirrhinus mrigala***	Naini	Cyprinidae	LC
6	***Mystus seenghala***	Tengara	Bagridae	LC
7	***Rita rita***	Rita	Bagridae	VU
8	***Wallago attu***	Pardni	Siluridae	NT
9	***Clarias batrachus***	Mangur	Clariidae	LC
10	***Heteropneustes fossilis***	Singhi	Saccobranchidae	LC
11	***Channa punctatus***	Saura	Ophiocephalidae	LC
12	***Gudusia chapra***	Suhia	Clupeidae	LC

Status assigned by the International Union for Conservation of Nature and Natural Resources, where NT- Near Threatened, LC –Least Concern and VU- Vulnerable, CR- Critically Endangered, *Source: Primary Survey, Consultation, IUCN Red Data List 2024-02*

View of Nilgai in the Study area

View of Siberian Seagulls in Yamuna River near Triveni Sangam

View of Black-winged stilt in the Yamuna River

View of Jungle Babbler

Source: Primary Survey

4.3.6. Legally Protected or Internationally Recognized Areas

Assessment of the study area towards this criterion is based on overlap of the Project Site with a Legally Protected Area (LPA) or Internationally Recognized Area (IRA). As per IFC PS6 Point 20, if a proposed project is located within any LPA or IRA, it would need to meet PS6 requirements for Critical Habitat (CH), depending on the qualifying biodiversity values present in the concerned LPA (including areas officially proposed for protection) or IRA.

For an area to be considered as an LPA towards this assessment, it must meet the IUCN definition: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long- term conservation of nature with associated ecosystem services and cultural values." Areas proposed by governments for such designation must also be treated as LPAs. LPAs that meet the criteria of the IUCN's Protected Area Categories Ia, Ib and II are more likely to qualify as potential CH.

For the purposes of this assessment, an IRA is exclusively defined as a UNESCO Natural World Heritage Site, UNESCO Man and the Biosphere Reserve, Key Biodiversity Area and/or wetland designated under the Convention on Wetlands of International Importance (the Ramsar Convention). Thus, project sites that are located fully or partially within nationally and/or internationally designated areas of high biodiversity value qualify as potential CH.

There is no overlap between the Project Site and any of the said LPA or IRA. Hence, the LPA and IRA nearest to the Project Site do not qualify as potential CH with respect to the Project.

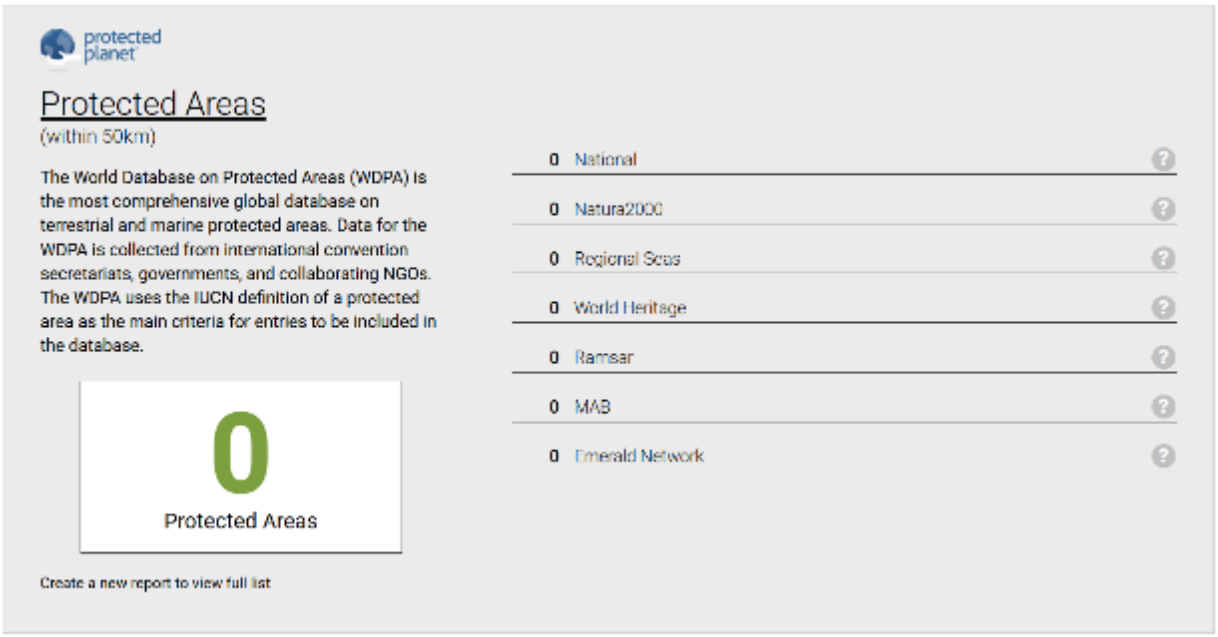
4.3.6.1. Assessment Based on Available Secondary Information

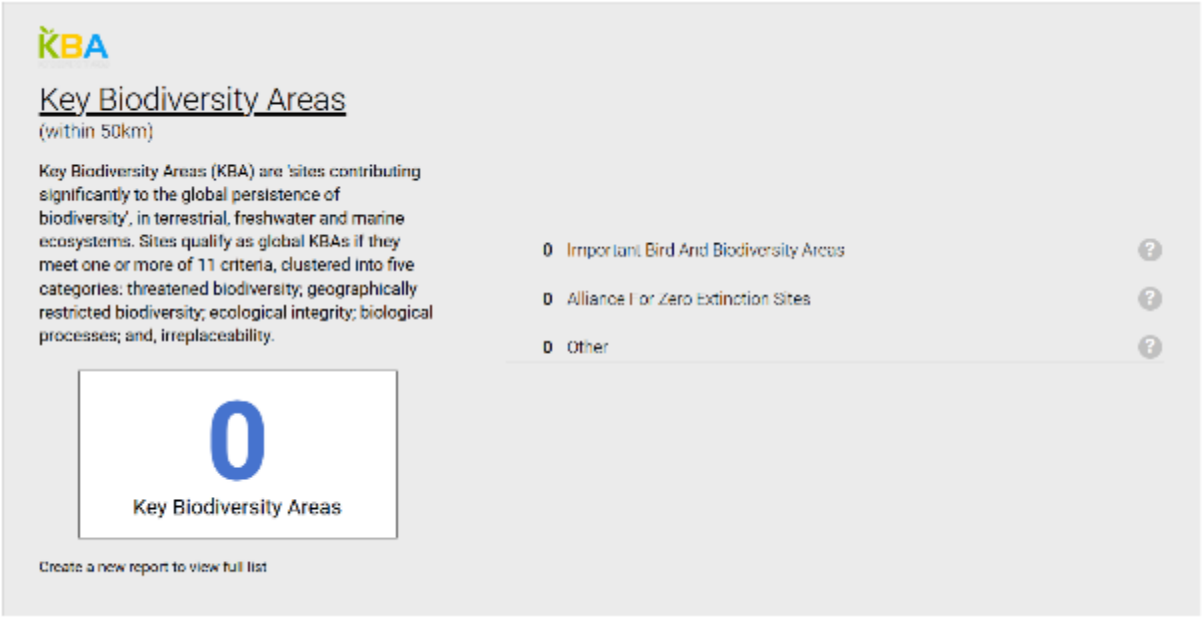
Based on the secondary research and discussion with forest department, it was noted that the Project site is not located within any LPA such as Wildlife Sanctuary, National Park and Eco Sensitive Zone, and no such areas are located within a 50 km radius. Details of nearest LPAs from the project site are provided below:

Samaspur Bird Sanctuary	Samaspur Bird Sanctuary is situated in Rohaniya Development block of the Raebareli district, 5000 km. which include Greleg Googe, Pin Tail, Common Teel, Vision, Showler, Surkhab etc. Local birds include Comb Duck, Whistling Teel, Spot Bill, Spoon Bill, King Fisher, Vulture etc. Twelve varieties of fish are there in the lake at Samaspur.	76 km towards Northwest
Ranipur Wildlife Sanctuary	Ranipur Wild Life Sanctuary, is located in District Chitrakoot.	76 km towards Southwest
Chandraprabha Wildlife Sanctuary	Chandraprabha Wildlife Sanctuary is located in District Chandauli district of Uttar Pradesh.	130 km towards Southeast

4.3.6.2. Assessment Based on IBAT

An overview biodiversity screening was carried out using Integrated Biodiversity Assessment Tool (IBAT) that provides fast, easy, and integrated access to authoritative global biodiversity datasets such as World Database of Key Biodiversity Areas and the World Database on Protected Areas. The location of the EverEnviro's BioCNG Plant was fed into the IBAT and the results obtained from the tool are shown below.





As per the IBAT output, there are no Protected Areas or Key Biodiversity Areas situated within 50 km radius from the centre of the Project Site.

4.4. SOCIO-ECONOMIC PROFILE

4.4.1. Socio-Economic Environment

The purpose of the baseline is to draw a profile of socio-economic indicators of the study area, to inform the impact assessment exercise and determine appropriate measures to minimise or mitigate negative impacts and enhance positive ones for a smooth functioning of the project.

The socio-economic baseline is formed using secondary data and supported by primary data collected through on-site consultations. Among the secondary sources of data, is Census of India 2011 database. Due to unavailability of census data 2021, the former data set has been used. However, wherever available, most recent information from various other sources has been provided.

4.4.2. Study area

The study area for this baseline comprises of villages, where the project is located and those within 5 km radius around the project location.

Table 30: Census Villages within 5 KM radius of Project Location

District	Tehsil (Sub-District)	CD Block	Villages
Prayagraj (Allahabad)	Karchhana	Chaka	Mahewa Patti Pashchim Kachhar
			Mahewa Patti Purab Uparhar
			Dandi
			Tignauta
			Marauka Uparhar
			Chak Mohiuddin
			Chaka
			Chak Rana Tiwari
			Arail Kachhar
			Dewrakh Uparhar
			Chak Satai Mishir
			Chak Daud Nagar
			Cheonki
			Chak Gulam Mohmmad
			Chak Nauniya

4.4.3. Administrative Framework

Uttar Pradesh is the fourth largest State in India covering an area of 2,40,928 sq. km, which is 7.33 per cent of the geographical area of the country. It borders Nepal and Uttarakhand in the North; Himachal Pradesh in the North-west; Haryana, Delhi and Rajasthan in the West; Madhya Pradesh in the West and South-west; Chhattisgarh and Jharkhand in South and South-east, and Bihar in the East.

Uttar Pradesh is administratively divided into 18 divisions, 75 Districts and 822 development blocks. There are 915 urban bodies, 13 municipal corporations, 226 municipal boards, 59,163 gram sabhas, 8,135 nyaya panchayats, 1,07,040 villages and 650 cities and towns. The district of Prayagraj (erstwhile Allahabad) is situated at the southern tip in eastern side of Uttar Pradesh State. For implementation and monitoring of development scheme the district is divided into 20 Development Blocks. As stated earlier, the project site completely falls under the Chaka Block in Prayagraj District, which consists of about 102 villages.

4.4.4. Key Demographics

The ***Table 31*** below provides information against key demographic indicators for the Chaka Block in which the study area is located along with comparative figures for the districts and the state.

Table 31: Key Demographic Details

S. No.	Name	Level	Total Geographical Area (Square Kilometer)	Total Population (number)	Population Density (persons per sq.km.)	Scheduled Caste Population (%)	Scheduled Tribe Population (%)	Sex Ratio/ 1000 Male	Literacy Rate (%)	Female Literacy Rate (%)
1	***UP***	State	2,40,928	19,95,81,477	828.4	23.80%	0.68%	908	69.72%	59.26%
2	***Prayagraj***	District	5,482	59,54,391	1086.2	22%	13.36%	901	72.32%	60.97%
3	***Karchhana***	Tehsil (Sub-District)	256.21	2,35,625	919.7	22.26%	0.21%	907	57.91%	47.06%
4	***Chaka***	Block	141.09	1,73,866	1232.3	25.48%	0.19%	917	69.69%	58.62%
Census Villages within 1 KM of the Project Site										
5	***Arail Uparhar (CT)***	Village	7.22	12,190	1688.4	11.93%	0	812	70.19%	60.87%
6	***Mahewa Patti Purab Uparhar***	Village	0.3	2941	9803.3	44.17%	0	965	80.07%	75.52%
Census Villages within 5 KM of the Project Site										
7		Village	4.6	6408	1393.0	38.72%	0.12%	854	64.80%	56.55%

	Mahewa Patti Pashchim Uparhar									
8	***Dandi***	Village	1.16	4185	3607.8	50.78%	0	914	60.44%	50.18%
9	***Tignauta***	Village	0.5	4268	8536.0	13.66%	0	950	78.50%	61.46%
10	***Marauka Uparhar***	Village	10.06	3382	336.2	20.67%	0	860	61.39%	50.37%
11	***Chak Mohiuddin***	Village	0.25	1531	6124.0	71.39%	0	897	50.04%	41.76%
12	***Chaka***	Village	2.34	4940	2111.1	34.47%	0	873	75.21%	66.82%
13	***Chak Rana Tiwari***	Village	0.25	2279	9116.0	21.54%	1.05%	950	84.60%	76.21%
15	***Dewrakh Uparhar***	Village	20.07	2320	115.6	39.40%	0	1010	67.43%	60.62%
16	***Chak Satai Mishir***	Village	0.11	655	5954.5	0	0	888	88.85%	67.68%

17	***Chak Daud Nagar***	Village	0.31	509	1641.9	3.73%	0	838	96.29%	95.75%
18	***Cheonki***	Village	0.34	1600	4705.9	35.63%	0	930	77.54%	69.26%
19	***Chak Gulam Mohmmad***	Village	0.18	663	3683.3	1.21%	0	979	93.58%	90.24%
20	***Chak Nauniya***	Village	0.22	831	3777.3	3.37%	0	969	88.58%	82.77%

4.4.5. Population Density

Total population in Chaka Block (where the study area is located) is 1,73,866 and on an average 1,280 people live in every sq.km. of the land. The study area is densly populated compared to the overall population density in Prayagraj district and Uttar Pradesh state. As of 2024, the population in Prayagraj (erstwhile Allahabad) District is projected to approximately 72,70,000 people[22] accounting to the population density of approximately 1,326 persons per sq.km of land. The high population density in the Chaka Block maybe due to its location within Prayagraj Municipal Corporation & proximity to Allahabad Fort, other infrastructures and educational institutions & Triveni Sangam.

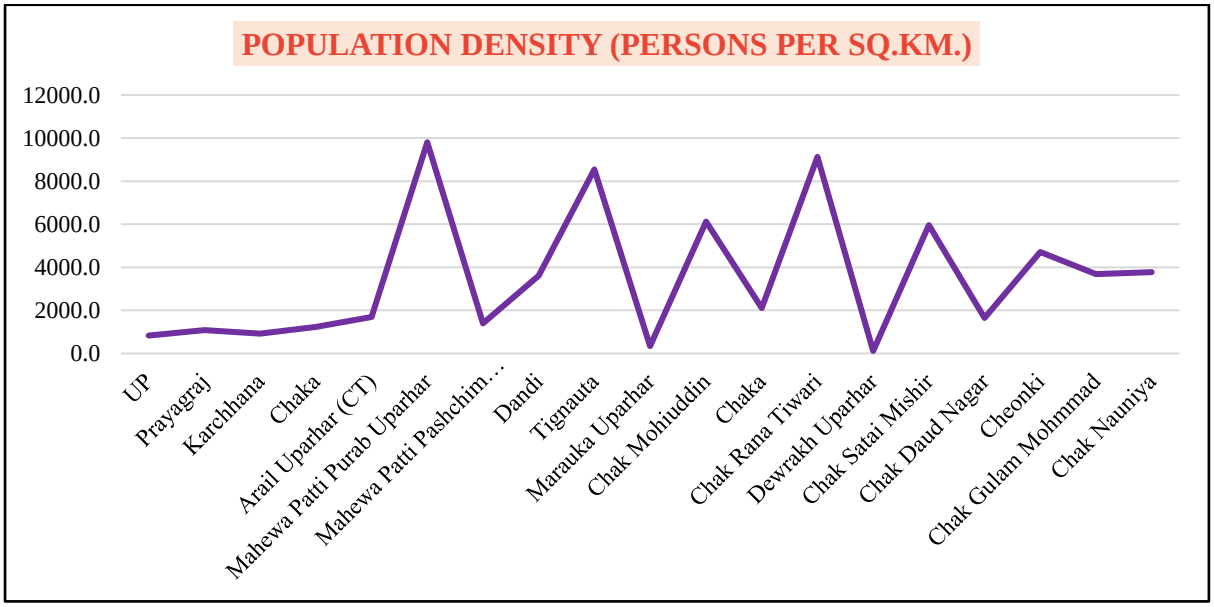


Figure 28: Population density in the study area

The town of Mahewa Patti Purabh Uparhar has the highest population density at 9,803.3 people per square kilometer, followed by the village of Chak Rana Tiwari with a density of 9,116.0 people per square kilometer. Population density is calculated based on the total area of the village or town (in square kilometers) and its total population. The project area is located within the Arail Uparhar town, which has a population density of 1,688.4 people per square kilometer.

4.4.6. Scheduled Caste and Scheduled Tribe Population

About 25.48% of the total population in Chaka Block (where the study area is located) belongs to Scheduled Caste community, and 0.19% belongs to Scheduled Tribe community. similar trend of SC population is recorded at the district and state levels too. Prayagraj District has 22% of SC population and 13.36% of ST population. Uttar Pradesh state has 23.8% of SC population aligning with the same pattern as other lower administrative levels; however, the state records only 0.68% of its total share falling under ST community.

[22] Source: https://www.census2011.co.in/census/district/546-allahabad.html

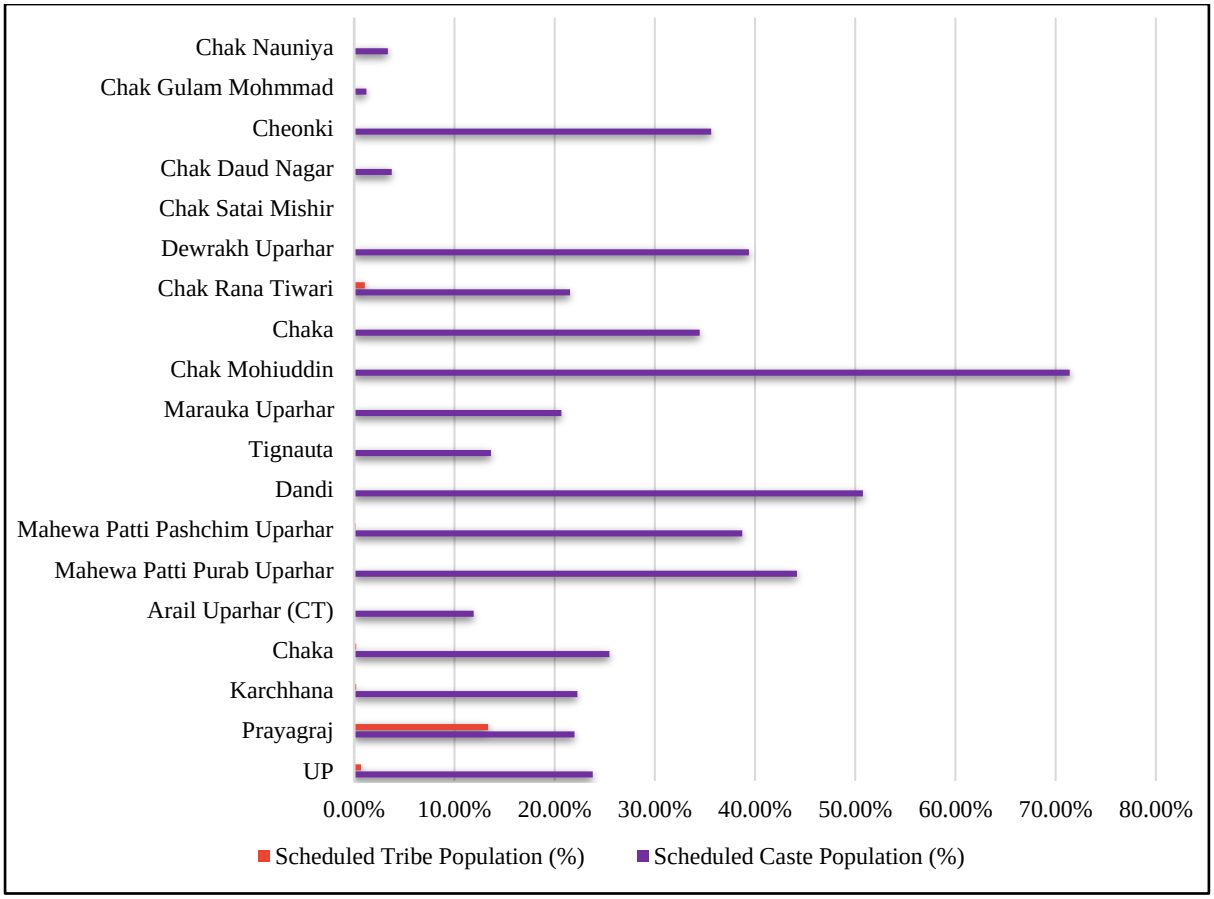


Figure 29: SC & ST Category Population in the study area

The figure indicates that among the villages in the study area, Chak Mohiuddin village has the highest percentage of Scheduled Caste (SC) population at 71.39%, followed by Dandi village at 50.78%. Most villages reported no Scheduled Tribe (ST) population, with Chak Rana Tiwari village being an exception, as it has 1.05% of its population classified as ST. In the project site located in Arail Uparhar town, the SC population is recorded at 11.93%, while the ST population remains non-existent in this area.

4.4.7. Sex Ratio

There are 917 females per 1000 males in the Chaka Block. The sex ratio in Prayagraj district is 901 females per 1000 males. The state marked a sex ratio of 908 females per 1000 males. The sex ratio in the study area is greater than the average ratio across all its higher administrative levels.

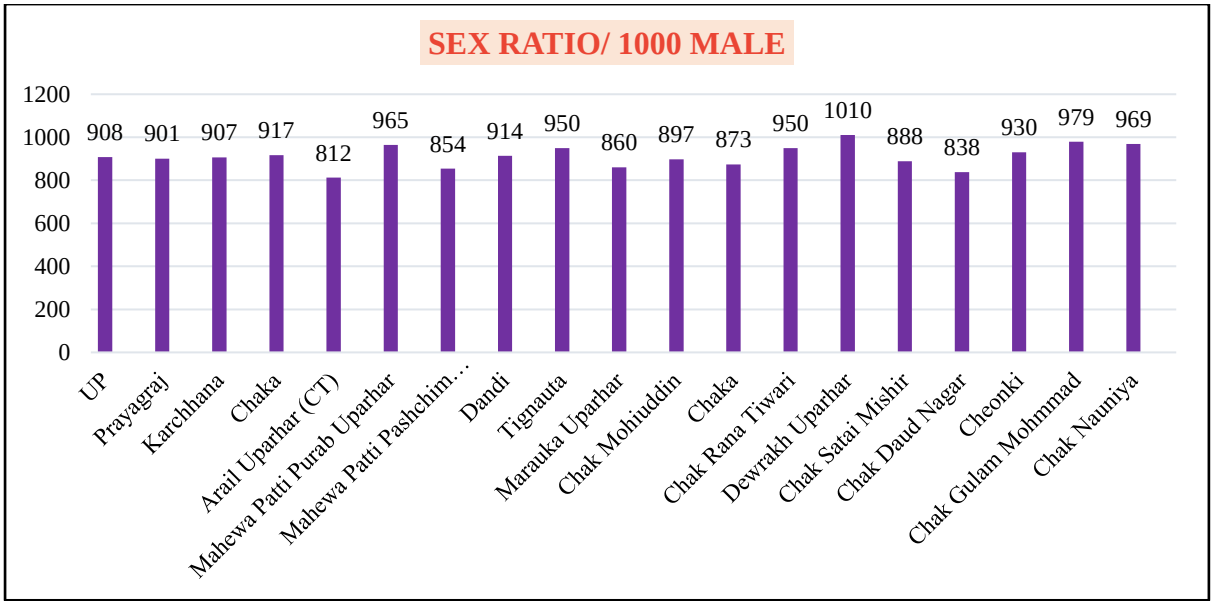


Figure 30: Sex ratio per 1000 male in the study area

Within the study area, highest sex ratio is recorded in Dewrakh Uparhar village at 1010 females per 1000 males, followed by Chak Gulam Mohmmad village at 979 females per 1000 males. The lowest sex ratio is recorded in the town of the project area 812 females per 1000 males in Arail Uparhar.

4.4.8. Literacy Rates

The literacy rate of the Chaka Block is 69.69%. Females comprise of 49.49% of the total literates, while 58.62% of total females are literates; showing a scope of major improvement in both overall and female literacy rates. The literacy rate in Prayagraj district is 72.32% and 60.97% respectively. Uttar Pradesh state recorded 69.72% of total literates while 59.26% of female literates. The female literacy rates are consistently low across block, district and the state.

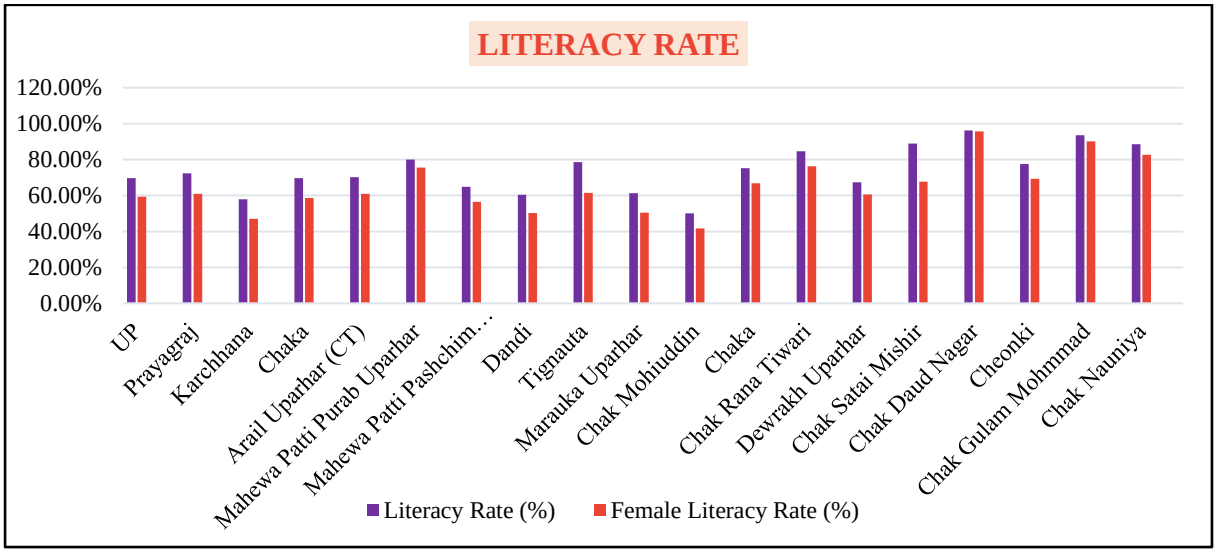


Figure 31: Literacy rate in the study area

The table above indicates that Chak Daud Nagar village has the highest literacy rate at 96.29%, followed by Chak Gulam Mohmmad village, which has a literacy rate of 93.58%. In all the villages studied, female literacy levels exceed 40%. Chak Daud Nagar reported in female literacy with an impressive rate of 95.75%, followed by Chak Gulam Mohmmad at 90.24%. In contrast, Chak Mohiuddin village has the lowest female literacy level at 41.76%. Additionally, the area surrounding the project site, Arail Uparhar town, has an overall literacy rate of 70.19% and a female literacy rate of 60.87%.

4.4.9. Working Population and Occupations

Table 32: Working Population and Occupations (Male and Female) in the Study Area

Name	Total Workers	Male	Female	Cultivators Persons	Male	Female	Agricultural labourers	Male	Female	Household industry workers	Male	Female	Other workers Persons	Male	Female
Chaka (Block) Census Villages within 5KM of the Project Site															
Arail Uparhar	4195	3245	950	72	58	14	52	46	6	65	55	10	2175	1875	300
Mahewa Patti Purab Uparhar	898	722	176	18	13	5	14	10	4	95	54	41	696	607	89
Mahewa Patti Pashchim Uparhar	1684	1484	200	6	5	1	7	7	0	27	21	6	685	618	67
Dandi	1379	1091	288	36	26	10	38	30	8	91	84	7	695	565	130
Tignauta	1352	1132	220	93	74	19	44	34	10	99	55	44	897	827	70
Marauka Uparhar	1159	877	282	112	93	19	314	214	100	69	39	30	283	241	42
Chak Mohiuddin	442	353	89	23	11	12	46	35	11	11	10	1	264	235	29
Chaka	1503	1245	258	116	88	28	87	77	10	69	49	20	848	754	94
Chak Rana Tiwari	606	514	92	49	37	12	57	39	18	73	69	4	332	292	40
Dewrakh Uparhar	516	454	62	14	9	5	51	39	12	13	12	1	260	247	13
Chak Satai Mishir	156	143	13	23	22	1	2	2	0	2	2	0	125	113	12
Chak Daud Nagar	170	127	43	110	94	16	1	1	0	5	4	1	13	7	6
Cheonki	351	297	54	8	8	1	5	5	0	2	0	2	233	209	24
Chak Gulam Mohmmad	347	161	186	4	4	0	3	1	2	14	6	8	281	130	151
Chak Nauniya	182	169	13	8	6	2	3	3	0	1	1	0	153	142	11

More than quarter of total population (31.34%) in the Chaka Block is engaged in work, out of which 45.5% are males and 15.91% are females. Out of the total workers, 20.64% find work for more than six months in a year and they are referred to as main workers. Whereas the rest of workers get to work for maximum six months, in one year – these are referred to as marginal workers. While the data shows that a marginal section of total workers (31.34%) finds work for major part of the year, this involves out-migration to other districts and even to other states e.g., Daily wage work at construction sites, roadside restaurants, labour work on others' farms etc.

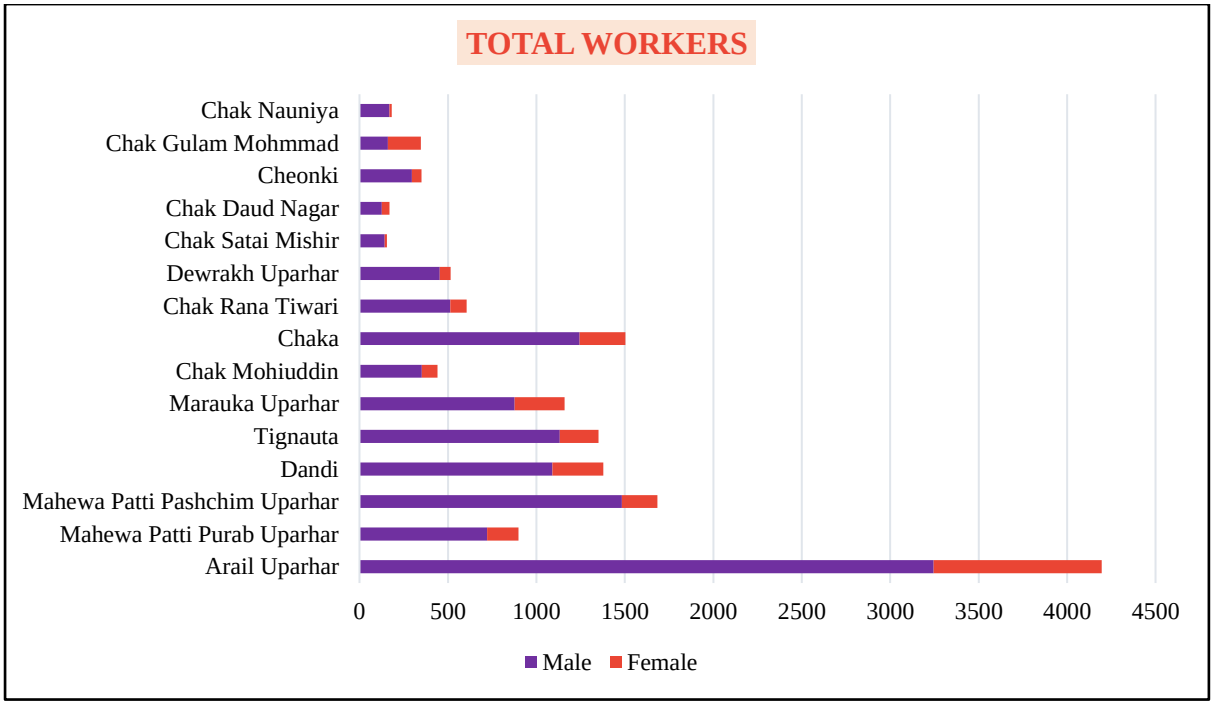


Figure 32: Total Workers in the study area (Villages and Town)

Out of the main workers, 31.87% are males and 8.4% are females. However, this record is observed to have changed in the last few years, as many women were seen working in all occupations including farming, shopkeeping, labour work, brick kilns etc. In line to the male-female ratio among main workers, marginal workers accounted by 13.64% of male and 7.51% of females.

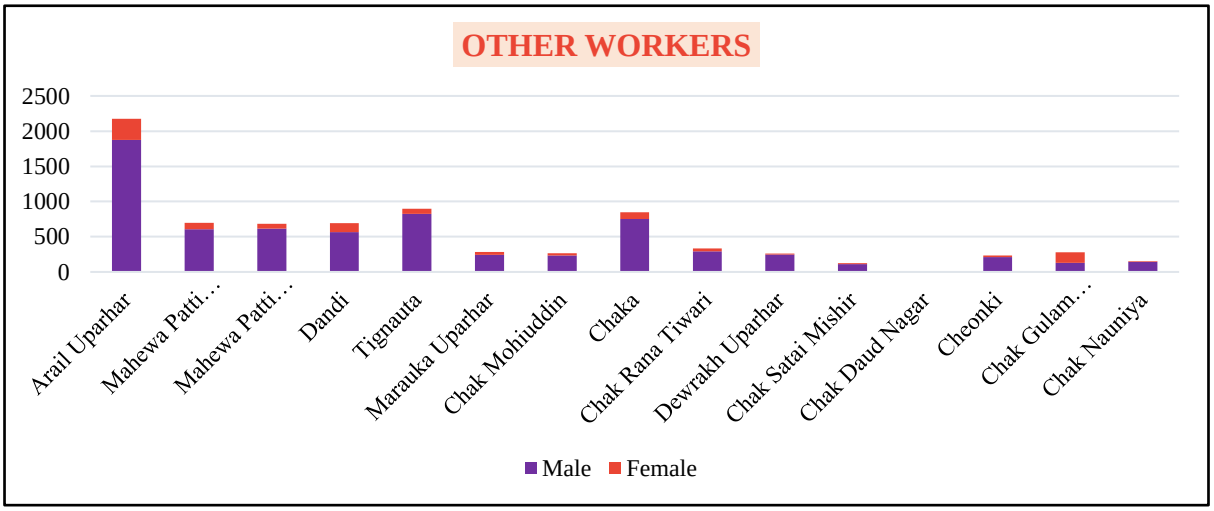


Figure 33: Other Workers in the study area (Villages and Town)

As per distribution of workers in four categories of economic activity namely cultivation[23], agricultural labour[24], household industrial workers[25] & other workers[26] in Chaka Block account to about 11.51%, 17.13%, 9.35% & 62.01% respectively. Other workers form the majority of workforce both among main and marginal workers It was noted that the Female workers were working quantity than the male workers in cultivation, agricultural labour and household industrial workers.

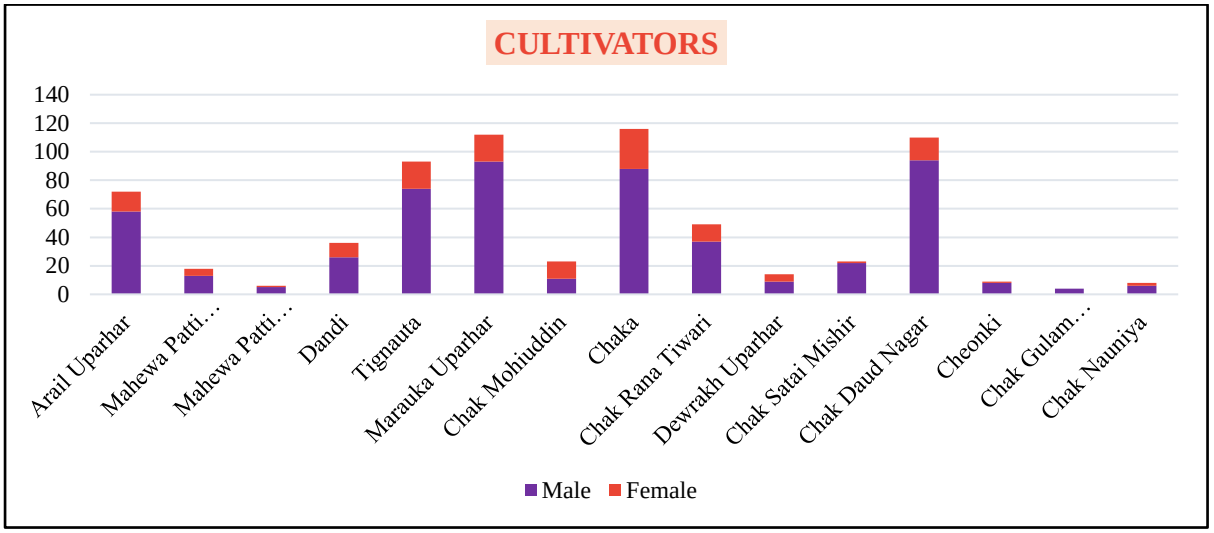


Figure 34: Agricultural Workers in the study area (Villages and Town)

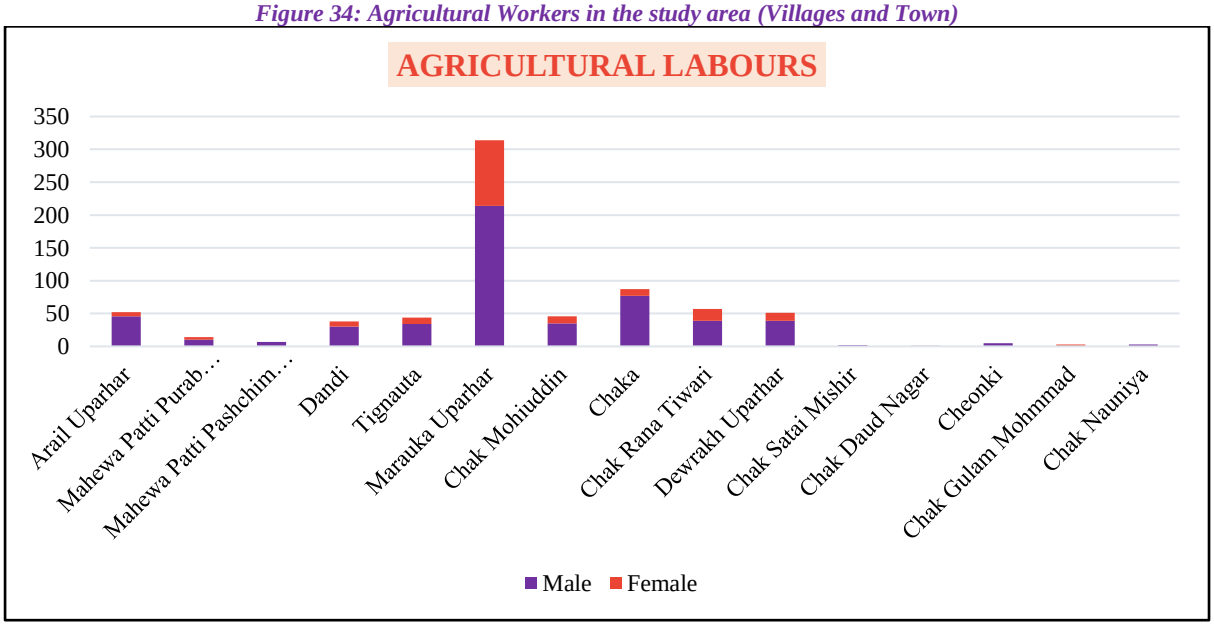


Figure 35: Cultivators in the study area (Villages and Town)

[23] A person was considered working as cultivator if he or she was engaged either as employer, single worker, or family worker in the cultivation of land owned or held from Government or from private person or institution for payment in money, or in kind or on the basis of sharing of crops. Cultivation also included supervision or direction of cultivation.

[24] A person who worked on another person's land for wages in money, kind or share of crop was regarded as an agricultural labourer.

[25] Household Industry was defined as an industry conducted by the head of the household himself or herself and/or by the members of the household at home or within the village in rural areas and only within the precincts of the house where the householder lives in urban areas. The larger proportion of workers in household industry consists of members of the household including the head. This industry is not run on the scale of registered factory. Household industry relates to production, processing, servicing, repairing, or making and selling (but not merely selling) of goods.

[26] All workers i.e., those who had been engaged in some economic activity during the year preceding numeration and who were not cultivators or agricultural labourers or household industry workers were termed as other workers. The type of workers that came under this category included factory workers, plantation workers, those in trade, commerce, business, transport, mining, construction, political or social work, all government servants, municipal employees, teachers, priests, entertainment artists, etc. In fact, all persons who work in any field of economic activity, other than cultivation, agriculture labour or household industry, were covered in this category.

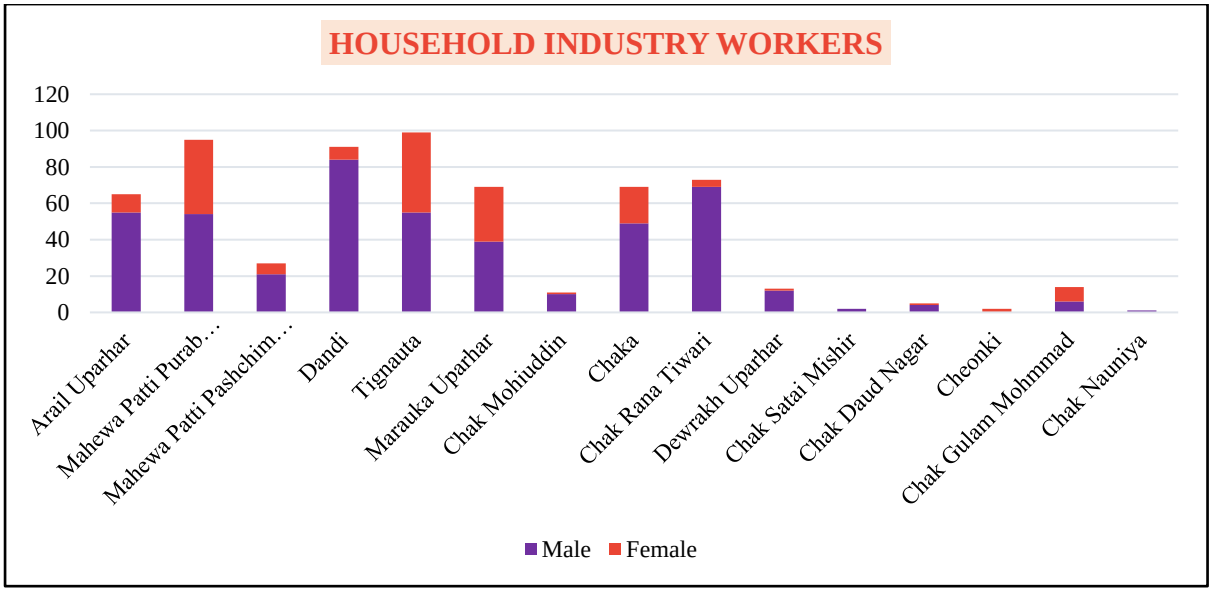


Figure 36: Household Industry Workers in the study area (Villages and Town)

All farmers in the study area engage in two seasons (kharif and rabi) of farming, accounting for availability of work for major part of the year. So, it can be assumed that cultivators among main workers represent landowning farmers. Individuals from marginal landholding families and landless families engage as agricultural labourers on others' farmlands.

4.4.10. Areas of Archeological and Cultural Significance

Some areas of special archaeological and cultural significance, were found to be located around the Site (within 10 km) as detailed below.

Site	Description about Site	Distance from Project Site
Proximity to Archaeologically and cultural Significant Sites (No UNESCO World Heritage Site is located within or adjacent to the projects site)		
Triveni Sangam, Prayagraj	Triveni Sangam is where the three rivers— Ganges, Yamuna, and the mystical river Saraswati meet.	1.5 km towards North East
Allahabad Fort		1 km towards North
Khusro Bagh	Khusro Bagh is a large historical garden, in which tombs of Prince Khusro, the eldest son of Emperor Jahangir and Sultan Begum are located. The three (3) sandstone mausoleums within this walled garden, represent an exquisite example of Mughal architecture.	5 km towards Northwest
Kydganj Cemetery, Baiharan Kabristan, Kala Danda Kabristan		2-5 km towards North

5. ANALYSIS OF ALTERNATIVES

This section of the report presents the analysis of alternatives considered for the BioCNG Project. The analysis aims to identify other options, including not implementing the project, to achieve the project objectives and compare their impacts with the original proposal. The analysis systematically compares feasible, less adverse, alternative technologies, designs, operations and sites – including the 'no project' option – to the project in terms of:

- Their effectiveness of achieving the project objectives as well as potential trade-offs;
- Their potential E&S impacts;
- The feasibility of mitigating these impacts;
- Operational requirements and their suitability under local conditions;
- Their institutional, training and monitoring requirements;
- Their estimated cost-effectiveness; and
- Their conformity to existing policies, plans, laws and regulations.

The following six (6) scenarios have been considered for the alternative analysis:

a) No Project Scenario;
b) Alternate location for the Project;
c) Alternate technology for the Project;
d) Alternate fuel option;
e) Greenhouse Gas Emissions from Project; and
f) Benefits of the Project.

5.1. NO PROJECT SCENARIO

5.1.1. Solid Waste Management Scenario in Prayagraj

According to estimates from the PMC, approximately 600 TPD[27] of Municipal Solid Waste (MSW) is generated in the city. On average, residents contribute about 400-450 grams of waste per capita per day. This includes waste from local inhabitants—comprising households, shops, commercial establishments, vegetable and fruit markets, and construction and demolition activities—along with waste from hospitals (non-infectious and non-hazardous) and the floating population. The majority of this waste consists of organic materials such as vegetables, fruits, food scraps, as well as recyclable materials like paper, plastic, glass, metal, rags, and packaging.

Prayagraj is divided into 80 wards, which together house approximately 265,000 households. Waste collection services are provided by two (2) private contractors: Prayagraj Lion Waste Management Pvt. Ltd. handles 40 wards and Om Swachhata Corporation manages the remaining 40 wards. These collection contracts were awarded for a period of seven years, starting in 2021. To ensure complete coverage, a fleet of 512 vehicles is used for door-to-door waste collection across the city. Of these, 35 compactors transport the waste to a centralized processing and disposal site.

As of the latest data (Smart Cities Data 2019), the city's waste segregation rate stands at 22%. However, the Prayagraj Municipal Corporation has set an ambitious target to increase this segregation rate to over 80% in the near future.

Even though the city is working diligently on processing the waste to the best extent possible, this project is an opportunity to utilize the energy potential in the biodegradable waste of the area. A 'No project Scenario' will not address the issue of waste management. An alternative without project is undesirable, as it would worsen the generation-processed scenario which would be a constraint on environment and economy.

[27] For more information, please refer to the following link: https://www.data.gov.in/catalog/solid-waste-management-revenue-prayagraj-0.

5.2. ALTERNATE LOCATION FOR THE PROJECT

BioCNG Plants effectively address the issue of organic waste management, diverting organic waste from landfills and reducing methane emissions. The Project Site was allotted by PMC in the year 2024 for a period of 25 years. The following criteria have been considered for site selection:

- The project site is a government land and does not involve any resettlement;
- Prayagraj generates a significant amount of organic waste every day and this Plant was selected as a sustainable solution for waste management that would convert organic waste into biogas and other valuable by-products;
- The site does not fall under any reserved or protected forests;
- Although the site is situated near major settlements, the access road to the site and the road for the local community are different, hence no traffic problems will occur due to this project.
- No cultural property of archaeological importance is located within a 500m radius;
- The site has easy access in terms of connectivity with the main road and highway which will help in the transportation of materials, man, and machinery required during construction phase and transportation of waste during operation phase;
    a) NH 30 (Uttarakhand-Andhra Pradesh Highway) is located about 0.5 km to the west of the Project Site.
    b) Daraganj Railway Station is approximately 2.6 km to the northeast and Prayagraj Rambag Railway Station is approximately 2.7 km to the northwest of the Project Site.
    c) Prayagraj Airport Terminal (Allahabad Airport Terminal) is located at a distance of about 13 km to the west.

Therefore, considering all the above details of the location and site settings, the identified site was selected as a suitable option for the project.

5.3. ALTERNATE TECHNOLOGY FOR THE PROJECT

Several waste-to-energy (WTE) technologies are available based on the type, quantity, and characteristics of raw material, the required method of energy, economic conditions, environmental standards, and specific factors. Subsequent sections explain the most commonly used WTE technologies.

5.3.1. Incineration

Incineration is a chemical process in which carbon, hydrogen and other elements in the MSW mix with oxygen in the combustion zone to generate heat. The air requirements for the combustion of solid wastes are considerable. Usually, excess air is supplied to the incinerator to ensure complete mixing and combustion and to regulate operating temperature and control emissions. The principal gas products of combustion are carbon dioxide, carbon monoxide, water, oxygen and oxides of nitrogen. The purpose of incineration aims at the following:

- ***Volume reduction***: Depending on its composition, incineration reduces the volume of solid wastes to be disposed of by an average of 90%. The weight of the solid wastes to be dealt with is reduced by 70-75%. This has both environmental and economic advantages since there is less demand for final disposal to landfills, as well as reduced costs and environmental burdens due to transport if a distant landfill is used.
- ***Stabilization of waste***: Incinerator output (i.e., ash) is considerably more inert than incinerator input (i.e., solid wastes), mainly due to the oxidation of the organic components of waste stream. This leads to a reduction of landfill management problems and the organic compounds present in landfill leachate.
- ***Recovery of energy from waste***: Energy recovered from burning the wastes is used to generate steam for use in on-site electricity generation or export to local factories, etc. Combined heat and power plants increase the efficiency of energy recovery by producing electricity as well as utilizing the residual heat.

The incineration facility along with combustion of waste emits air pollutants (i.e., fine particulate and toxic gases), which are an environmental concern, and therefore, their control is necessary. Other

concerns relating to incineration include the disposal of the liquid wastes from floor drainage, quench water, scrubber effluents and the problem of ash disposal in landfills because of heavy metal residues.

5.3.2. Pyrolysis

Pyrolysis refers to the heating of organic material, in the absence of oxygen, which is usually conducted at or above 500°C, providing enough heat to deconstruct strong bio-polymer bonds between them. Because no oxygen is present combustion does not occur, rather the biomass thermally decomposes into combustible gases and biochar. Pyrolysis of biomass produces three (3) products, liquid bio-oil, solid bio-char and gaseous syngas. The proportion of these products depends on several factors including the composition of feedstock and process parameters. However, there are several environmental implications of pyrolysis which are as follows:

- ***Financial***: Although pyrolysis is promising in managing environmental waste, the process often comes with substantial financial considerations. The cost of consistent feedstocks, cost-effectively upgrading pyrolysis oil, and making pyrolysis oil production competitive against combustion are economic challenges all operations face.
- ***Scalability of operations***: The demand for products derived from the pyrolysis of plastics is very high. Yet, suppliers cannot meet these demands due to the limited availability of consistent feedstock, limited technology for the industry, and the high costs of both. Tight timelines further complicate this scalability challenge for launching new technologies, limited space for expansion in most plants, and a need for flexible solutions that are only sometimes available.
- ***Water management***: Water management is also an essential part of pyrolysis recycling technologies, with energy use being just one of the issues. Access to water sources for cooling products also adds difficulties. The process uses large amounts of energy and water, which increases production costs. Also problematic is the issue of water pollution from waste streams. Careful management of hydrocarbons, minerals, and oils is necessary to avoid environmental degradation and protect public health. This management comes at a high cost.

5.3.3. Gasification

Gasification is the process in which the supply of oxygen is controlled and the waste is converted into a chemical product called producer gas/syngas. The main components of producer gas are carbon monoxide (13-19%), hydrogen (18-22%), carbon dioxide (9-12%), nitrogen (45-55%), methane (1-5%) and water vapor (4%). This process transfers the majority of the chemically bound energy of solid fuel into the gas phase. The oxygen supply will be 20-40% of the stoichiometric air requirement.

The main challenges associated with the biomass gasification process include: excessive tar production, managing impurities like ash and soot, inconsistent feedstock quality, high capital costs, the need for efficient tar removal systems, and the difficulty of producing a clean syngas with low contaminants; all of which can impact the overall efficiency and economic viability of the process.

5.3.4. Refuse-derived Fuel (RDF)

RDF is produced from MSW that is usually shredded, dried, baled, and then finally burned to produce electricity. MSW consists of various fractions and to manage them effectively, different technological processes are required. The segregated combustible fraction includes recyclables of less value (torn paper, plastic pieces, glass pieces, metal pieces, etc.) mixed with it. Also, a percentage of garden waste, soiled paper, cardboard, textile, thin film plastic, multi-layered packaging and other such materials not suitable for recycling due to technical and financial reasons and end up at dumpsites and water bodies which can be converted into RDF.

RDF is a renewable energy source that ensures waste is not thrown into a landfill and instead put to good use. The most common way of extracting RDF from MSW is to combine mechanical and biological treatment methods that include:

- Size Screening
- Coarse shredding
- Bag splitting;
- Shredding

- Magnetic separation
- Refining separation

The primary challenge with RDF is ensuring consistent quality due to the variable composition of MSW from which it is derived, making it difficult to reliably use in industries like cement production that require a stable fuel source; this inconsistency can lead to issues with combustion efficiency and potential environmental concerns if not properly managed.

Hence, bio-methanation becomes the most favourable option for management of MSW particularly wet / organic portion of waste. As informed, the organic waste, oversized & pre-treatment rejects, and solids from the digester effluent will be processed in the Plant to convert into FOM, i.e., high-quality compost. Compost shall help in improvement of soil organic carbon of agricultural soil in the region and also reduce requirement for chemical fertilizers/pesticides and boost efforts on organic farming. The main product from the Plant, BioCNG which is green eco-friendly fuel, shall be used to fuel vehicles through dispensing mechanism.

5.4. BioCNG as an Alternate Fuel Option

Biogas is produced from agricultural, manure, municipal, plant material, sewage, green, or, food waste and is a cleaner alternative to petrol and diesel. Bio-CNG could replace CNG and LPG, benefiting industries like distilleries, sugar and scratch factories, milk processing, pulp and paper, and slaughterhouses. There are various advantages to BioCNG, as elaborated below:

- ***High-calorific value***: Bio-CNG provides a high calorific value, which makes it an efficient fuel source for various applications.
- ***Clean fuel***: As **clean energy**, Bio-CNG helps control air pollution by significantly reducing emissions such as carbon monoxide (70-90%), non-methane organic gas (50-75%), nitrogen oxides (75-95%), and carbon dioxide (20-30%).
- ***No residue production***: Bio-CNG combustion does not produce any residue, contributing to a cleaner environment.
- ***Safety***: Bio-CNG vehicles are very safe and so is filling them up with biogas. It's safer than refueling with conventional fuels. Bio-CNG is less fire resistant, lighter than air, and evaporates upon release.
- ***Reduces dependency on fossil fuels***: Bio-CNG reduces the burden on forests and fossil fuels, offering a sustainable alternative energy source.
- ***Convenient ignition temperature***: It has a convenient ignition temperature, which makes it easy to burn and use in various applications.
- ***Waste management***: It can help to avoid problems associated with solid waste being dumped in landfills by utilizing organic waste to produce energy.
- ***Reduction in greenhouse gases***: Vehicles running on BioCNG can reduce CO_2 emissions by 78% compared to petrol or diesel, contributing to the fight against climate change.

Having all these advantages, BioCNG can serve as an alternate fuel possibility for the area.

5.5. Greenhouse Gas (GHG) Emissions

Reportedly, when used as a fuel, BioCNG emits significantly lower levels of GHGs compared to traditional fossil fuels. Vehicles running on BioCNG emit only 120 grams of CO_2 equivalent per kilometer (g CO_2 eq/km), compared to 150 g CO_2 eq/km for petrol and 140 g CO_2 eq/km for diesel.

5.6. Benefits of the Project

Bio-CNG as vehicular fuel not only has the potential to mitigate methane emissions, but will also aid India in providing cheap, reliable, and environment-friendly transportation, especially to rural areas. This will lead to improved living standards for the rural population by integrating these remote areas to nearby cities providing easy access to external markets, raising agricultural productivity and income, and creating new economic opportunities. Some of the various advantages that this Project would provide are as follows:

- Biogas is an eco-friendly fuel that provides a non-polluting and renewable source of energy.
- It has a calorific value of around 6 kWh/m^3 which is equivalent to half a litre of diesel.
- It is an efficient way of energy conversion.
- Saves women and children from the drudgery of collecting and carrying of firewood, exposure to smoke in the kitchen, and time consumed for cooking and cleaning of utensils.
- The digested sludge is high-quality organic manure, completely natural and free from harmful synthetic chemicals. It can supplement or even replace chemical fertilizers.
- Leads to improvement in the environment, sanitation and hygiene.
- Provides a source for decentralized power generation.
- Shall lead to employment generation.
- Organic waste can be disposed off usefully and healthily.
- The technology is cheaper and much simpler than those for other biofuels.
- Dilute organic waste materials (2-10% solids) can be used as feed materials.
- Any biodegradable matter can be used as substrate.
- Anaerobic digestion inactivates pathogens and parasites and is quite effective in reducing the incidence of water-borne diseases.
- It shall significantly lower the Greenhouse effects on the earth's atmosphere by lowering methane and CO_2 emissions.
- The Project aligns with six (6) Sustainable Development Goals, namely:

1) *Goal 7: Affordable and Clean Energy*
2) *Goal 8: Decent Work and Economic Growth*
3) *Goal 9: Industry, Innovation and Infrastructure*
4) *Goal 11: Sustainable Cities and Communities*
5) *Goal 12: Responsible Consumption and Production*
6) *Goal 13: Climate Action*

6. STAKEHOLDER MAPPING AND ENGAGEMENT

6.1. INTRODUCTION

Stakeholder participation and consultation is an essential process to meaningfully engage stakeholders and discuss potential environmental, social and economic impacts (both positive contributions and potential risks) that the project may have during the design, planning, implementation and operational stages of the project and to establish an ongoing mechanism for feedback in consultation with stakeholders. For stakeholders, the consultation process creates an opportunity to be informed, as well as to inform the company about local contexts that may not be obvious, to raise issues and concerns and to help shape the objectives and outcomes of the project. The following section presents the consultative and participatory mechanisms that were adopted along with the outputs of these consultations.

INDUS Team visited the Project Site from 19th November – 21st November 2024. The Project Manager at the site was notified in advance about the various kinds of stakeholders that INDUS Team would like to consult regarding the project. In this regard, consultations with PMC, feedstock suppliers of Cattle dung & chicken litter, waste collectors, forest department officials, etc. were undertaken, to better understand the modalities of the project and the waste management practices in the city. Consultant's social experts interacted with the local community including women, about the likely impacts, social risks, safety, livelihood, awareness, and opinions about the project.

6.2. STAKEHOLDER CONSULTATION AND DISCLOSURE REQUIREMENT FOR PROJECT

Government regulatory bodies and project finance institutions have placed a greater emphasis on stakeholder engagements and the disclosure of project information. A brief overview of IFC's requirements under PS-1, for public disclosure and stakeholder consultation applicable to this project is as follows:

- Community consultation shall be undertaken in a manner that provides the affected communities with opportunities to express their views on project risks, impact, and mitigation measures and allows the proponent to consider and respond to them;
- Consultation shall be based on prior disclosure and dissemination of relevant, transparent, objective, meaningful, and easily accessible information that is in culturally appropriate local language(s) and format and is understandable to Affected Communities;
- Focus inclusive engagement on those directly affected as opposed to those not directly affected;
- Be free of external manipulation, interference, coercion or intimidation;
- Enable meaningful participation, where applicable and document the whole consultation process.
- *Informed Consultation and Participation (ICP)*: For projects with potentially significant adverse impacts on Affected Communities, the proponent shall conduct an ICP process that involves a more in-depth exchange of views and information and an organized and iterative consultation, leading to incorporating the views of Affected Communities in the proponent's decision-making process.

6.3. IDENTIFICATION OF STAKEHOLDERS

Stakeholder identification and preparation of influence matrix are crucial steps in the Social Impact Assessment process because they guide subsequent stakeholder engagements over the course of the project. The stakeholders identified in the present project area have been categorized into Primary and Secondary. The primary stakeholders are those who have a direct connection with the project and either have a substantial influence on it or are influenced by it. Secondary stakeholders, on the other hand, are those who are indirectly connected with the project.

Stakeholders and their level of interest may shift as the project progresses, depending on the impacts associated with each stage of planning, construction and post-construction. The succeeding table provides a list of identified stakeholders, their degree of involvement throughout the project's lifecycle, the impact of project on them as well as their impact on the project and the overall rating of the influence.

Keeping in mind the nature of the project and its setting, the following stakeholders were identified and listed in the ***Table 33*** given below.

Table 33: Stakeholder Group Categorization

Primary Stakeholders	Secondary Stakeholders
Prayagraj Municipal Corporation	*Local community*
Feedstock (Cattle dung, chicken litter, paddy straw) suppliers	*Waste Collectors and Transporters*
Construction contractors and Sub-contractors	*IEC Teams*
Employees	*Forest Department*
Unskilled and semi-skilled labourers on-site	*Other Projects in the Area*
Commercial vendors near the Project Site	

6.4. STAKEHOLDER ANALYSIS

After identifying the primary and secondary stakeholders, their profile and impact on the project as well as the impact of the project on these stakeholders was analysed. Table below has been used to classify the identified stakeholders (primary and secondary) with respect to their levels of significance on the project. The influence and priority have both been primarily rated as:

High	This implies a high degree of influence of stakeholders on the project in terms of participation and decision-making or high priority to engage with the stakeholders.
Medium	Implies a moderate level of influence and participation of the stakeholder in the project as well as priority level to engage with the stakeholder which is neither critical nor insignificant in terms of influence.
Low	Implies a low degree of influence of the stakeholder on the project in terms of participation and decision-making or low priority to engage with stakeholders.

The coverage of stakeholders as stated above includes any person, group, institution or organization that is likely to be impacted (directly or indirectly) or may have interest/influence over project. Keeping this wide scope of inclusion in stakeholder category and the long life of project, it is difficult to identify all potential stakeholders and gauge their level of influence over project at the outset of the project. Therefore, the project proponent is advised to consider this stakeholder mapping as a live document which should be revised in a timely manner so as to make it comprehensive for any given period of time. In this regard, stakeholder analysis matrix has been elucidated in ***Table 34***, highlighting the points of discussions during the consultations.

Table 34: Stakeholder Analysis Matrix

Identified Stakeholders	Profile	Impact/Influence of the project on stakeholders	Impact/Influence of the stakeholders on the project	Category of Impact/ Influence
PRIMARY STAKEHOLDERS				
PMC	The Project is being developed by PMC in concession with EverEnviro that is obligated to supply Minimum Obligated Quantity of 200 TPD SSO fraction of solid waste to Project Site.	The project will be a positive development as PMC not only plans to process the waste, but also turn it into BioCNG and generate compost that shall be distributed by PMC.	PMC has leased out 12.95 acres of land to EverEnviro for a period of 25 years for this Project. Support of PMC is crucial for the smooth functioning of the project related activities in the area.	**High**
Feedstock suppliers	This stakeholder group comprises of the various suppliers that shall be supplying the feedstock	Some of the waste such as Cattle dung that was being produced in excess and	This stakeholder group shall be responsible for providing adequate amounts of feedstock to	**High**

Identified Stakeholders	Profile	Impact/Influence of the project on stakeholders	Impact/Influence of the stakeholders on the project	Category of Impact/ Influence
	such as Cattle dung, chicken litter and paddy straw to the Project Site.	lying haphazardly on road shall be processed at the Project Site, therefore contributing to effective waste management system in the city.	the Plant. Therefore, it is critical for the smooth functioning of the project-related activities in the area.	
Construction Contractors and Sub-contractors	This stakeholder group comprises of the contractors and sub-contractors involved in the Project for various tasks, like construction of structures and civil and electric works for the Plant.	The project is anticipated to provide this group economic opportunities and steady flow of income during the construction period.	This stakeholder group is critical for the smooth functioning and timely implementation of the Project. This group may also play an important role in the formation of public opinion towards the project.	**High**
Employees of EverEnviro	These stakeholders comprise the employees of the Company.	The project deliverables are dependent upon the smooth functioning of this category of stakeholders.	This stakeholder group is critical for the smooth functioning and timely implementation of the Project. This group is to be considered as direct internal stakeholders.	**High**
Unskilled and semi-skilled labourers	This group comprises of skilled and semi-skilled local or migrant population who may be engaged in the project on a contractual basis.	It will help in creation of goodwill and project-related opportunities which would be shared with the local population.	Good relations with the local people and their engagement in the project will help in timely completion of the construction.	**Medium**
Commercial vendors near Project Site	This group comprises of local vendors selling vegetables, snacks, tea, etc. to the workers employed at Plant.	The workers purchase snacks, tea, etc. from these vendors leading to increased sales for the commercial vendors.	Providing the workers on the project site with a reliable source for food will help in timely completion of the construction.	**Low**
SECONDARY STAKEHOLDERS				
Local community	Local population in the vicinity of the Project that are not directly impacted by the Project activities.	The main Arail road shall be used for the transportation of waste which may temporarily disturb the traffic.	Significant role in the smooth functioning of the Project.	**Low**
Waste collection workers	This group comprises the workers deployed at the Fixed Compactor Transportation Service (FCTS) ports that are responsible for segregation and transportation of waste from source to FCTS and further to landfill/plant.	The workers can benefit from the increased demand for segregated organic waste.	They shall ensure a consistent supply of segregated organic waste that will allow the Plant to operate at optimal capacity, maximizing energy output. Efficient waste collection and transportation minimize the amount of organic waste sent to landfills,	**Medium**

Identified Stakeholders	Profile	Impact/Influence of the project on stakeholders	Impact/Influence of the stakeholders on the project	Category of Impact/ Influence
			reducing environmental pollution. Proper waste management practices help prevent the spread of diseases and improve overall public health.	
IEC Teams	This stakeholder group comprises of IEC Teams deployed by EverEnviro and PMC (Shrishti Waste Management Services Pvt Ltd.) for effective waste management practices in the city.	Critical for the smooth functioning of the Plant, as more awareness about good waste management practices can ensure the availability of source-segregated wastes from households and commercial establishments.	Provide awareness to helpers engaged in waste collection and segregation practices. Inspection and Monitoring of waste segregation personnel and bulk waste generators (like hotels, and restaurants) Training and Door-to-door awareness campaigns for families, RWAs, etc. Get bulk waste generators penalized by PMC if they are not providing segregated waste and are not ready to understand also.	**Medium**
Forest Department Officials	Divisional Forest Office in Prayagraj Range Forest Office, karchhana	BioCNG, being cleaner fuel alternative to fossil fuels, can reduce the demand for wood-based fuels that can lead to decreased deforestation and forest degradation.	Assistance in obtaining necessary information regarding floral and faunal species found in/near the Project area.	**Low**
Other Projects in the Area	A number of BioCNG Plants can be present in the same area such as Reliance Industries in this case.	Multiple plants competing for same feedstock sources can lead to increased prices and potential shortages.	Can affect financial viability of the Plant. Competition for skilled labour and other resources.	**Low**

6.4.1. Consultations held with the Stakeholders

INDUS Team held consultations with different stakeholders, during the preliminary site visit (23rd – 24th October 2024) and detailed baseline site visit (19th – 21st November 2024), which are summarized in ***Table 35***.

Table 35: Summary of stakeholder consultations undertaken by INDUS Team

S. No.	Stakeholder Details	Venue	Date of Consultation	Points of discussion
1.	Project Site Team of EverEnviro • Project Manager • Assistant Manager – Feedstock	Project Site	24th October 2024 20th November 2024	PMC will facilitate MSW supply to this Plant after it becomes operational. The project site was previously being used by Forest Department for growing plantations and as parking ground during Kumbh Mela. The company is collaborating with an IEC Team for community awareness regarding effective waste segregation practices. Paddy straw, Cattle dung and chicken litter suppliers are being shortlisted and discussions are ongoing with suppliers on pricing and other terms.
2.	IEC Team deployed by EverEnviro	Project Site and FCTS Port	19th – 21st November 2024	The IEC Team, hired by EverEnviro, is responsible for conducting door-to-door awareness campaigns to promote waste segregation in the wards. Also responsible for conducting regular inspection and monitoring of waste segregation personnel and bulk waste generators (like hotels and restaurants). Currently, 40 out of 100 wards are fully segregating waste into two (2) streams: dry and wet. Segregated waste is transported to FCTS or FPTS for further processing. Dry waste is sent to Baswar landfill. The main challenge faced by the Team is in rural areas where people are resistant to segregation. This creates a delay in segregation that causes large traffic congestion at FCTS/FPTS ports, as the compactors are parked roadside during the process.
3.	Thermax (Project Contractor)	Project Site	23rd – 24th October 2024 20th November 2024	Discussed working of the whole BioCNG plant, including the plant components and technology used. Emergency procedures, including an assembly area, shall be established.
4.	Workers deployed at Project Site	Project Site	24th October 2024 21st November 2024	They receive initial safety training on the day of joining and medical checkups and there is awareness about safety protocols and supervisors. The workers have access to proper living conditions, relying on labor camps, sometimes self-prepared meals, and water provided through portable tankers.
5.	Feedstock Suppliers	Project Site	24th October 2024	According to this group, they shall secure Cattle dung, chicken litter, and additional feedstock from nearby farms within a 10 km radius and supply it to this Plant once it becomes operational. Currently, they supply the same to the nearby Reliance Industries similar plant. The feedstock will

				be transported via tractors and trucks. They will be associated with Farmers, Dairy Owners and Poultry farms for sourcing of feed stock.
6.	Gaushala, dairy owners, chicken litter supplier	At their premises	19th – 20th November 2024	The gaushala/dairy owners in the area have varying practices for managing Cattle dung. Some sell milk locally and dispose off Cattle dung through composting, feeding to fish or sell it to suppliers. Many were unaware of the BioCNG plant but are optimistic about its potential to utilize Cattle dung efficiently. They believe the plant will help manage the excess Cattle dung, reduce environmental impact, and potentially provide additional income.
7.	Environment Engineer from PMC	Prayagraj Nagar Nigam	21st November 2024	The BioCNG project is designed to address the waste management challenges in the city by implementing best practices from the Bhopal BioCNG plant. A temporary agreement with Reliance has been established for the supply of Municipal Solid Waste (MSW), which will be diverted to the plant once it becomes operational. The city has achieved an impressive 80-90% waste segregation in 40 wards through extensive Information, Education, and Communication (IEC) efforts, with plans to extend this initiative to the remaining wards. To ensure proper waste management, vehicles transporting waste will be fully covered during transit, eliminating the risk of odor. For waste segregation, Lion Waste Management, Neelkanth, and Lion Securities have been engaged, across the 40 wards. The segregated waste is sent to multiple ports for compaction before being transported to the plant or landfill (inert waste). All vehicles involved in waste transportation are GPS-enabled, geofenced, and monitored through a centralized control room that is alerted if any discrepancies are detected. The reject waste from the plant shall be sent to Baswar Sanitary Landfill (SLF), located 12-13 km from the plant site. The SLF currently contains legacy waste (21.5 lakh tonnes), which has already undergone processing.
8.	IEC Team deployed by PMC (Shristi Waste Management Services Pvt Ltd)		21st November 2024	The IEC team is actively involved in raising awareness about waste segregation. They conduct training sessions in households, RWAs, schools, shops, and other community spaces. The ward in charge reports to the head office. While there are challenges in rural areas, urban areas have shown better understanding and cooperation. The team continues to educate workers on waste segregation practices regularly.
9.	Waste collection workers at FCTS Ports	Teliarganj	21st November 2024	The waste management process involves a team of supervisors and workers who collect segregated waste from households and commercial

				establishments such as hotels and restaurants. The waste is segregated at the source whenever possible. However, mixed waste from commercial establishments requires additional segregation efforts. The collected waste is transported using community and door-to-door vehicles. Dry waste is currently being sent to the Baswar SLF, while wet waste is being supplied to the Reliance plant. Two waste segregation agencies, Neelkanth and Lion, are involved in the process.
10.	Forest Department Officials	Divisional Forest Office	21st November 2024	Discussions regarding the diverse flora and fauna present in the city and near the Project Site. Migratory birds come to Trveni Sangam area every Winter season, which is a popular tourist destination. The area also boasts a variety of trees, including Gular, Amla, Chilbil, Mango, Sharifa, and silver oak.
11.	Local Community including, women, shop owners, road users, Temple priest, and boat owners near Triveni Sangam/Arail Ghat	-	21st November 2024	The people in the area are aware of waste segregation and are willing to participate in the process. They have been informed about the upcoming BioCNG plant and are supportive of the initiative. The municipal corporation currently collects mixed waste from the nearby rural area, but the people are committed to segregating waste at the source. Urban population provides regular segregated waste. However, they have suggested measures to minimize disruptions, such as covering waste trucks and limiting their movement during peak hours.



Consultation with Gaushala/Dairy Owners



Consultation with IEC Team | *INDUS Team discussing Plant Layout* | *At PMC's Office*




With roadside contractors | *With the priest of a temple* | *With tea stall owner outside plant* | *With local women*

Figure 37: Some visual representations of Stakeholder Consultations

7. ASSESSMENT OF FEEDSTOCK PROCUREMENT AND SUPPLY CHAIN

7.1. INTRODUCTION

The procurement and management of feedstocks are fundamental to the success of BioCNG plants, particularly those focused on producing renewable energy from organic materials. The feedstock supply chain forms the backbone of BioCNG production, as the availability, quality, and consistency of feedstock directly influence the efficiency, cost-effectiveness, and sustainability of the entire BioCNG production process. The assessment of feedstock procurement and supply chain management is critical for ensuring a reliable and continuous supply of materials like SSO fraction of MSW, Paddy Straw, Cattle Dung, and Chicken Litter.

Feedstocks for BioCNG plants come from a variety of sources, including municipal waste, agricultural by-products like paddy straw, poultry waste such as chicken litter, and livestock waste like Cattle dung. Each of these feedstocks presents distinct procurement challenges, such as sourcing, transportation, seasonality, and contamination risks. Effective supply chain management addresses these challenges, ensuring that the feedstock delivered to the BioCNG plant meets the necessary quality standards and is available in the right quantities at the right time.

This assessment focuses on understanding the dynamics of feedstock procurement in Prayagraj, identifying key risks and opportunities, and evaluating the efficiency of the supply chain. It includes an analysis of local supply sources, transportation risks, cost considerations, and environmental factors based on the information collected during site visits conducted by INDUS team in the months of October 2024 and November 2024. By evaluating these factors, EverEnviro's BioCNG plant can optimize its feedstock procurement strategies, reduce risks, and enhance the overall economic viability of the BioCNG production process. The subsections of this chapter cover the following:

- Type and characteristics of feedstock.
- Risk and opportunities in the procurement of feed stocks.
- Assessment of feasibility of Feed stock availability including assessment of feed stock generation locations, quantum of generation, availability, pricing, tie up with EverEnviro.
- Feedstock Transportation risks and Mitigation Measures.

7.2. TYPE AND CHARACTERISTICS OF FEEDSTOCK

7.2.1. Municipal Solid Waste

MSW presents a promising feedstock option for BioCNG production due to its abundance and diverse organic content, which can be converted into biogas through anaerobic digestion. MSW typically contains a significant proportion of biodegradable materials called SSO, such as food waste, paper, and garden trimmings, making it an ideal source for biogas generation. The use of SSO fraction of MSW as a feedstock in BioCNG plants not only offers an efficient waste management solution but also contributes to reducing greenhouse gas emissions by diverting organic waste from landfills, where it would otherwise decompose anaerobically and release methane. Additionally, utilizing SSO fraction of MSW for BioCNG production supports the circular economy by turning waste into a valuable energy source, thereby reducing dependence on fossil fuels and contributing to energy security.

7.2.2. Paddy Straw

Paddy straw, a by-product of rice farming, has traditionally been discarded or burned, causing air pollution and environmental degradation. However, recent advancements in sustainable technologies have led to the exploration of paddy straw as a valuable feedstock for producing BioCNG. Paddy straw possesses a distinctive lignocellulosic composition, averaging 30-45% cellulose, 20-25% hemicellulose, and 15-20% lignin, along with various minor organic compounds. Paddy straw is characterized by low nitrogen content and is also rich in inorganic elements such as silica, which

generates ash upon combustion[28]. The elevated silica content can lead to wear on machinery components, such as conveyors and grinders, while also impeding digestibility in livestock.

Moreover, the volatile matter content in Paddy straw exceeds that of wood and is significantly higher than that of coal. Conversely, the fixed carbon content in Paddy straws is considerably lower than that found in coal. The high carbon-to-nitrogen ratio inherent in Paddy straw contributes to its notably low biodegradability in comparison to other agricultural residues[29]. This aspect is particularly relevant when using straw as a substrate for anaerobic digestion aimed at biogas production. To enhance the degradation of organic matter, it is advisable to blend Paddy straw with other agricultural residues such as animal manure to facilitate the anaerobic digestion process.

7.2.3. Cattle Dung

Cattle dung, a by-product of livestock farming, is widely available in rural areas and has long been used as a fuel for cooking and as an organic fertilizer. However, in recent years, cow dung has gained attention as a feedstock for producing BioCNG. The use of cattle dung for BioCNG production offers an innovative solution to manage organic waste while generating clean energy and reducing greenhouse gas emissions. Cattle dung is rich in organic matter and possesses a balanced carbon-to-nitrogen (C/N) ratio, typically ranging from 20:1 to 40:1[30]. Due to its availability and as an inexpensive source of organic material rich in methane-producing bacteria, cow dung is the most common feedstock used in biogas digesters. The presence of volatile solids in cow dung, which can be converted into biogas, makes it a highly effective substrate for biogas production[31]. Anaerobic digestion of Cattle dung leads to the generation of biogas, primarily composed of methane (CH_4) and carbon dioxide (CO_2). On average, about 20-30% of the volatile solids in Cattle dung can be converted into biogas during the digestion process[32]. This process allows the transformation of organic waste into a valuable renewable energy source while reducing greenhouse gas emissions associated with waste decomposition.

7.2.4. Chicken Litter

Chicken litter is a mixture of chicken manure, bedding materials (like straw, sawdust, or rice husks), and other organic materials. It is typically considered waste but can be a valuable resource for the production of BioCNG. Chicken manure is an effective feedstock for digesters, yielding approximately 20 m^3 of biogas from 100 kg of litter[33]. However, its high nitrogen content can hinder microbial digestion in biogas plants. To improve biogas quality, poultry waste is often combined with carbon-rich materials like paddy straw or cattle dung. Poultry dung has a Carbon Nitrogen (C/N) ratio between 6:1 and 25:1, which is not ideal for efficient biogas production compared to cattle manure's optimal ratio of 30:1. By mixing poultry and cattle dung, the overall biogas quality can be enhanced. Notably, 1 kg of chicken manure can produce about 70 litres of biogas, exceeding the yield from the same amount of cattle manure.

7.3. Risks and Opportunities

The procurement of feedstocks for biogas production is a critical component of a biogas plant's success. Feedstocks such as Municipal Solid Waste (MSW), paddy straw, chicken litter, and cattle dung serve as valuable resources for biogas plants, particularly in regions like Prayagraj, where agricultural and waste management practices present both challenges and opportunities. Each feedstock type brings its own set of risks and opportunities, which must be carefully assessed to ensure a consistent and reliable supply chain.

[28] Evaluating the Potential of Rice Straw as a Co-digestion Feedstock for Biogas Production in Bangladesh. (https://www.cosmosscholars.com/images/JACST_V4N1_2017/JACST-V4N1A2-Rahman.pdf)
[29] http://www.knowledgebank.irri.org/step-by-step-production/postharvest/rice-by-products/rice-straw.
[30] https://www.ontario.ca/page/carbonnitrogen-ratios-organic-amendments.
[31] G.A Soliu and C. Onunka 2019 J. Phys.: Conf. Ser. 1378 022093
[32] https://doi.org/10.1016/j.crsust.2021.100026
[33] https://gazpack.nl/en/biogas-from-cow-dung-pig-and-chicken-manure/

7.3.1. MSW

MSW is widely available in all the 100 wards of Prayagraj district. As cities grow, the quantity of solid waste increases, providing a substantial and consistent supply of feedstock for biogas plants. Using MSW for biogas production helps reduce landfill waste, mitigating methane emissions from uncontrolled decomposition. This not only aligns with environmental sustainability goals but also helps in achieving waste management objectives. The conversion of waste into energy supports the circular economy, promoting resource efficiency and reducing the dependence on fossil fuels.

Source segregation is a major issue associated with the procurement of MSW as a feedstock for a Biogas Power Plant. MSW often contains non-biodegradable materials like plastics, metals, and glass, which can hinder the anaerobic digestion process. Effective sorting and pre-treatment technologies are required to minimize contamination which could lead to an increase in capital cost of the project if the waste is not source segregated. Further, waste generation may fluctuate seasonally or due to regional factors (e.g., festivals, local events), creating potential inconsistencies in feedstock supply. Transporting MSW to the biogas plant can be costly, especially when the waste is dispersed across large urban or rural areas.

7.3.2. Paddy Straw

As per the Economic Survey 2023-24, Uttar Pradesh is the second largest state in Rice production and hence the availability of paddy straw as an agricultural residue is significant, especially during the harvest season. Paddy straw often poses a waste disposal challenge for farmers, as it is typically burned, leading to air pollution and the use of paddy straw for biogas production could provide a sustainable solution, helping reduce environmental pollution. The Indian government's focus on promoting biomass and waste-to-energy initiatives provides financial and policy support to projects utilizing paddy straw.

Paddy straw is primarily available after the rice harvest season (October-November), meaning there may be seasonal fluctuations in feedstock availability. In regions with less paddy cultivation, securing adequate supplies year-round could be a challenge. Further, paddy straw requires proper storage to prevent decomposition or contamination before it is used in the biogas plant and if not properly stored, poor storage practices can reduce its effectiveness as a feedstock. The bulkiness and volume of paddy straw make it difficult and costly to transport to the biogas plant.

7.3.3. Chicken Litter

Chicken litter is an excellent feedstock for biogas production due to its high nitrogen content, which promotes microbial activity in the anaerobic digestion process and is particularly suitable for biogas plants with large-scale operations. Using chicken litter as feedstock addresses waste management issues in the poultry sector while generating renewable energy. Chicken litter is typically available at low cost, as it is considered a waste product by poultry farmers. This provides an economical feedstock option, especially when compared to other organic materials.

The availability of chicken litter is closely tied to the scale of poultry farming, which can be affected by market demand, seasonal production cycles, or outbreaks of disease. Maintaining a steady supply for the biogas plant may require securing contracts with poultry farms. Chicken litter can contain harmful pathogens such as bacteria or viruses. Proper handling, storage, and pre-treatment are required to ensure the safety of the feedstock and prevent contamination. Chicken litter has a high moisture content and can develop strong odors if not stored properly. Effective storage systems and odour control measures are necessary to manage these challenges.

7.3.4. Cattle Dung

Cattle dung is a readily available feedstock in rural areas around Prayagraj, as dairy farming is a significant activity in the region. It can be collected directly from farms, ensuring a consistent and reliable supply. Cattle dung is a highly biodegradable material rich in organic matter, making it ideal for anaerobic digestion. It is often used in traditional biogas plants and can be incorporated into modern biogas production systems. Using Cattle dung as a feedstock supports rural farmers by creating a market

for their agricultural waste. It can also enhance local waste management practices, reducing the reliance on firewood and dung cakes.

The quality of cattle dung can vary depending on factors such as diet, storage conditions, and the type of livestock. Consistency in feedstock quality is essential for optimal biogas production. While Cattle dung is widely available, it may not be sufficient to meet the high feedstock demands of a large-scale biogas plant. Securing a steady supply may require collaboration with local farmers or integrating multiple feedstock sources. In rural areas, Cattle dung collection is often done manually, which can be labor-intensive. Mechanized collection systems or partnerships with local cooperatives can help improve efficiency.

7.4. FEASIBILITY OF AVAILABILITY OF FEEDSTOCK

The availability and identification of peak and off-peak periods for feedstocks i.e., MSW, Cattle dung, chicken litter, and paddy straw, is vital for efficient waste management and bioenergy production. Each of these feedstocks exhibits distinct seasonal patterns that are influenced by agricultural practices, livestock management, and climatic conditions. Understanding these patterns is essential for optimizing the utilization of these resources in sustainable energy initiatives. For the operation of the plant, 200 TPD SSO Waste, 90 TPD Paddy Straw, 30 TPD Cattle Dung and 23 TPD Chicken Litter shall be required.

7.4.1. MSW Availability in PMC

. For collection of SSO MSW on a daily basis, PMC has signed a concession agreement with IEISL which is described below.

7.4.1.1. Concession Agreement for MSW Procurement

For procurement of MSW, PMC has signed a concession agreement with IEISL on 22nd November 2022, for DFBOO of 200 TPD capacity (may be expandable in future), Bio-CNG (CBG) Plant based on SSO Fraction of MSW, paddy straw, Cattle dung and chicken litter at Prayagraj under PPP. It is intended to utilize SSO as feedstock along with other available feedstocks and generate 21.5-ton CBG per day. The concession is granted for period of 25 years from the Commercial Operation Date. PMC is obligated to supply Minimum Obligated Quantity 200 TPD, in a yearly progressive manner, from third year onwards, during concession period. Maximum 10% impurities are allowed in Minimum Obligated Quantity at any stage of time. It is allowed to use other biomass as per requirement during the operations.

As per the Concession Agreement, PMC shall mandatorily supply Minimum Obligated Quantity (200 TPD, excluding maximum 10% impurities) of SSO fraction of MSW up to Project Site during the Concession Period on free of cost basis in the next two (2) years as following:

- During 1st year from Commercial Operation Date (COD) – 100 TPD (excluding maximum 10% impurities)
- During 2nd year from COD – 150 TPD (excluding maximum 10% impurities)
- 3rd year onwards from COD – 200 TPD (excluding maximum 10% impurities)

In case PMC is able to supply 200 TPD waste earlier than above stipulated time and intimates the same through a letter, Royalty payment will start from that time. The agreement also allows for the use of other biomass feedstocks, such as agricultural residues, as required for operations.

7.4.1.2. Current Collection Status and Challenges

During a site visit, representatives from INDUS and EverEnviro held a meeting with PMC officials to assess the progress and challenges associated with the Bio-CNG project. PMC officials provided a detailed overview of the district's waste collection and segregation practices. Prayagraj is divided into eight administrative zones, covering 100 municipal wards. However, the collection of SSO waste is currently limited to only 40 wards, primarily due to:

- Insufficient public awareness about the importance of waste segregation at the source.
- Gaps in waste collection and segregation infrastructure.

At present, approximately **40–45 TPD of SSO waste** is being collected and is temporarily supplied to the Reliance CBG plant, located around **15 km from the EverEnviro Bio-CNG plant**. It was informed by PMC officials that, once this **plant** will be operational, the temporary supply will be stopped and entire SSO will be supplied to the EverEnviro's BioCNG plant as per the concession agreement. The current collection volume is far below the concession agreement's stipulated Minimum Obligated Quantity (MOQ) for progressive years, highlighting the need for immediate action to scale up waste segregation and collection efforts.

7.4.1.3. PMC's Action Plan to Increase SSO Collection

PMC is actively working on strategies to enhance the availability of segregated organic waste. These strategies include:

- **Expansion of Source Segregation Practices:** Extending source segregation initiatives to additional wards within the PMC jurisdiction to cover the remaining 60 wards. Engaging more waste management companies to improve door-to-door collection and ensure proper segregation at the source.
- **Strengthening IEC Activities:** Deployment and reinforcement of Information, Education, and Communication (IEC) teams across all wards to educate residents on the importance of source segregation. Organizing workshops, awareness campaigns, and training programs for households and commercial establishments to promote sustainable waste practices.
- **Implementation of Monitoring Mechanisms:** Establishing a robust monitoring framework to ensure adherence to segregation and collection standards. Using real-time data and performance metrics to track the progress of waste collection efforts.

7.4.2. Paddy Straw Availability

Paddy straw is predominantly produced during the rice harvesting season, which varies across different regions in India. The peak availability of paddy straw generally starts with the Kharif season, during which rice is sown between June and July and harvested from October to December. In northern states, particularly Punjab, Haryana, and Uttar Pradesh, substantial straw yield is typically observed around November. Conversely, off-peak periods for paddy straw occur immediately after harvesting and before the next sowing season. These off-peak periods may vary by region but generally extend from January to May in most rice-growing areas.

Uttar Pradesh demonstrates substantial paddy cultivation capacity, making it a viable region for sourcing raw materials for a Bio-CNG plant. According to the Reserve Bank of India, the state's rice yield for 2023–24 stands at 2,772 kg/hectare, contributing to an impressive total rice production of 15,990 thousand tonnes for 2023-24[34]. Furthermore, under the Kharif procurement season for 2024-25, agencies have procured over 7.28 lakh metric tons of paddy[35]. This significant volume of paddy production and procurement demonstrates the consistent availability of agricultural residues, such as paddy straw and husk, which can be effectively used as feedstock for the manufacture of biogas, guaranteeing a steady and sustainable supply for the Bio-CNG plant throughout the State.

In Prayagraj district, paddy cultivation spans 171,824 hectares, yielding approximately 370,562 metric tons of rice. This corresponds to a productivity rate of 21.57 quintals per hectare[36]. Given a grain-to-straw ratio is 1:1.5[37], around 32.355 quintals of paddy straw are available per hectare, amounting to a total of approximately 555,843 metric tons annually.

[34] https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/85T_0912202456F10A414AD341DF89A78FDD8D5E33C4.PDF https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/63T_09122024E8AD40A0D45D40858679DA42E92B7482.PDF

[35] https://economictimes.indiatimes.com/news/economy/agriculture/up-achieves-record-paddy-procurement-under-kharif-season-2024-25/articleshow/115704522.cms?from=mdr

[36] https://allahabad.kvk4.in/district-profile.php.

[37] Binod P, Sindhu R, Singhania RR, Vikram S, Devi L, Nagalakshmi S et al. Bioethanol production from rice straw: An overview. Bioresource Technology 2010; 101: 4767- 4774.

For the efficient operation of the BioCNG plant, a steady supply of 90 tons per day (TPD) of paddy straw is essential. Assuming continuous operation throughout the year (365 days), the total annual requirement amounts to approximately 32,850 metric tons. This represents roughly 6% of the total paddy straw available in the Prayagraj district, indicating that the region has sufficient resources to meet the plant's needs without significantly impacting the overall availability of paddy straw. This level of availability highlights the feasibility of securing the required feedstock locally, ensuring a consistent supply for uninterrupted plant operations.

To ensure a steady feedstock supply, EverEnviro has deployed a procurement team at the site. The team is actively engaging with paddy straw suppliers to formalize Memorandums of Understanding (MoUs) that will guarantee a year-round supply at nominal rates. Discussions with potential suppliers have revealed the need for initial capital investment to procure balers and develop adequate storage facilities for the seasonal storage of paddy straw to ensure uninterrupted supply throughout the year. Several suppliers have expressed interest in signing MoUs with EverEnviro. This partnership would enable them to make the necessary investments on machinery and storage infrastructure and procure paddy straw directly from farmers in the upcoming season, ensuring a reliable supply chain for the plant. While no formal agreements have been finalized, the suppliers are expecting a rate of approximately ₹3,000 per metric ton to supply paddy straw. The approximate price is inclusive of costs for collection from fields, safe storage, transportation and unloading at plant.

7.4.3. Cattle Dung Availability

Cattle dung is produced continuously throughout the year; however, its availability varies seasonally due to the milk production cycle of milch animals. Peak availability typically occurs during the winter months, from October to March, when milk production is maximized. During this period, dairy farmers generally maintain a larger herd size to meet the heightened demand for milk, which results in increased dung production. Conversely, the off-peak months usually align with the monsoon season, from June to September. During this interval, many cattles are not milked as frequently due to reduced milk yields, the dry season for milking cattle, and feed shortages that arise from excessive rainfall.

In Uttar Pradesh, there are 1,90,19,641 cattle comprising in 70 districts. Proper utilization of Cattle dung and Cattle urine into manure, pesticides, medicines and other daily products can generate employment for millions of people and help protect the soils from use of agro-chemicals.

The Prayagraj district is home to a variety of livestock, including cattle (both dairy and draught), buffalo, goats, sheep, and poultry. Dairy farming is particularly significant, with many households relying on milk production as a primary source of income. As per the District cattle population 2019 census data, in Prayagraj district, the overall population of cattle was 560456 and out of this, 377715 were Indigenous breeds, and 182741 were Exotic breeds of cows[38]. Further, in the district, 10 Gaushalas are registered under the Regional Gaushala Registration System from Allahabad (Prayagraj)[39]. To calculate the amount of cow dung generated in the district, it is noted that indigenous cows produce on average 10 kg of dung per day[40].

During the site visit, consultations were held with cattle dung suppliers as well as from nearby farms within 10 km radius, from where the Cattle dung will be source. INDUS team along with EverEnviro's team and potential suppliers, visited a number dairy farms in villages located in the study area. As informed, currently, few farm owners supply Cattle dung to another CBG Plant operated by Reliance Industries. However, they all have surplus quantity of Cattle dung and are ready to supply Cattle dung as soon as the company's plant becomes operational. The Cattle dung will be transported via tractors, with each trip costing around 2,500-3000 rupees and carrying ~3 tons per trolley. It was also informed that suppliers are in touch with many other dairy owners in the vicinity in order to ensure uninterrupted supply of required quantity of Cattle dung to the BioCNG Plant.

[38] https://www.animalhusb.upsdc.gov.in/sites/default/files/Animal%20Census%20Files/District-wise%20cattle2019.pdf.
[39] http://ahgoshalareg.up.gov.in/eDist/RegistredGoshalList.aspx
[40] Bio-energy Potential from Agricultural Crop Residue & Animal Husbandry Waste in Uttar Pradesh: https://www.upneda.in/bio/wp-content/uploads/2023/03/Book_Bio-energy%20Potential_220323.pdf.

7.4.4. Chicken Litter Availability

Chicken litter, which comprises bedding material and manure, is produced consistently throughout the year, particularly in intensive poultry farming operations. The availability experiences a peak during periods of high egg production, typically occurring in the winter months. This peak generation of chicken litter generally spans from October to March. Conversely, off-peak periods may arise during the warmer summer months, as some poultry farms reduce their flock sizes to mitigate heat stress, usually from April to June. The quantity of litter or manure can vary greatly from farm-to-farm. Estimates of the amount of layer manure produced per animal unit per year depend on the moisture content and the litter depth at the time the house is cleaned out. The numbers of flocks that are grown on the litter also affect the total quantity that must be handled.

According to the data published on the Uttar Pradesh Poultry Development Portal, the following table shows the number of layer poultry birds district-wise in the State of Uttar Pradesh (under Private and Poultry Development Policy-2023).

The total number of layer poultry birds in the district Prayagraj (under Private and Poultry Development Policy-2023) is 176000[41]. For estimating chicken litter in the district, it was noted that around 0.18 kg of litter is generated per day per head of a poultry bird, and the amount of chicken litter generated per day could be approximately 31.68 mt/day as per the available poultry data of the district. Additionally, there are more than 150000-layer poultry birds in each nearby districts namely Bhadohi, Kaushambi, Mirzapur, indicating that the region has sufficient poultry resources to meet the plant's needs for chicken litter. This level of availability highlights the feasibility of securing the required feedstock from the region, ensuring a consistent supply for uninterrupted plant operations. However, transportation from other districts may pose a risk of increased cost.

Discussions with suppliers have revealed the presence of various small- and medium-sized poultry farms in Prayagraj and nearby districts. These farms can serve as sources for procuring chicken litter, and suppliers have expressed their readiness to supply the required quantities. However, it is important to note that an adequate supply of chicken litter is not readily available in close proximity to the plant. This poses a significant challenge in terms of transportation costs. To meet the demand for the required quantity of chicken litter, sourcing from farms located over 50 kilometers away will be necessary. Currently, suppliers are quoting prices in the range of approximately ₹1,500 to ₹1,800 per metric ton for the supply of chicken litter.

During the site visit it was noted, there are two big poultry farms located near the project site at a distance of around ~60 km. One is located in Shankargarh, Bara Tehsil and the other one is located in Chakghat. Currently, chicken litter is being supplied to Reliance CBG Plant on demand basis by one of the potential suppliers. Approx. 15 Ton chicken litter is supplied to Reliance CBG plant a day on demand. Chicken litter is supplied through vehicles with maximum 7-8 tonnes of chicken litter in a single vehicle. Approx. 20 TPD of chicken litter, he can supply in a single day. However, 2 months prior intimation is required for arranging manpower, transportation etc.

7.5. TRANSPORTATION RISK ASSOCIATED WITH PROCUREMENT OF FEEDSTOCK

Transportation plays a crucial role in the feedstock supply chain for biogas generation plants based on the multiple feedstocks such as MSW, Paddy straw, Cattle dung and Chicken Litter, ensuring the timely delivery of raw materials. However, movement of feedstocks like MSW, paddy straw, chicken litter, and Cattle dung to a biogas plant presents several transportation-related risks. These risks can impact the cost, efficiency, and reliability of the biogas production process. The following section covers the transportation risk associated with different type of feedstock.

[41] https://www.poultrynivesh.in/total-progress.aspx

7.5.1. Municipal Solid Waste (MSW)

MSW typically comprises a mix of biodegradable and non-biodegradable materials. During transportation, the feedstock can become further contaminated, negatively affecting the biogas production process. Improper segregation of MSW may introduce foreign materials such as plastics, metals, and glass, which can damage the equipment at biogas BioCNG plants and reduce the efficiency of anaerobic digestion. Currently, MSW collection is being carried out in 40 of the 100 wards, with some challenges like delays in waste collection, irregular schedules, and unpredictable waste generation patterns, including seasonal variations. These factors can lead to inconsistent feedstock availability. EverEnviro's BioCNG plant, located in Zone 5 in Arail, Naini, faces additional logistical challenges due to the dispersed nature of MSW collection points in urban and peri-urban areas of Prayagraj. This distribution increases transportation distances, and when combined with high transportation costs in areas with inefficient waste management systems, it can impact the overall feasibility of using MSW as feedstock.

Several other risks are associated with the transportation of MSW:

- Leakage and Spillage: Poorly loaded or unsecured MSW can lead to spillage during transit, resulting in road hazards, littering, and loss of material.
- Odour and Aesthetic Concerns: Open transportation of MSW can generate unpleasant odours and compromise cleanliness, leading to community complaints and reduced public support.
- Vehicle Wear and Tear: Frequent transportation of MSW over long distances can lead to higher wear and tear on vehicles, increasing maintenance costs and downtime.
- Traffic and Road Infrastructure Issues: Transportation through congested urban areas or poorly maintained roads can cause delays and increase operational costs.
- Environmental and Health Risks: Leakage of leachate during transit can contaminate soil and water resources, while exposure to improperly managed waste can pose health risks to workers and nearby communities.

To mitigate these risks, the following measures are recommended:

- **Use of Covered Vehicles**: Employ vehicles with proper covers or sealed containers to prevent spillage, control odour, and protect waste from external contamination during transit.
- **Route Optimization**: Plan efficient transportation routes to minimize distances, reduce fuel consumption, and avoid congested areas.
- **Regular Maintenance**: Ensure timely maintenance of transportation vehicles to reduce downtime and enhance operational efficiency.
- **Leachate Management**: Equip vehicles with leachate collection systems to prevent leaks and manage waste effectively.
- **Public Awareness**: Conduct community outreach to address concerns and promote understanding of the importance of proper MSW transportation for biogas production.

While the responsibility for supplying and transporting the SSO fraction of MSW lies with the PMC, implementing these measures will help mitigate risks, streamline operations, and enhance the overall efficiency of feedstock supply to the BioCNG plant.

7.5.2. Paddy Straw

Currently, no agreements have been established with paddy straw suppliers for the BioCNG plant. As paddy straw is available only during specific times of the year, its demand significantly increases during those periods, placing strain on local transportation resources. This heightened demand can lead to delays or challenges in securing sufficient quantities, potentially causing shortages during peak periods.

The transportation of paddy straw is also subject to several other challenges. The bulky and lightweight nature of paddy straw results in low payload efficiency, requiring more trips and increasing transportation costs. Poorly loaded or unsecured paddy straw can lead to spillage during transit, resulting in material loss and potential road hazards. Furthermore, limited availability of specialized vehicles suitable for transporting large volumes of paddy straw can exacerbate logistical challenges.

Adverse weather conditions, such as rain, high winds, or extreme heat, can further complicate transportation. If the paddy straw is not adequately covered, it may become wet, moldy, or otherwise damaged, reducing its effectiveness for biogas production and necessitating additional drying or treatment.

To mitigate these risks, it is recommended to:

- Develop adequate storage facilities at or near the plant to ensure a consistent supply throughout the year.
- Establish long-term agreements with suppliers who have sufficient storage capacity and reliable transportation infrastructure.
- Implement better logistics planning, including the use of covered and specialized vehicles to minimize spillage, protect the straw from weather, and improve payload efficiency.
- Explore opportunities for decentralized storage units near collection points to reduce transportation distances and costs.

7.5.3. Chicken Litter

The availability of chicken litter is directly linked to the scale and consistency of poultry farming in the region. Fluctuations in poultry production, seasonal variations, or disease outbreaks can significantly reduce feedstock availability and disrupt transportation schedules.

Transportation of chicken litter poses several challenges:

- **High Moisture Content**: Chicken litter has a high moisture content, making it heavier and more difficult to transport. This increases transportation costs and reduces the efficiency of payloads.
- **Odour and Environmental Concerns**: The moisture in chicken litter can amplify odours during transit, potentially causing environmental issues and complaints from nearby communities.
- **Spillage and Leakage Risks**: Improperly secured or uncovered loads may result in spillage or leakage of liquid from the litter, which can contaminate roadways and surrounding areas, creating additional environmental hazards.
- **Biosecurity Risks**: Transporting chicken litter from poultry farms may spread pathogens, including bacteria or viruses, if not handled properly. This risk is especially critical during disease outbreaks in poultry farms.
- **Decomposition During Transit**: High moisture content and organic matter in chicken litter can lead to partial decomposition during transportation, generating heat and potentially causing a fire hazard if not adequately ventilated.
- **Seasonal and Weather Challenges**: Due to the significant distance of poultry farms from the site, transporting chicken litter during the rainy season can pose significant challenges. Poorly maintained or muddy roads increase the risk of delays, while the moisture in the feedstock could affect its quality and consistency. These factors may disrupt the timely delivery and processing of feedstock.
- **Health and Safety Concerns**: Workers handling chicken litter during loading or unloading may be exposed to harmful gases such as ammonia, posing health risks without proper protective equipment.

Recommendations to Mitigate Risks:

- **Use of Covered Vehicles**: Employ covered or sealed vehicles to contain odours, prevent spillage, and protect chicken litter from weather conditions.
- **Moisture Control Measures**: Consider pre-processing methods like partial drying or mixing with absorbent materials to reduce moisture content before transportation.
- **Biosecurity Protocols**: Implement strict biosecurity measures, such as disinfection of vehicles and equipment after each trip, to minimize the risk of disease transmission.
- **Route and Schedule Optimization**: Plan transportation routes and schedules to minimize delays and ensure timely delivery, especially during peak demand periods.
- **Community Engagement**: Engage with local communities to address concerns related to odours and environmental impact, emphasizing measures being taken to mitigate these issues.

- **Proper Handling Practices**: Train workers in safe handling practices and provide them with appropriate protective gear to reduce exposure to harmful gases.
- **Emergency Preparedness**: Develop contingency plans for disruptions caused by disease outbreaks or seasonal variations, such as identifying alternative suppliers or temporary storage solutions.

7.5.4. Cattle Dung

The transportation of Cattle dung, while essential for biogas production, presents several challenges that can impact its quality, logistics, and overall efficiency. Ensuring the consistent and timely delivery of Cattle dung is critical, as delays, improper handling, or unfavorable conditions during transit can compromise its effectiveness as a feedstock. Additionally, factors such as odour, contamination, and health risks must be carefully managed to ensure sustainable and community-friendly operations. Below are the key challenges and risks associated with the transportation of Cattle dung.

Key Challenges and Risks in the Transportation of Cattle Dung:

- **Quality Degradation**: If Cattle dung is not transported promptly or is stored improperly during transit, it can degrade due to microbial activity. This degradation can lead to the loss of volatile solids essential for biogas production. Prolonged storage before transportation may result in excessive moisture accumulation, contamination, or nutrient loss, reducing its effectiveness as a feedstock.
- **Odour and Environmental Concerns**: Decomposing Cattle dung emits unpleasant odours, which can lead to environmental concerns and complaints from nearby communities during transportation. Leachate from improperly managed Cattle dung can contaminate roads, soil, or water bodies, creating environmental hazards.
- **Handling and Labor Intensity**: Handling and sorting Cattle dung during loading and unloading can be time-consuming and labor-intensive, increasing operational costs. Poor handling practices may also lead to spillage, resulting in material loss.
- **Contamination Issues**: Wet Cattle dung can lead to leakage during transit, causing hygiene concerns and road safety risks. Contamination with foreign materials like soil/sand, stones, or plastic during collection or transportation can substantially increases pre-treatment cost, and/or damage biogas plant equipment or reduce digestion efficiency.
- **Weather and Storage Challenges**: Adverse weather conditions, such as rain or extreme heat, can impact the quality of Cattle dung during transit if it is not adequately covered. During rainy seasons, transporting Cattle dung on poorly maintained or muddy roads may lead to delays and increased wear and tear on vehicles.
- **Health and Safety Risks**: Workers handling Cattle dung may be exposed to harmful pathogens or gases like ammonia and methane, posing health risks without proper protective equipment. Poor hygiene during transportation may attract pests, increasing health hazards.

Recommendations to Mitigate Risks:

- **Timely Transportation and Storage**: Ensure Cattle dung is transported promptly after collection to prevent degradation. Establish interim storage facilities to maintain quality during delays.
- **Use of Covered Vehicles**: Transport Cattle dung in covered or sealed vehicles to contain odours, prevent leachate leakage, and protect it from weather conditions.
- **Quality Control Protocols**: Implement quality checks at the source to ensure only uncontaminated and high-quality Cattle dung is collected for transportation.
- **Optimized Logistics**: Plan transportation routes to reduce travel time and fuel costs. Use specialized equipment or containers to streamline loading, unloading, and handling processes.
- **Community Engagement**: Engage with communities along transportation routes to address odour and hygiene concerns, emphasizing measures taken to mitigate these issues.
- **Health and Safety Measures**: Provide workers with appropriate protective gear and training to minimize exposure to harmful pathogens and gases during handling and transport.

Some photographs of consultations held with potential feedstock suppliers are presented in below figure.

Figure 38: Consultations with feedstock suppliers

8. EVALUATION OF IMPACTS

This chapter describes the environmental and social impacts identified by accessing the primary and secondary information gathered. Impacts have been identified based on review of available project information, discussions with representatives of the project and the local community, as well as sector-specific professionals and subject experts. Impacts anticipated during the operation phase have also been included and classified.

Additionally, this chapter evaluates the significance of each identified impact based on the collective severity of its spread, duration, intensity, and nature. Mitigation measures have been suggested for each identified impact evaluated as significant.

8.1. IMPACT ASSESSMENT CRITERIA

Identified impacts have been appraised along the criteria of spread, duration, intensity and nature. As presented in ***Table 36***, each appraisal criterion is further classified based on the level or type impact while stating the defining limit of each level or type.

Table 36: Impact Assessment Criteria

Criteria	Sub-Classification	Defining limits	Remarks
Range: (Refers to area of direct influence from the impact of a particular project activity)	Low Range	Impact is restricted within the foot prints of the Project boundary	Except for ecology (Which is defined as limited loss of vegetation only at site)
	Medium Range	Impact is spread up to 2 km around the project boundary	Except for ecology (which is defined as loss of vegetation at site including large trees with limited disturbance to adjoining flora and fauna)
	High Range	Impact is spread beyond 2 km from project boundary	Except for ecology (which is defined as loss of vegetation at site and/or damage to adjoining flora and fauna)
Duration: (Based on duration of impact and the time taken by an Environmental component to recover back to original state)	Short Duration	When impact is likely to be restricted for duration of less than 2 years	The anticipated recovery of the affected environmental component is within 2 years
	Medium Duration	When impact extends beyond 2 years and up to 5 years	The anticipated recovery of the affected environmental component is within 5 years
	Long Duration	When impact extends beyond 5 years	The anticipated recovery of impacted component is more than 5 years.
Intensity: (Defines the magnitude of Impact)	Insignificant	When the changes in the environmental baseline conditions is up to 10%	However, it shall be reconsidered where the baseline values are already high.
	Low Intensity	When the changes in the baseline conditions is up to 20%	For ecology it refers to minimal changes in the existing ecology in terms of their reproductive capacity, survival or habitat change
	Medium Intensity	When the changes in the baseline conditions is up to 30%	For ecology, it refers to changes that are expected to be recoverable

Criteria	Sub-Classification	Defining limits	Remarks
	High Intensity	When change resulting in the baseline conditions is beyond 30%	While for ecology, high intensity refers to changes that result in serious destruction to species, productivity or critical habitat.
Impact Type: A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect)	Direct	Impacts that result from a direct interaction between the Project and a resource/ receptor	-
	Indirect	Impacts that follow on from the indirect interactions between the Project and its environment as a result of subsequent interactions within the environment	-
	Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project.	-
Impact Nature: (refers to whether the effect is considered beneficial or adverse)	Positive	Useful to Environment and Community	-
	Negative	Harmful to Environment and Community	-
	Neutral	No change to Environment and Community	-

Table 37 below presents the Impact Significance Matrix applied in order to assess the overall significance of the impacts appraised as per the Impact Assessment Criteria outlined in *Table 36*.

Table 37: Impact Evaluation Matrix

Range	Duration	Intensity	Nature	Type	Receptor Sensitivity	Overall Significance	
						Adverse	Beneficial
Low	Short	Low/ Insignificant	Negative/ Positive	Direct/ Indirect	Low/Medium	**Extremely Low**	**Extremely Low**
Low	Short	Medium	Negative	Direct/ Indirect	Low/Medium	**Low**	**Low**
Low	Medium/ Long	Low	Negative	Direct/ Indirect	Medium		
Low	Medium	Medium	Negative	Direct/ Indirect	Medium		
Medium	Short	Low/ Medium	Negative/ Positive	Direct/ Indirect	Medium/High		
Low	Short	Low	Negative/ Positive	Direct	Low/Medium		
Low	Short	High	Negative	Direct	Medium/High	**Medium**	**Medium**
Low	Medium	High	Negative	Direct	Medium		
Low	Long	Medium	Negative	Direct	Medium/Low		
Medium	Short	Medium	Negative	Direct/ Indirect	Medium/High		
Medium	Medium	Low	Negative	Direct	Medium		
Medium	Medium	Medium	Negative	Direct	Medium		

Range	Duration	Intensity	Nature	Type	Receptor Sensitivity	Overall Significance	
						Adverse	Beneficial
Medium	Long	Low	Negative	Direct	Medium		
Medium	Long	Medium	Negative	Direct	Medium		
High	Short	Low	Negative	Direct	Medium		
High	Short	Medium	Negative	Direct	Medium		
High	Medium	Low	Negative	Direct	Medium		
High	Medium	Medium	Negative	Direct	Medium		
High	Long	Low	Negative	Direct	Medium		
Low	Long	High	Negative	Direct	High	**High**	**High**
Medium	Short	High	Negative	Direct	High		
Medium	Long	High	Negative	Direct	High		
High	Short	High	Negative	Direct	High		
High	Medium	High	Negative	Direct	High		
High	Long	Medium	Negative	Direct	High		
High	Low	Low	Negative	Direct	High		
High	Low	High	Negative	Direct	High		

The context of overall impact significance is given in ***Table 38*****.**

Table 38: Overall Impact Significance

Extremely Low significance	An impact of **Extremely Low** significance is one where a resource/ receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Low significance	An impact of **Low** significance is one where a resource/ receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards/ guidelines.
Medium significance	An impact of **Medium** significance has an impact magnitude that is within applicable standards/guidelines, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of medium significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
High significance	An impact of **High** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of impact assessment is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

8.2. IMPACT IDENTIFICATION MATRIX

Table 39 below presents the Activity-Impact Interaction matrix for pre-construction, construction, operation and decommissioning phases of the project, based on environmental and occupational health and safety variables. Each of the impacts identified has been further discussed and corresponding mitigation measures have been proposed.

Table 39: Activity- Impact Interaction Matrix

E&S Resources and Receptors Project Activity/ Hazard	Land Use and Topography	Soil Environment	Visual Impact	Traffic and Transport	Water resources	Air Quality	Noise Quality	Ecology & biodiversity	Loss of land-based livelihood	Employment opportunities	Infrastructure and services	Occupational health and Safety	Community health and Safety
PRE-CONSTRUCTION PHASE													
Land Procurement	✓								✓				
CONSTRUCTION PHASE													
Site Clearance, Site Levelling and Grading	✓	✓	✓			✓	✓	✓		✓		✓	
Sourcing and Transportation of Construction Materials and equipment		✓		✓		✓	✓	✓		✓		✓	✓
Storage and Handling of Raw Materials and Debris				✓		✓	✓	✓		✓		✓	✓
Civil Works (site preparation, RCC foundations, access road construction etc.)	✓	✓	✓			✓	✓	✓		✓		✓	
Operation of DG sets		✓		✓		✓	✓	✓		✓			✓
Constructing tanks, laying of Pipelines connecting digester and purifier etc.		✓								✓		✓	
Handling and Disposal of Wastes		✓	✓			✓		✓		✓		✓	✓
OPERATION PHASE													
Bio-CNG plant operations				✓	✓					✓		✓	
Maintenance of ancillary facilities such as store, yard, site office												✓	
Site Maintenance and Security										✓		✓	
Handling and Disposal of Waste		✓		✓		✓						✓	
Material Handling and Storage												✓	
Water Requirements for employees					✓							✓	
Repair and Maintenance of unit							✓			✓		✓	
Inspection and maintenance of pipelines		✓								✓		✓	
DECOMMISSIONING PHASE													
Removal of all the tanks, conveyor belts and plant units	✓	✓		✓	✓	✓	✓	✓		✓		✓	
Removal of foundations		✓		✓		✓	✓	✓		✓		✓	
Site restoration	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓
Waste Management		✓	✓	✓	✓	✓	✓	✓		✓		✓	✓
Material Handling and Storage				✓	✓							✓	

8.3. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

8.3.1. Impacts during the Pre-construction and Construction Phase

During the construction phase, the following activities may have impacts on environment:

- Site Preparation;
- Evacuation and levelling;
- Hauling of earth materials and wastes;
- Cutting and filling;
- Erection of concrete and steel structures;
- Painting and finishing;
- Clean-up operations; and
- Landscaping

8.3.1.1. Ambient Air Quality

Anticipated Impacts: The impact on ambient air quality is anticipated due to the various Project activities. Project components such as site preparation, biogas plant units' installation, pipeline laying, internal road network, transportation of raw materials and porta cabins, along with land clearing, levelling, excavation, grading activities, vehicle movement and Diesel Generator (DG) sets operation. The main impacts associated with construction activities will be:

- **Dust Generation:** resulting from earthworks such as levelling, grading, excavation works, piling and movement of vehicles across dirt/unpaved roads, especially during windy conditions.
- **Exhaust Emissions:** Exhaust emissions of SO_2, NO_X, CO and PM_{10} will be attributed predominantly to the construction of the plant, road activities such as movement of trucks and vehicles during construction works and point source emissions from the batching plant to be installed during construction phase. These emissions will be restricted to the project area and are anticipated to be generated in medium concentration. However, it will be dispersed rapidly within the area leading to an impact of low significance. This implies the effects to be of localized nature and temporary which indicates that any deterioration in air quality at project location is unlikely to be significant and is expected to be transient.

Mitigation Measures

- The EverEnviro and contractors shall ensure the reduction and control of air emissions from construction activities by minimizing dust from material handling sources.
- Loading and unloading of raw materials should be carried out in the most optimum way to avoid fugitive emissions. Dust protectors like sheets can be used to cover the area of dust generator.
- Sprinkling of water as and when required to be carried out by the respective contractors to suppress dust from construction activities, but it shall only be done on waste free areas so that leachate formation can be omitted.
- Best practices such as halting of activity during sustained strong winds should be opted for. It shall be ensured that all stockpiles are covered, and waste storage areas if any are provided with enclosures to minimize dust from open area source.
- Stock piling and storage of construction material will be oriented after considering the predominant wind direction.
- Vehicles engaged for the project will be required to obtain "Pollution under Control" (PUC) certificates.
- Sufficient stack height needs to be provided to D.G. sets (if used during construction) as per the Central Pollution Control Board (CPCB) norms.
- Speed of vehicles on the village road and on the internal roads (unpaved) shall be limited to 10-15 km/hr in order to reduce fugitive dust emissions.
- Allow only covered transportation of material.
- Cease or phase down work if excess fugitive dust is observed, or there is any community grievance related to dust. Investigate the source of dust and ensure proper dust suppression.

Significance of Impact

Table 40: Impact Significance – Ambient Air Quality

Aspect: Air Quality	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Low	Short	High	Direct	Medium
With Mitigation	Negative	Low	Short	Medium	Direct	Low

8.3.1.2. Soil Quality

Anticipated Impacts

The project site was an agricultural land and hence have native soil. Few areas, mainly project surroundings area like road will be developed where there is chance of generation of loose topsoil. The intensity of the impact can be considered as low. Soil contamination may result due to accidental spillage and inappropriate storage of diesel or transformer oil, etc.

Mitigation Measures

Following mitigation measures are recommended to reduce impact on soil due to project activities.

- Provide appropriate storage of topsoil, if generated, in an isolated and covered area to prevent its loss during high wind and runoff.
- Allow only covered transportation of material.
- Construction debris to be reused in paving on site approach road to prevent dust generation due to vehicular movement.
- Re-vegetation to be done in the area after the completion of construction, in order to reduce the risk of soil erosion.
- Any excess soil will be disposed as per the C&D Waste management Rules, 2016 after obtaining the permission from the authorities.

Significance of Impact

Table 41: Impact Significance – Soil Quality

Aspect: Soil Quality	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Low	Short	Medium	Direct	Low
With Mitigation	Negative	Low	Short	Low	Direct	Low

8.3.1.3. Impact on Surface and Ground Water Quality & Quantity

Anticipated Impacts

Surface Water:

The Yamuna River is located to the North of the project site, running parallel to the Arail Road at a distance of ~250 m. The site is at a lower elevation compared to Arail Road, and its general slope directs water towards the north. As a result, during heavy rainfall, the plant may face an increased risk of waterlogging and flooding.

Any spillage of chemicals or disposal of waste in or near from project site can cause water pollution issues in nearby areas. Especially during raining reason, the runoff water will flow towards the North and reach the River located beyond the Arail Road.

Ground Water:

As per the Concession Agreement, the responsibility for supply of water at the project site falls under PMC, therefore PMC has sought provision from Jalkal Vibhag for 100KLD water supply at the Project Site through a Letter dated 31st May 2024. As informed during the site visit, Prayagraj Jalkal Vibhag has installed a borewell for supply of water during construction phase, inside the premises. During construction phase, adequate number of portable toilets has been provided by PMC for workers and employees at site and a septic tank with soak pit will be provided for disposal of domestic wastewater generated. Improper disposal of sewage and wastewater from worksite can contaminate the groundwater resources in the area. It is also suggested that the quality of water from the bore wells is monitored regularly to check for contamination, if any.

Mitigation Measures

Construction of dedicated storm water drains for reduction any contamination to runoff due to project activities.

- Storm water drains shall be designed considering natural topography and as per required regulations. No material storage, septic tanks, waste storage, labour resting areas, etc. will be located close to these drains and workers will be trained on not using this drain or disposal of any waste in it.
- Proper drainage to be provided for wastewater generated and shall be treated on Site septic tanks and soak pits as per the specifications in IS 2470:1995 (Part I and Part II);
- Proper stormwater drainage system shall be provided to ensure efficient water flow and prevent any adverse impacts from water logging and flooding.
- Periodic monitoring shall be carried out to ensure that the wastewater is not finding its way into surface and ground water;
- All solid wastes such as construction debris, used or waste oil, paint cans, etc. will be stored on impervious surface in secure location to avoid soil and groundwater contamination;
- Paved impervious surface and secondary containment to be used for fuel and chemical storage tanks;
- Loading and unloading protocols should be prepared and followed for diesel oil and used oil;
- Leak proof holding tanks for sanitary wastewater to protect the ground water level; and
- Install an effective leachate barrier system that isolates Project-related leachates from the soil and groundwater around the Project Site.

Significance of Impact

Table 42: Impact Significance – Impact on Surface and Ground Water Quality

Aspect: Water Quality	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Short	Medium	Direct	Medium
With Mitigation	Negative	Medium	Short	Low	Direct	Low

8.3.1.4. Impact on Water Availability

Anticipated Impacts

In the construction phase, water will be required for civil work during the preparation of concrete, construction of the foundation and building structure of all facilities, as well as for worker needs water for their daily use. The Project's water use has the potential to result in decreased water available for other users, particularly in the Project area where known water resource challenges.

The primary source of water in the nearby area is provided by the PMC and additionally as per the Concession Agreement, the responsibility for supply of water at the project site falls under PMC. PMC has sought provision from Jalkal Vibhag for 100KLD water supply at the Project Site. As informed during the site visit, Prayagraj Jalkal Vibhag has installed a borewell for supply of water during construction phase, inside the premises to meet the domestic water requirement of workers & labourers.

As per National Aquifer Mapping And Management Plan (NAQUIM) of Prayagraj District, Uttar Pradesh, 2018-19, Project site falls under Chaka Block which is categorised as critical and Prayagraj City is in Over-Exploited Category for ground water withdrawal where in storage ground water resources is depleting very fast.

Mitigation Measures

Water for construction activities, flushing and gardening purposes shall be met through water supplied from treated STP water. The other mitigation measures to be implemented are:

- Conservation of water to be undertaken at all project locations and ancillary facilities and if possible, recycling and reuse of water to be taken utilising every opportunity.
- Restoration plan to accommodate the loss of groundwater to be undertaken, if used.

Significance of Impact

Table 43: Impact Significance – Impact on Water Availability

Aspect: Water Availability	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Short	High	Direct	High
With Mitigation	Negative	Low	Short	Medium	Direct	Low

8.3.1.5. Ambient Noise Quality

Anticipated Impacts

Construction will cause increased noise levels due to activities such as grading, excavating and drilling for foundations, concrete batching, construction of ancillary structures, and operation of diesel generators, material movement and site clean-up, and construction equipment like dozer, scrapers, concrete mixers, generators, pump, rock drills, etc. There is potential for disturbance to habitations in proximity of construction site. Movement of traffic during night hours can also disturb the local community. Approximately 85 – 90 dB (A) of noise is expected to be generated from construction activities which will attenuate to less than 45 dB(A) i.e., night time prescribed noise level at about 80 m. The nearest habitations from the proposed Project site is approximately 200 m away.

Additionally, the ambient noise level of all the locations except the project site were noted to be in the permissible standards of noise levels prescribed by with National Ambient Air Quality Standards (NAAQS) in respect of noise limits for day and night-time.

Mitigation Measures

- In case of complaints of uncomforting noise received from the inhabitants of nearby settlements there should be considered possibility of putting noise barriers near to the receptor.
- Mobile noise sources such as cranes, earth moving equipment and heavy goods vehicles (HGVs) shall be routed in such a way that there is minimum disturbance to receptors.
- Contractor shall instruct their safety officers to arrange for inherently quiet construction equipment and machines to maintain the noise level to minimum.
- Only construction activities with low noise shall be carried out during night-time (i.e., no use of machinery).
- The hours of operation for specified pieces of equipment or operations, especially mobile sources operating through community areas should be limited.
- It is also to be ensured that no village road will be utilized for movement of equipment during the night-time. All loud and sudden noises will be avoided wherever possible and fixed noise sources shall be located at least 50 m away from the site boundary.
- Rubber padding/noise isolators will be used for construction equipment or machinery.
- Temporary noise barriers shall be provided surrounding the high noise generating construction equipment.
- The personnel involved in high noise generating activities shall be provided with personal protective devices to minimize their exposure to high noise levels.
- Construction vehicles and machinery will be well maintained and not kept idling when not in use.
- Periodic monitoring of noise level should be conducted and compared with the ambient noise standard. It should also be made sure that the levels do not exceed the NAAQS level.

Significance of Impact

Table 44: Impact Significance – Ambient Noise Quality

Aspect: Noise Quality	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Short	Medium	Direct	Medium
With Mitigation	Negative	Low	Short	Low	Direct	Low

8.3.1.6. Solid and Hazardous Waste Management

Anticipated Impacts

The construction activities such as site clearance, excavation works, and construction of various units' installation of modules will generate different types of solid and hazardous wastes. The construction demobilization which will entail removal of machinery, and other temporary structures will also result in generation of waste. The following types of wastes will be generated due to construction of the project:

- Domestic solid waste and sewage due to workers;
- Used oil, oil lined containers, oil-soaked rags from generator and other construction machinery;
- Packaging waste such as gunny bags, plastics, etc.;
- Empty paint containers, metal scrap, chemical lined containers etc.; and
- Construction debris.

The construction debris generated due to the construction activities will have the potential for spread to areas outside the project boundary or getting mixed with the outside waste during construction phase. The dust particles from debris generated during construction activities can be carried along with the wind into nearby areas, thereby increasing the particulate matter in the area. However, this will happen only for a temporary period as the construction activities will be for small duration only. Improper disposal of solid waste from the labour camps and lack of proper sanitation facility for labour can lead to unhygienic conditions due to open defecation and spread of diseases in the area. It can also lead to discontent of local community and result in conflicts with the labour engaged at site.

Improper disposal of packaging materials, boxes, plastics, ropes etc. can lead to littering in the construction site and surrounding areas. Hazardous wastes such as used oil from DG sets, lubricants, hydraulic oil etc. can cause contamination of soil and water bodies if adequate precautions for storage, management and handling are not undertaken. Spillage of chemicals such as paints (if any), curing chemicals can lead to contamination of soil.

Mitigation Measures

- The quantity of domestic waste generated daily from the labours will be small and limited as most of the workers will be hired locally.
- Arrangements for collection of garbage in dustbins and daily disposal to the nearest dumpsite shall be made.
- Provision of segregated toilets for male and female workers (if any) in the ratio of 1:15 and 1:10 (toilet to workers) respectively shall be made at the project site in order to maintain hygienic and clean surroundings.
- Washing and bathing areas should be provided with proper drainage system so that wastewater is not accumulated in the project site.
- Disposal of sewage shall be made through a septic tank – soak pit arrangement.
- Waste/used oil generated from generators and construction machinery and equipment, oil lined containers, oil-soaked rags etc. should be stored on paved surface in a secure location at the project site.
- Appropriate secondary containment capable of containing 110 percent of the content of the largest storage tank should be provided.
- The used oil and oil lined containers, which are characterized as hazardous wastes according to the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, should be sold to SPCB approved vendors at frequent intervals.
- All packaging material should also be collected at the storage area and sold to authorized scrap dealers.
- Construction debris and excavated material to be stored in a confined area to prevent spread by wind or water. The construction debris to be used for backfilling of excavated areas and for foundation works at site.
- Recyclables viz. paper, plastic, glass, scrap metal waste etc. will be properly segregated and stored in designated waste bins/containers and periodically sold to local recyclers. Any recyclable waste should be encouraged to be recycled at the site.

Significance of Impact

Table 45: Impact Significance – Waste Storage and Disposal

Aspect: Waste Storage and Disposal	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Low	Short	Medium	Direct	Low
With Mitigation	Negative	Low	Short	Low	Direct	Extremely Low

8.3.1.7. Traffic and Transport

Anticipated Impacts

The construction phase shall involve transportation of construction materials, other machineries and mounting structures. The project site can be accessed through NH 30 which runs between Uttarakhand to Andhra Pradesh. This NH 30 passes through Prayagraj where the project site is located. The road is located at an aerial distance of ~650 m and the accessibility to the NH 30 is through Leprosy chauraha, which further connects to Yamuna Marg Road & to Arail Road which is adjacent to the site along Northern Direction. There are two gate provided at the project site. The road towards the site currently appears to be under expansion, a new lane is constructed.

The Project construction activities will lead to additional traffic and increased risk of traffic related accidents and industries to community and workers. The traffic density along the Arail Road are moderate and has adequate carrying capacity to accommodate the additional traffic due to the construction activities. However, the road connecting the project site is narrow (~3.5 m wide) and hence if used for project activities will lead to increased vehicular movements which may have adverse impacts in the community due to increased risk of traffic related accidents and injustices and increased pollution. Arail road is also used by villagers and School Buses also use the same road.

Mitigation Measures

A Traffic Management Plan is required for the management of traffic due to movement of vehicles for transport of equipment and material. Additional traffic on the village road connecting to Project site can be managed by following mitigation measures:

- Use designated roads and not the village roads for transportation of construction material.
- Scheduling of transportation vehicles at non-peak hours and also avoid school buses plying timings so as to avoid any traffic congestion.
- Only trained drivers with valid license shall be recruited by the Contractor for transfer of material;
- Training program for all the drivers, regarding awareness about road safety and adopting best transport and traffic safety procedures shall be provided before initiation of the commissioning activities;
- Mitigation measures such as emphasizing on safety amongst drivers, adopting limits for trip duration and arranging driver roster to avoid overtiredness and avoiding dangerous routes and times of day to reduce risk of accident shall also be implemented;
- Regular maintenance of vehicles and use of manufacturer approved parts should be adopted to minimize potentially serious accidents caused by equipment malfunction or premature failure;
- The villagers shall be made aware about the schedule prior to the movement of trucks and transportation in the Project area.

Significance of Impact

Table 46: Impact Significance – Impact on Traffic and Transport

Aspect: Traffic and Transport	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Short	Medium	Direct	Medium
With Mitigation	Negative	Low	Short	Low	Direct	Low

8.3.1.8. Occupational Health and Safety

Anticipated Impacts

Occupational Health and Safety (OHS) of workers is important during construction and operation phases where local and migrant workers are involved. The activities included in the construction phase that have potential impact to OHS of workers are land clearance for establishment of temporary structures, access road, digester tanks, mobilisation of equipment and contact with harmful gases.

There are likely to be potential impacts on worker's health and safety due to exposure to risk through the project development activities. The following occupational health and safety risks are frequently present, in particular during the construction phase:

- Mobile vehicles and heavy equipment accidents;
- Heat stress when working in humid and high temperatures;
- Manual handling and musculoskeletal disorders;
- Vibration impacts from concrete breakers, grinders, hammer drills, chipping hammers, chainsaws, scrabbles and needle guns;
- Temporary or permanent hearing loss from noise generated machinery used for excavation or piling work;
- Dermatitis that can rise from contact with small substances such as wet cement and asphalt;
- Tripping due to uneven surfaces and obstacles;
- Falling during working at height;
- Fire due to hot works, smoking and failure in electrical installations; and
- Electrical shocks.

Mitigation Measures

The above identified risks are typical on any construction site of this nature. Therefore, it is anticipated that the sub-contractor will have the necessary management measures in place to manage potential OHS issues under their responsibility. Appropriate OHS programme and procedures are also expected to be in place to align with the local regulations, as well as IFC PS-2. The procedure will include at minimum, the following measures:

- Develop and implement a Health and Safety (H&S) plan to follow throughout the construction phase;
- Provide occupation health and safety orientation training to all employees and workers consisting of basic hazard awareness, site-specific hazards, safe working practices, and emergency procedures;
- The contractors will be committed to ensure all Health and Safety measures are in place to prevent accidents and reduce the consequences of non-conformance events;
- The contractors will provide training, awareness and supervision to ensure all of its construction workers comply with the OHS procedures;
- The contractor will provide appropriate resources i.e., PPE to workers based on site working and atmospheric conditions;
- An emergency response procedure and infrastructure will be available on Site to ensure provision of first aid for personnel in case of emergency.
- If necessary, the personnel working in poorly ventilated workplaces will be provided with respiratory protective equipment.
- Fire hazard safety norms are required to be strictly followed.
- Site clearance with involvement of PMC before initiating further work.

Heat related Stress

- Heat- related illness can have significant impact on health of the workers engaged at the site. Heat-related illness is a spectrum of disorders due to environmental exposure to heat. It includes conditions such as heat cramps, fainting, convulsion, heat fatigue, rashes, and heat exhaustion as well as the more severe condition known as heat stroke. The heat stress can be due to many factors such as air, temperature, humidity, radiant heat, wind speed, workload, physical fitness of the worker, hydration status of the workers and clothing (including PPE that may restrict air flow across the skin and hinder evaporation of sweat).

- Additionally, Ultraviolet (UV) radiation burns occurs when the skin is exposed to UV radiation from been out in the sun or from activities such as welding. The symptoms include reddening and inflammation of the skin and blistering and peeling of the skin in severe cases.

Mitigation Measures

The above identified risks are typical on any construction site of this nature. Therefore, it is anticipated that the contractor will have the necessary management measures in place to manage potential issues under their responsibility. The procedure will include at minimum the following measures:

- Increase air velocity for indoor workers by using natural cross-ventilation from windows and doors or mobile or ceiling fans. This increases both evaporation of sweat and convective heat loss, and may significantly improve thermal comfort at air temperatures as high as 40°C;
- Operate effective general and local exhaust ventilation and air conditioning;
- Avoid non-essential sources of hot ventilation (e.g., air conditioner outlets adjacent to working areas);
- Install a shield between employees and a source of radiant heat such as curtains on windows or other insulating barrier, enclose the heat source, or move the heat source away from employees;
- Provide cooled drinking water as close as possible to the work site;
- Arrange shade for outdoor workers;
- Provide a cool rest area in which workers can take their meal breaks and tea breaks;
- Modify the work schedule or shift times so that outdoor and physiologically demanding work is done in the early morning or late afternoon, when it is generally cooler, and the sun's radiation is less intense than during the middle of the day;
- Allow workers to self-regulate their pace of work. This may involve working continuously at less than full capacity, and/ or working for short periods followed by rest pauses in a cool area;
- Workers should be encouraged to present to work in a well hydrated state, and take frequent small drinks throughout each shift to replace fluid lost through sweating;
- Diuretic Fluids such as tea, coffee, alcohol and some soft drinks should not be used to replenish fluid lost due to heat;
- Use PPE that reduces exposure to ultra violet radiation and heat (such as reflective masks or aprons, large brimmed hat, sunscreen); and
- Workers returning from periods away from hot environments should be given the opportunity to acclimatize before being expected to undertake work in very hot conditions at full capacity.

Significance of Impact

Table 47: Impact Significance – Impact to Occupational Health and Safety of Workers

Aspect: Occupational Health and Safety	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Low	Short	High	Direct	Medium
With Mitigation	Negative	Low	Short	Low	Direct	Low

8.3.2. Impacts during Operation Phase

8.3.2.1. Visual Impacts and Aesthetics

Anticipated Impacts

Visual impacts are assessed with reference to the presence of Bio-gas plant units, reduced vegetation, erection of ancillary facilities. The visual effects are evaluated with reference to passing motorists and fixed settlement, primarily the under construction recreational park in close proximity to the site.

Excess Biogas released during plant breakdown or in any other case of emergency will be burned by flare unit. This can be visually not pleasant.

Mitigation Measures

- The units to be arranged in a systematic manner which will give an aesthetic sense to it.

- Landscaping around project boundary (fast-growing, dense trees such as bamboo and shrubs should be planted along the western boundary of the project site to create a natural visual barrier)
- Wind and acoustic barrier wall of appropriate height, constructed with suitable materials, should be provided.

Significance of Impact

Table 48: Impact Significance – Aesthetic and Visual Impacts

Aspect: Visual Impacts and Aesthetics	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Low	Long	Low	Direct	Low
With Mitigation	Negative	Low	Short	Low	Direct	Low

8.3.2.2. Impact on Soil and Water Quality

Compaction of soils nearby and inside the project boundary from increased levelling and grading of areas will result in lower permeability and therefore, decreased infiltration and increased runoff. Without appropriate measures, runoff from these units, compacted areas and hard standing areas in addition to erosion by wind may increase erosion and increase the sediment load in run-off.

The Yamuna River is located to the North of the project site, running parallel to the Arail Road at a distance of ~250 m. The site is at a lower elevation compared to Arail Road, and its general slope directs water towards the north. As a result, during heavy rainfall, the plant may face an increased risk of waterlogging and flooding. Proper stormwater drainage system shall be provided to ensure efficient water flow and prevent any adverse impacts from water logging and flooding.

Run-off from the plant site with leaked washed wastewater, waste oil, and seepages from hazardous waste stored without secondary containment & proper drainage system may affect the ground & nearby surface water quality (Yamuna River). Proper septic tanks and soak pits shall be constructed for disposal of domestic wastewater or it shall be channelized to proposed ETP, hence the risk of wastewater runoff into the surface water would be reduced.

Once the plant is commissioned there will be limited disturbance to soil. Solid wastes generated during operation will include domestic solid waste which will mostly be office waste; lubricant, used oil/waste oil and oil contaminated rags.

As segregated waste will be received at facility, there will be negligible waste generation from plant. Any waste received from PMC, which is not suitable for project, will be segregated and stored at designated place, and handed back to PMC for further treatment or disposal.

It is expected that approximately 127 KLD process waste water will be generated during project operation, improper disposal of the same can contaminate the soil and water quality of the area. During project operation, the output slurry from the digester will be sent to SLS where it will be dewatered and converted into compost/manure that will be sold off. Separated water from the process shall be resent to process and excess 127 KLD wastewater shall be treated in ETP. Further, approximately 20 KLD domestic sewage is expected to be generated from the Plant.

Mitigation Measures

- Domestic waste will be segregated and wet waste shall be utilized in plant and dry waste shall be disposed of with the help local waste collectors.
- Fuel and used oil will be stored in demarcated storage areas with adequate secondary containment and appropriate capacity.
- Spill control and prevention mechanism will be developed, and all the staff will be trained.

- Storage of oil/chemicals shall be undertaken on paved impervious surface and secondary containment shall be provided for fuel storage tanks;
- During the washing and maintenance activities, adequate storage area shall be designed to collect the washed water.
- Proper drainage & storm water management system shall be developed.
- Before monsoon season, stormwater drainage system shall be inspected, cleaned and properly maintained to prevent waterlogging and flooding.
- The domestic wastewater shall be discharged through Septic tank / soak pit arrangement or suitable sewage treatment plant before disposal.
- The dewatered process water shall be reused and remaining water shall be treated in ETP of capacity 140 KLD. Treated water shall be utilized in for gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads, etc., remaining treated water shall be discharged to nearby STP of 42 MLD, for further treatment and final disposal.

The Plant shall install necessary pipeline/drains and ensure necessary permissions from concerned authorities and agreement with STP administration for discharge of treated water to the STP.**Significance of Impact**

Table 49: Impact Significance – Impact on Soil Quality

Aspect: Soil Quality	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	High	Long	Medium	Direct	High
With Mitigation	Negative	Medium	Long	Low	Direct	Medium

Table 50: Impact Significance – Impact on Surface Water Quality

Aspect: Water Quality	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	High	Long	Medium	Direct	High
With Mitigation	Negative	Medium	Long	Low	Direct	Medium

8.3.2.3. Impact on Water Availability

During construction, water is required for domestic use and in construction activities. Drinking water requirement will be met through packaged water supplied by local vendors, and domestic water requirement of approximately 8 KLD (considering 45 litre/person/day) will be met through PMC water supply. As per the Concession Agreement, the responsibility for supply of water at the project site falls under PMC, therefore PMC has sought provision from Jalkal Vibhag [42](Water Works Department) for 100KLD water supply for construction requirement, at the Project Site through a Letter dated 31st May 2024. As informed during the site visit, Prayagraj Jalkal Vibhag has installed a borewell for supply of water during construction phase, inside the premises.

During operation phase, plant will require approximately 186 KLD fresh water for process, and 20 KLD for domestic purposes. The water supply for operation phase fresh water requirement will be provided by the PMC. During the operations phase, water will be required for various processes such as feedstock preparation, hot water generation, anaerobic digestion, gas cleaning system, fire hydrant systems, domestic use, gardening etc. For fire hydrant systems, water will be required once initially for filling of fire water tanks, during mock drills and in case on any fire incident/accident.

Output slurry from the digester will be sent to Solid Liquid Separator (SLS) where it will be dewatered and converted into compost/manure that will be sold off. Separated water from the process shall be resent to process, which will further reduce the fresh water requirement and subsequent waste water generation. Approximately, 127 KLD waste water will be generated, which will be treated in ETP of capacity 140 KLD, provided within the plant. The ETP is designed to treat and recycle waste water generated from various processes within the plant, it will consist of a MBR system integrated with

[42] Jalkal Vibhag – The water works department has been entrusted the work of operation and maintenance of city water supply and sewerage system

PVDF membranes, offering advanced filtration. Water requirement for some of the activities such as gardening, water sprinkling for dust suppression on unpaved areas, and access/internal roads will be met through treated water from the ETP, which will further reduce fresh water requirement.
Following mitigation measures are suggested to reduce the impact on water availability:

Mitigation Measures

- Use of ETP treated water in gardening, sprinkling, and process as feasible.
- Use of STP treated water from nearby STP of 42 MLD, for process water requirement, as feasible.
- The site office shall be provided with leachate collection line and the collected lechate shall be channelized to proposed ETP, so that same can be treated and reused.
- Installation of Rainwater harvesting system within the plant premises. The water harvested will be stored at the Site and will be used for plant operation, wherever feasible.

Significance of Impact

Table 51: Impact Significance – Impact on Water Availability

Aspect: Water Availability	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	High	Medium	Low	Direct	Medium
With Mitigation	Negative	Medium	Short	Low	Direct	Low

8.3.2.4. Occupational Health and Safety of Workers

Anticipated Impacts due to operations

During the operation phase, the risks will be quite limited due to nature of operation activities; the activities will be limited to guarding and on call and/or onsite technical support (maintenance and cleaning). There will be potential impacts on personnel's health and safety during operation phase due to exposure to risks such as:

- Slipping and tripping;
- Falling during working at height;
- Exposure to hazards such as electric shock and thermal burn hazards;
- Exposure to chemicals, hazardous and flammable materials;
- Exposure to harmful gases like H_2S, CH_4, etc.; and
- Maintenance activities are expected to be carried out in hot weather conditions; thus workers are exposed to dehydration, heat exhaustion and heat stroke.

Also, Pipe failure or any other gaseous leakage can possibly have:

- Short-term effects that can be perceived and may represent a nuisance
- Possible long-term health effects.

The operations of the project will involve the use of pressurized gas cylinders, pipelines, and digesters to manage and process the generated gases. The transportation of these pressurized gases from nearby villages to the site introduces significant fire-related hazards for the local community. This risk arises primarily from the potential for improper storage and transfer of the gas during transit. Poorly maintained storage facilities or pipelines, coupled with inadequate safety measures, could increase the likelihood of leaks, ruptures, or accidents, which may lead to dangerous fire incidents. Additionally, the local population, who may not be familiar with handling such materials, could be exposed to these risks, further exacerbating safety concerns. To address these risks, a separate risk assessment study shall be conducted to evaluate all potential hazards associated with the transportation, storage, and use of pressurized gases. Based on the findings, a comprehensive emergency preparedness plan shall be implemented to ensure the safety of both the local community and the project operations. This plan shall include clear emergency response procedures, regular safety drills, and effective communication strategies to minimize the impact of any incidents. Moreover, proper infrastructure, safety protocols, and community awareness programs will be crucial to mitigating these hazards and ensuring safe operations.

Mitigation Measures

EverEnviro will prepare and implement Occupational Health and Safety Plan (OHSP) with clearly identified roles and responsibilities of the personnel involved with the project. The OHSP to include but not limited to the following: site specific safety plan, electrical safety, fire safety, heat stress, personnel protective equipment, emergency response plan, reporting and investigation and others.

Mitigation measures that will be followed include the following:

- Regular electrical safety training to workers with safety procedures and other safety requirements that pertain to their respective job assignments;
- Implement Lock out/ Tag Out (LOTO) system;
- Use work equipment or other methods to prevent a fall from occurring. Collective protection systems, such as edge protection or guardrails, should be implemented before resorting to individual fall arrest equipment. In addition, safety nets can be used to minimize the consequences of a fall should it occur.
- Personal Protective Equipment (PPEs) e.g., shock resistant rubber gloves, shoes, other protective gear etc. should be provided to workers handling electricity and related components and monitored that they are used by the employees
- There should be arrangement for hygienic and scientific sanitation facilities for all the labourers working in the site.
- An accident reporting, and monitoring record shall be maintained.
- All joints and penetrations of building structure should be sealed.
- Waterproof/gas resistant geomembrane and passively ventilated underfloor sub-space is recommended as part of protection against human exposure to onsite contaminants.
- All systems will be designed and operated as per regulations, especially PESO as applicable.
- A Risk assessment study shall be conducted to evaluate all potential hazards associated with the project. Based on the findings, a comprehensive emergency preparedness plan shall be implemented to ensure the safety of both the local community and the project operations.
- Project specific disaster management plan (DMP) will be developed including onsite and offsite elements.
- Inputs from local administration such as police, health facilities, DISH, fire station, etc. can be taken for DMP.
- The project is required to develop an off-site emergency plan for safety and security of the community due to any activities induced by the project.
- The project is required to ensure safe storage and transfer measures of the gas cylinders to avoid any fire risks, especially those impacting the local community.
- Firefighting system as per applicable regulations and best practices as storage area will be required for CNG.
- Regular maintenance, inspections and audits of all systems
- Hazard Identification and Risk Assessment for project activities shall be followed
- QRA and/or HAZOP to be carried out during detailed design stage and the output of the tool should always be presented in a detailed way for various stakeholders.

Significance of Impact

Table 52: Impact Significance – Occupational Health and Safety of Workers

Aspect: Occupational Health and Safety	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Long	Long	Medium	Direct	Medium
With Mitigation	Negative	Low	Long	Low	Direct	Low

8.3.2.5. Impact on Air Quality

Excess Biogas released during plant breakdown or in any other case of emergency will be burned by flare unit. This will not be regular activity. There is possibility of impact on air quality and temperature increase due to flaring.

Mitigation Measures

- Adequate stack height will be provided
- Flaring stack will be positioned as far away from habitation/vegetation and as per wind direction.
- Client will undertake detailed assessment for positioning of flare stack.

Significance of Impact

Table 53: Impact Significance – Impacts on Air Quality

Aspect: Air Quality	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Long	Medium	Direct	Medium
With Mitigation	Negative	Low	Long	Low	Direct	Low

8.3.2.6. Traffic and Transport

Anticipated Impacts

The operation phase shall involve transportation of MSW and other feedstock to the project site & transportation of manure and Bio-CNG from the site. The project site can be accessed through Arail Road. There are two gates proposed at the plant.

The Project operational activities will lead to additional traffic and increased risk of traffic related accidents and industries to community and workers. The traffic density along the Arail Road is moderate and has adequate carrying capacity to accommodate the additional traffic due to the construction activities. However, the road is narrow (~3.5 m wide) and hence if used for project activities will lead to increased vehicular movements which may have adverse impacts in the community due to increased risk of traffic related accidents and injustices and increased pollution. Though another lane is also constructed, which will further ease the traffic. Further, the road is also used by locals and visitors to Arail area, and School Buses also use the same road.

Mitigation Measures

It is important that the project uses the designated roads and not the village roads for transportation. A Traffic Management Plan is required for the management of traffic due to movement of vehicles for transport of raw materials & products. Additional traffic on the road connecting to Project site can be managed by following mitigation measures:

- A comprehensive Traffic Management Plan shall be developed;
- Scheduling of transportation vehicles at non-peak hours and also avoid school buses plying timings so as to avoid any traffic congestion, as feasible.
- Only trained drivers with valid license shall be recruited by the Contractor for transfer of material;
- Training program for all the drivers, regarding awareness about road safety and adopting best transport and traffic safety procedures shall be provided before initiation of the commissioning activities;
- Mitigation measures such as emphasizing on safety amongst drivers, adopting limits for trip duration and arranging driver roster to avoid overtiredness and avoiding dangerous routes and times of day to reduce risk of accident shall also be implemented;
- Regular maintenance of vehicles and use of manufacturer approved parts should be adopted to minimize potentially serious accidents caused by equipment malfunction or premature failure.

Significance of Impact

Table 54: Impact Significance – Impact on Traffic and Transport

Aspect: Occupational Health and Safety	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Long	Medium	Direct	Medium
With Mitigation	Negative	Low	Long	Low	Direct	Low

8.3.3. Impacts during Decommissioning Phase

8.3.3.1. Environment and Occupational Health & Safety

Anticipated Impacts

Typical activities during the Bio-CNG facility decommissioning and site reclamation phase include facility removal, breaking up of concrete pads and foundations, removal of access roads that are not maintained for other uses, re-contouring the surface, and re-vegetation.

Dismantling operation however will have impact on environment due to noise and dust arising out of it. During de-installation, a specific strategy shall be adopted to handle each type of item to keep the impact low during the actual activity. The decommissioning will also have social impact. The impact due to decommissioning on power, social and environmental scenario will be guided by applicable laws and guidelines. The key issues associated with demobilization phase will include:

- Issue of loss of job when the workers will be asked to leave;
- Improper disposal of demolition waste and obsolete machineries will lead to contamination of soil and discontent of community;
- Demolition activity is anticipated to generate dust and exhaust emissions which can be carried downwind to nearby habitations;
- Risks associated with health and safety issues such as trip and fall, release of harmful gases like methane, electrical hazard etc.;
- The decommissioning activities of dismantling the plant units and removing the ancillary facilities can lead to increased noise levels;
- Depending on the technology and chemicals used, chemicals are likely to spill and leach into the soil and water of the area, posing threat to environmental and public health.

Mitigation Measures

Demobilization will require removal of machinery, workers and other structures. The mitigation measures for decommissioning shall include:

- The proponent shall inform the workers and local community about the duration of work;
- The workers shall be clearly informed about the expected schedule and completion of each activity;
- All waste generated from decommissioning phase shall be collected and disposed of at the nearest municipal disposal site or vendor;
- Sprinkling of water shall be carried out to suppress dust from decommissioning activities and transport movement;
- All necessary PPEs shall be used by the workers during demolition work;
- EverEnviro will be committed to ensure all health and safety measures are in place to prevent accidents;
- Institution of suitable training modules for project personnel and labour contractors involved in the dismantling process to ensure avoidance or minimization of any plant unit damage as far as possible and adherence to appropriate decontamination protocols in the event of any unavoidable damage and adhere to proper safe disposal methods.

In addition to above, it is anticipated that the contractor will have the necessary management measures in place to manage potential OHS issues under their responsibility. Appropriate OHS programme and procedures are also expected to be in place to align with the local regulations, as well as IFC PS-2. The procedure will include, at minimum, the following measures:

- Develop and implement a health and safety plan to follow throughout all phases of the project;
- Provide occupation health and safety orientation training to all employees consisting of basic hazard awareness, site-specific hazards, safe working practices, and emergency procedures;
- The contractors will be committed to ensure that all Health and Safety measures are in place to prevent accidents and reduce the consequences of non-conformance events;
- The contractors will provide training, awareness and supervision to ensure all of its construction workers comply with the OHS procedures;
- The contractor will provide appropriate resources i.e., PPE to workers on Site; and

- An emergency response procedure and infrastructure will be available on Site to ensure provision of first aid for personnel in case of emergency.

Significance of Impact

Table 55: Impact Significance – Impacts on Environment, Occupational Health and Safety Hazards

Aspect: Environment, Occupational Health and Safety	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Short	Medium	Direct	Medium
With Mitigation	Negative	Low	Short	Low	Direct	Low

8.4. Ecological Impacts and Mitigation Measures

The following sections present the ecological impacts anticipated directly from the Project in a phase-wise manner, along with corresponding mitigation measures based on international industrial good practices.

8.4.1. Impacts during the Pre-Construction and Construction Phase

Removal of vegetation: Presently, the Project Site shows presence of a few trees, shrubs and herbs that support fauna. The removal of natural vegetation would indirectly cause exposure of soil to desiccation by wind and sunlight, loss of soil anchorage and increased vulnerability of soil to erosion by wind and water, leading to changes in the soil regime and the corresponding loss or degradation of the related ecosystem services. Further, the site is in close proximity to Yamuna river and Triveni Sangam, which attracts large number of birds including migratory birds, there may be potential risk of hunting of birds by workers as well as there may be encounter of wildlife during construction or site clearing activities. These should be carefully handled to avoid any regulatory consequences and negative perception of community.

Mitigation Measures

- Undertake quantitative assessment of trees present on site prior to site clearance.
- Avoid or minimize tree cutting.
- Consider plantation of strictly native tree species along project periphery to compensate for trees removed from the Project Site as part of the site clearing process.
- Conduct awareness & training program among workers about biodiversity conservation and consequences of bird/wildlife hunting as well as how to respond if any wildlife encountered during construction or site clearing activities.

8.4.2. Impacts During the Operation and Maintenance Phase

Deployment of heavy machinery: The proposed Project operation involves use of heavy machinery to handle the organic waste to be processed. This would create risk of injury and/or mortality to any scavenging fauna, feeding on or attempting to access the said waste.

Spillage of Materials: Spillage of any chemicals used in Project operation would result in leaching of the said chemicals into the local environment, leading to contamination of the natural soil and water resources of the area. This potentially includes the Yamuna River, situated approximately 250 m downgradient of the Project Site in the Northern direction, which attracts large number of birds including migratory birds due to availability of good quality of aquatic environment, food, which may adversely impact. Additionally, there may be potential risk of hunting of birds by workers as well as there may be encounter of wildlife during plant operation.

Mitigation Measures

- Ensure that Project-related waste storage areas are designed to prevent access to scavenging fauna.
- Ensure no wastewater is discharged to outside of plant premises.
- Prevent any accidental discharge to drains flowing to Yamuna River.

- Ensure that heavy machinery and operation systems used in handling organic waste as part of Project operations are equipped/designed to prevent entrapment or injury with respect to scavenging fauna, especially vultures.
- Institute effective training modules and operation systems to prevent spillage of any Project-related chemicals, especially any toxic substances.
- Install an effective leachate barrier system that isolates Project-related leachates from the soil and groundwater around the Project Site.
- Install effective systems for treating leachate to be safe for disposal.
- Liaise with concerned authority of any Project-related electrical poles to install perch-excluder devices on, to prevent Birds from perching on them and being exposed to risk of electrocution, to extent feasible.
- Conduct awareness & training program among workers about biodiversity conservation and consequences of bird/wildlife hunting as well as how to respond if any wildlife encountered within the plant.
- Use native species for all Project-related plantations, including any greenbelt plantation.

8.4.3. Impacts during the Decommissioning Phase

Improper Disposal of Materials: If any materials generated during the dismantling of the Project such as project infrastructure debris, wastewater from effluent treatment plant, etc, are improperly handled or disposed of inappropriately, any polluting substances contained within them are likely to be introduced into the air, water or soil of the disposal site, thereby degrading its natural resources.
This impact is of minor significance since the Project Site is situated in proximity of modified habitats.

Mitigation Measures

- Consider instituting suitable training modules for project-personnel and labour contractors involved in the dismantling process to ensure adherence to appropriate safe disposal protocols and appropriate decontamination protocols in the event of any unavoidable damage.
- Ensure that the restoration/revegetation program, as part of the closure plan, does not contain any alien, exotic, or invasive species in order to avoid the risk of introduction of invasive alien species. Use native species as part of the revegetation program.

8.5. Socio- Economic Impacts and Mitigation Measures

8.5.1. Impact on Livelihoods & Hygiene

The main water supply for operation phase will be provided by the PMC through Jalkal Vibhag which will be supplied through a borewell.
The nearest habitations from the proposed Project site are approximately 200 m towards the southern direction where Jahangirabad Residential area is located which falls within the Core Zone. The site is also in close proximity to Yamuna River. In case of any ground water pollution in the future, the residents may have to reduce their dependency on the bore wells. It is understood that since the project will process the biodegradable waste and convert it to energy/manure, the project's activities will contribute to the positive impact.

Mitigation Measures

To minimise and mitigate the adverse impacts on local livelihoods, the following measures are recommended.

- Identify alternative seasonal water supply source. Use treated waste water in plant operation as feasible. Harvesting of rainwater on-site, as feasible.
- Give preference to locals from nearby villages during hiring of workers for project work
- Establishing the Bio-CNG plant, will help in management of biodegradable waste which is generated in the region. This will reduce the spread of smell generating from the wet waste and its effects on locals. This will create a positive impact on the community's health and hygiene.

Significance of Impact

Table 56: Impact Significance – Impacts on Livelihoods

Aspect: Livelihoods	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	High	Long	Medium	Direct	High
With Mitigation	Positive	High	Long	Low	Direct	Medium

8.5.2. Impact on Hygiene and Community Health

As reported, source segregated organic dry and wet waste collected in the jurisdiction of PMC is unloaded at this site. The substantial amount of waste dumped at the site, generates bad odour that along with light particles of the waste might drift to neighbouring areas, leading to growth of mosquitoes, flies, and an unpleasant environment to live and function in.

Mitigation Measures

To minimize and mitigate the adverse impacts on local hygiene conditions, the following measures are recommended.

- The Bio-CNG plant, will help in management of biodegradable waste which is generated in the region. This will reduce the spread of smell generating from the wet waste and its effects on locals. This will create a positive impact on the community's health and hygiene.
- There needs to be an Occupational Health Centre at the facility that caters to the health issues of the entire workforce engaged for the project or stakeholders affected due to the project.
- The project needs to put in safeguard to ensure that workforce at the site, the workers working at adjacent site, and the local community is not affected by menace of mosquitoes/disease causing vectors at the site or due to project activities. Therefore, maintaining good housekeeping at the site is crucial.

Significance of Impact

Table 57: Impact Significance – Impacts on Hygiene and Community Health

Aspect: Hygiene and Community Health	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Medium	Long	Medium	Direct	Medium
With Mitigation	Negative	Low	Long	Low	Direct	Low

8.5.3. Impacts on Local Economy and Employment Generation

During the construction phase, the project would require a workforce of approximately 200 persons as well as vendors for vehicles and construction equipment. During its operations phase, the project will require about 150 persons to work at the plant. If hired locally, the project will contribute to the local economy positively.

Additionally, feedstocks such as Paddy Straw, Cattle dung and Chicken litter shall be locally purchased, which will generate more employment and income generation opportunities to locals.

Mitigation Measures

- It is essential for the project to generate employment locally, instead of hiring workers from outside of the state.
- It is recommended that all contractors are intimated to prioritise employment of locals over migrants for the project.
- Give preference to locals from nearby villages during hiring.
- Prefer sourcing of raw material and feedstock from locals.

Significance of Impact

Table 58: Impact Significance – Impacts on Local Economy and Employment Generation

Aspect: Local Economy and Employment Generation	Nature	Range	Duration	Intensity	Type	Overall

Without Mitigation	Positive	Low	Long	Low	Direct	Low
With Mitigation	Positive	Low	Long	Low	Direct	Low

8.5.4. Impacts on Local women

Although the project does not have an impact that is specific to a gender, due to the project proponent's commitment to Gender equality, few gender-specific initiatives have been recommended for implementation during the construction and operations phase of the project.

Mitigation Measures

- The project proponent can create and facilitate the functioning of women's Self-Help Groups (SHG) by engaging a Gender and Micro-finance expert or by forming association/partnership with a local women empowerment organisation (an NGO) with good reputation. The agenda for this is to make the local women (especially those from socio-economically vulnerable communities and households) financially literate and independent.

Significance of Impact

Table 59: Impact Significance – Impacts on Local women

Aspect: Local Economy and Employment Generation	Nature	Range	Duration	Intensity	Type	Overall
Without Mitigation	Negative	Low	Long	Low	Direct	Low
With Mitigation	Positive	Low	Long	Low	Direct	Low

8.6. CUMULATIVE IMPACT ASSESSMENT

Cumulative Impact Assessment (CIA) is the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen Valued Environmental and Social Components (VECs) over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

Cumulative impacts[43] are a result of effects that act together (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as project under consideration (e.g., the combined effect of other similar projects in the general area). An effect to a resource in itself may not be considered significant but may become significant when added to the existing and potential effects eventuating from similar or diverse developments in the area.

There is no other bio CNG plant located within 10 km radius of the project boundary. The nearest CBG plant operated by Reliance Bio Energy in Newada Samogar, Naini, Prayagraj is approximately 15 km from the project site. There has been a substantial increase in waste to energy projects globally. The potential cumulative impacts identified for the project has been highlighted in the following sub sections.

8.6.1. Air Quality and Soil Characteristics

The baseline ambient air quality measured within 5 km radius of the project was noted to be well within the prescribes standards. During operation of the project no fuel of any kind will be burnt, and the gases formed during the anaerobic digestion also will not be released. However, plant construction activity will last for 12-18 months, along with some other ongoing/ upcoming infrastructure development activities such as road construction, development of Shivalaya Park and Kumbh Mela infrastructure development activities, the cumulative impact on ambient air quality can be considered moderate.

[43] As per Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets by IFC (2013), cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities.

8.6.2. Ambient Noise

The noise from existing surrounding has been captured in the baseline recorded for the project. the ambient noise level of all the locations except the project site were noted to be in the permissible standards of noise levels prescribed by with National Ambient Air Quality Standards (NAAQS) in respect of noise limits for day and night-time.

It is to be noted that ambient noise levels depend on various factors such as the exact number of vehicles/equipment being used at the construction site, number of hours of operation etc. Since construction activities will be temporary in nature and will be carried out during the daytime and will not last for more than 12-18 months so if the timelines of the other project developments in the area coincides with that of this project, then there will be more level of noise produced due to various construction activities and equipment's. Also, during the operation phase energy formation will be because of the anaerobic digestion which will not cause any noise pollution, cumulative noise impact is considered low for operation phase.

8.6.3. Soil and Water Quality

The output slurry from the digester will be sent to SLS where it will be dewatered and converted into compost/manure that will be sold off. There will be wastewater generation from cleaning the bio-CNG tanks. These wastewaters will be treated in the ETP of capacity 140 KLD before being discharged into nearby STP. The domestic wastewater may be generated from site office of the operation team. Septic tanks with soak pits should be provided or it shall be channelized to ETP, during operation stage. There are less chances of cumulative impact due to the future proposed projects.

8.6.4. Impacts on Common Property Resources

The other development projects in the area are also likely to take water from borewell with permission from Prayagraj Jalkal Vibhag. Though the quantity of required water is not known; any further groundwater extraction meant for irrigation & non-irrigation purpose will increase the scale of impact on the locals dependent on groundwater for farming. As per the Central Ground Water Board Report 2019, the ground water status of Chaka Block where the project site is located falls under critical category and Prayagraj City is in Over-Exploited Category. This may result in locals being concerned and may question authority's decision to extract groundwater, impacting water availability for the population that is dependent on ground water for their household consumption and livelihoods.

Roads: The other development projects in the area will require access to approach roads some of which are likely to be common to the Bio-CNG plant. Further, Arail road is also used by villagers and School Buses also use the same road. Any mismanagement of traffic on these common approach roads, leading to incidents or accidents can be mis-linked to the Bio-CNG plant or overall developments in area.

Mitigation Measures

- Use treated water from ETP and nearby STP, as feasible.
- It is important that the project uses the designated roads and not the village roads for transportation.
- Scheduling of transportation vehicles at non-peak hours and also avoid school buses plying timings so as to avoid any traffic congestion, as feasible.
- A GRM should be establish as per the ESMS and a Community Liaison Officer needs to be appointed for the implementation of the GRM.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The E&S Management and Monitoring Plan (ESMMP) aims to ensure that the E&S risks, impacts and liabilities discovered during ESIA process are successfully managed throughout the project's operation and closure. ESMMP is a crucial part of ESIA since it offers a vital instrument for continuously measuring and assessing the effectiveness of the project commitments and mitigation strategies included in the ESIA to reduce or eliminate identified adverse effects. The main goals of the ESMMP are to:

- Establish a framework for the implementation of E&S management initiatives;
- Monitor the Company's adherence to all mitigation measures and commitments in the ESIA report;
- Provide early warning signals on potential environmental changes so that appropriate actions can be taken to prevent or minimize E&S impacts;
- Establish a sound and affordable contingency plan that can be activated for prompt response to any accidental occurrence;
- Encourage and achieve the highest environmental and socio-economic performance and response from individual employees and contractors throughout the Project;
- Regularly check all the devices and measures implemented for efficient monitoring of project functions and activities.

The ESMMP consists of a combination of operational policies, procedures and practices. Overall responsibility for ESMMP lies with EverEnviro, whereby a number of the specific actions will be carried out by the Contractors (including sub-contractors) at different stages. The Contractors' activities, however, will be supervised by EverEnviro to ensure that the implementation is being performed as planned.

9.1 ORGANIZATIONAL STRUCTURE

The Company has established an organizational structure that defines roles, responsibilities, and authority to implement the project. Specific personnel including management representative(s) with clear lines of responsibility and authority have been designated. This section presents the organizational structure at the corporate and project site level depicting various departments, supplemented with a brief understanding of the roles and responsibilities. EverEnviro's organizational structures at the corporate level and project level are elaborated in ***Figure 39*** and ***40*** respectively and EHS Organogram of EverEnviro is elaborated in ***Figure 41***.

Figure 39: EverEnviro's Organogram at Corporate level

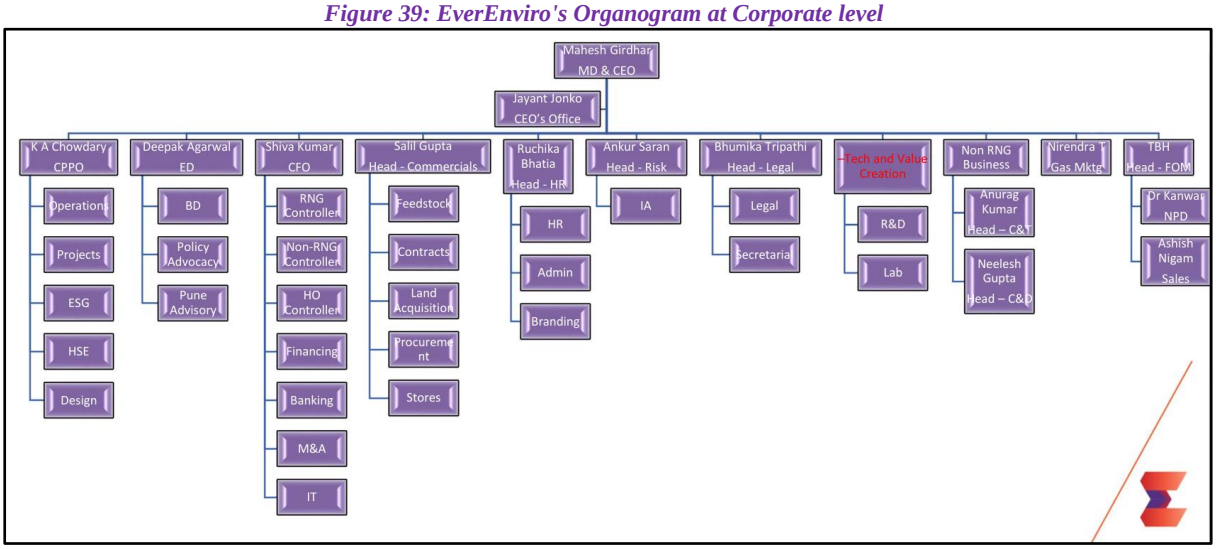


Figure 40: EverEnviro's Organogram at Project level

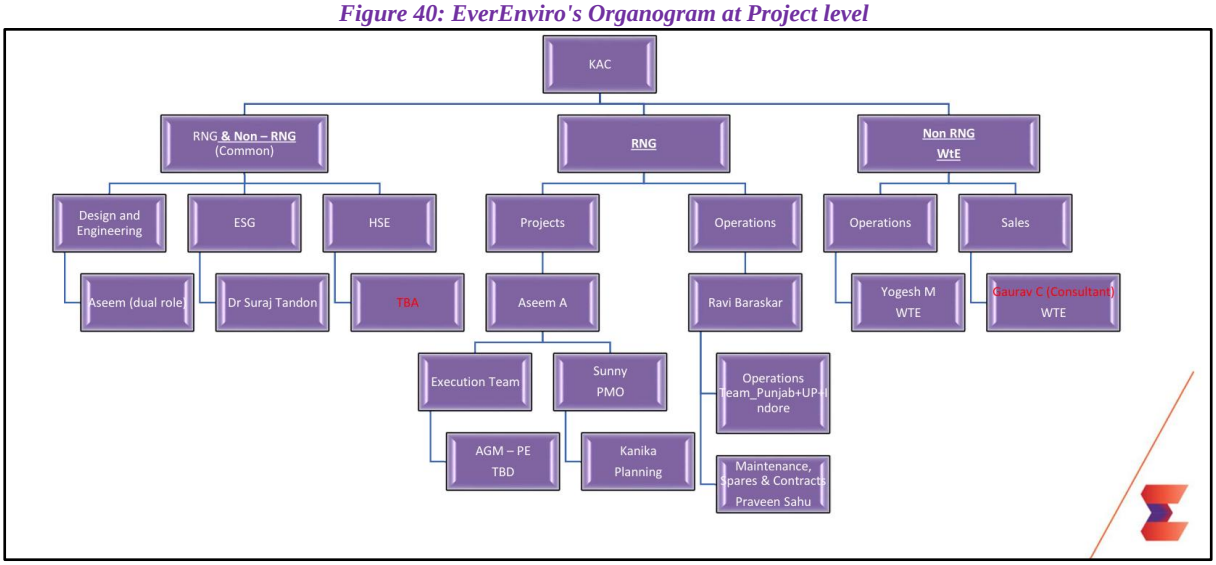
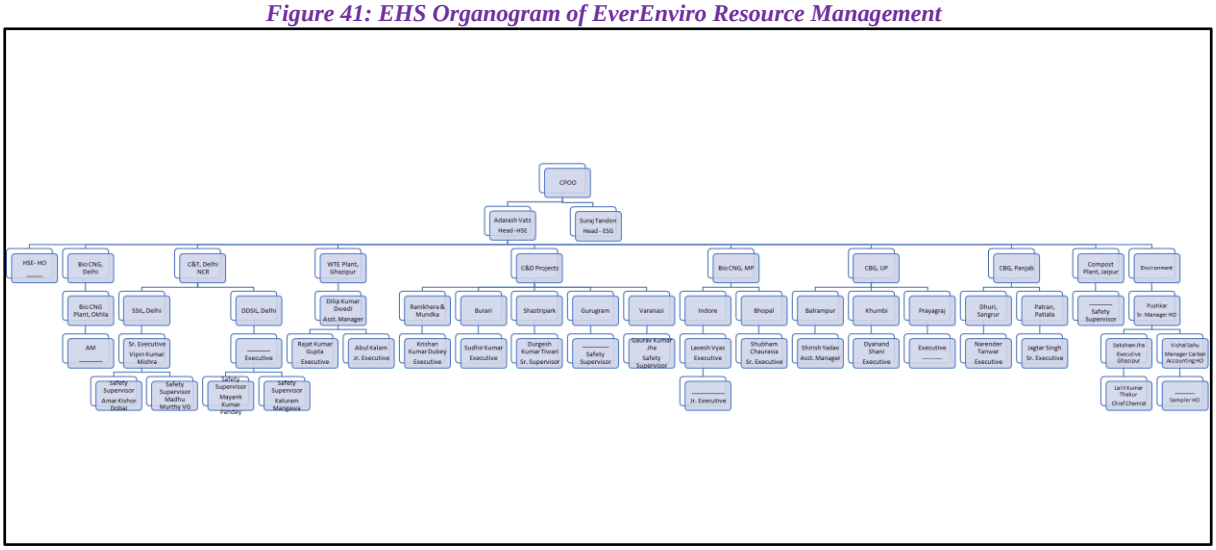


Figure 41: EHS Organogram of EverEnviro Resource Management



9.2 MONITORING AND AUDIT

The ESMMP will be monitored regularly to ensure effective implementation. The EHS team of EverEnviro will undertake inspection and monitoring of the environmental and social impacts of construction and operation phase activities in order to ensure the effectiveness of suggested mitigation measures.

- EverEnviro will ensure that the Engineering, Procurement and Construction (EPC) complies with the requirements of conditions for all applicable permits and guidelines;
- The ESMMP will be monitored on a regular basis, quarterly or half yearly all outcomes would need to be audited in accordance with EHS commitments of the Company.
- The monitoring process will cover all stakeholders including the local community impacted by the project activities and associated facilities.
- The inspections and audits will be undertaken by a trained team of external agencies/experts or from the Company.
- The inspection and audit findings will be implemented by EPC in the areas of concern.
- The entire process of inspections and audits will be documented.
- Sub-Contractors will be required to fully comply with the reporting requirements in terms of timely report submission with acceptable level of details. Reporting will be done in the form of environmental, health, safety and social check list, incident record register, environmental, health, safety and social performance reports (weekly, monthly, quarterly, half yearly, yearly etc.).

9.3 DOCUMENT AND RECORDKEEPING

Documentation and record keeping system has to be established to ensure updating and recording of requirements specified in ESMMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMMP documentation system is maintained and that document control is ensured. The following records shall be maintained at site:

- Documented EHS&S Management System;
- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;
- Monitoring reports;
- Auditing reports;
- Stakeholder Engagement Activities;
- Community Development Activities; and
- Complaints register and issues attended/closed.

9.4 TRAINING

The training and competence of personnel working remotely and the readiness of all necessary safety equipment in the location need to be assessed. Hence, EverEnviro shall ensure that the job-specific training and EHS Induction Training needs are identified based on the specific requirements of ESMS and project personnel (including the Contractors and Sub-contractors) to undertake the required actions and monitoring activities.

- The EPC contractor is responsible for ensuring that their workers are provided EHS training as stipulated. In addition to formal training, the contractor should undertake tool-box talks.
- A training register should be kept on-site for all training conducted onsite.
- An environmental and social management training programme shall be conducted to ensure effective implementation of the management and control measures during construction and operation of the project.
- The training programme shall ensure that all concerned members of the team understand the environmental aspects of the project.

- A basic occupational training program and specialty courses shall be provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments.
- Training shall be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards.
- Workers with rescue and first-aid duties must receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their co-workers.
- Through appropriate contract specifications and monitoring, the employer shall ensure that service providers, as well as contracted and subcontracted labour, are trained adequately before the assignments begin.

Table 60: Training Requirements for the Project

Topic	Training Content	Targeted Audience
General Awareness Project	• Benefits of the Project • Possible employment opportunities • Stakeholder Engagement Plan • Grievance Redressal Mechanism	• Local Communities • Feedstock Suppliers
E&S Management Training	• Purpose of action plans for Project • Requirement of specific action plans • Understanding of sensitive E&S features within and surrounding project area • Understanding potential risks from project activities • Grievance Redressal Mechanism	• Site Team of EverEnviro • EPC Contractor • Contractors and sub-contractors
Occupational Health and Safety Training	• Importance of conforming with all HSE policies • HSE impacts of the project activities • HSE benefits of improved personal performance • Worker's role and responsibilities in achieving conformance with the Client's HSE policy, procedure and EMP including associated procedures and emergency preparedness and response requirements • Mitigation measures required to be implemented when carrying out their work activities: i) Use of PPE ii) Job Safety Analysis iii) First Aid Training and Awareness regarding medicines iv) Fire Drill and usage of fire extinguishers at the time of emergency v) Maintaining accident and incident investigation reports	• Site Team of EverEnviro • EPC Contractor • Contractors and sub-contractors • First Aiders • Fire Fighters

9.5 MANAGEMENT PLANS AND PROCEDURES

EverEnviro is committed to ensuring compliance to the national and state level regulatory requirements and mitigating potential adverse environmental impacts resulting from the project activities. EverEnviro has developed a system for integrating ESG aspects in its business operations that has been divided into two (2) parts:

a) **ESG Policy**: presents the ESG commitments of ERMPL through a Policy Statement and supporting Operational Principles. The Policy document states ERMPL's intentions on ESG aspects of the business and can be circulated with ERMPL's stakeholders.

b) **ESMS Manual**: presents the operational procedures to be adopted by ERMPL. The ESMS Manual is an operational-level document, that may need to be adapted in future and will remain internal to the company.

EverEnviro has developed other policies as well, to demonstrate its commitment for good corporate governance in its business operations. These policies include the following:

- Health, Safety, Social, Environment & Quality (HSSEQ) Policy

- Anti-Corruption Policy
- Anti-Money Laundering and Countering the Financing of Terrorism Policy
- Care and Dignity Policy
- Code Of Conduct for Prevention of Insider Trading
- Declaration of Fidelity and Secrecy
- Employee "Fair Play" and "Equal Opportunities" Code
- Care and Dignity Policy for protection against sexual harassment at workplace
- Framework for Managing Conflicts of Interest
- Whistleblowing Policy.

As mentioned above, EverEnviro will follow all of these while implementing the project specific plans at this project site along with the mitigation measures suggested for each of the potential impacts.

9.5.1. Waste Management Plan (WMP)

The WMP sets out the primary applicable requirements associated with waste management (hazardous and non-hazardous waste) by EverEnviro during project life cycle. It provides details and requirements of applicable National legislation and International standards, identifies the waste that is likely to be generated during the construction, operation and decommissioning phase of the project, sets roles and responsibilities for implementation, provides the waste management approach and waste types to be generated, describes waste management measures for collection, segregation, storage, transport and disposal, in addition to monitoring, training and reporting/documentation.

WMP is intended to serve as a guideline for EverEnviro, contractors and sub-contractors to manage wastes effectively during the project life cycle. The WMP describes how wastes will be managed and how the project will:

- Minimize the potential to cause harm to human health and the environment;
- Comply with reference framework;
- Reduce operational costs and any potential liabilities which may arise from waste handling operations; and
- Ensures that every waste stream and solid waste materials from the main plant site and the associated facilities will be managed effectively.

9.5.1.1. Roles and Responsibilities

Site Manager of EPC Contractor
▪ Management of onsite waste generation associated with construction works to help avoid excessive generation where practicable; ▪ Maintaining all records/ manifests of waste types including construction waste and debris, hazardous waste, e-waste, etc.; ▪ Liasioning with government-approved vendors for disposal of hazardous waste generated; ▪ Ensuring proper storage and handling of feedstock to prevent contamination, spoilage and odor; ▪ Implementing measures to minimize feedstock losses during storage and transportation; ▪ Ensure safe transportation of MSW and feedstock as per specified procedures.
Safety Officer of EPC Contractor
▪ Demarcation of area within the module area in plant premises for keeping segregated wastes; ▪ Dedicated separate bins for solid, other waste, and hazardous waste with clear labeling; ▪ Maintaining records of hazardous waste (including bio-medical waste, e-waste, etc.) generated and transported for disposal by authorized vendors; ▪ Notifying the Site Manager of any activity that may generate a large amount of waste to allow appropriate controls to be put in place to manage waste generated; and ▪ Ensure implementation of the plan by planning budget, resources and adequate modification from time to time to mitigate risks and impacts due to changes in project plan.

9.5.1.2. Waste types and quantity generated

All wastes generated from the project life cycle will be categorized as either Non-Hazardous or Hazardous waste following an assessment of the hazard potential of the materials, in line with local and national requirements.

1) ***Construction Phase***: The waste will be generated from the construction activities such as clearing, levelling, excavation, etc. Other categories of waste will be produced daily and comprise of the following:
   - Scrap metal, timber scraps, pallets;
   - Soil waste;
   - Food debris from canteen;
   - Construction debris such as broken concrete, bricks, mortar, etc;
   - Oily rags, used oil, leftover paints and filters – from generators or vehicle maintenance;
   - Packaging material such as cardboard boxes, plastic wraps, etc.;
   - Broken or damaged machinery parts; and
   - Sewage from temporary toilets.

2) ***Operation Phase***: Operations and Maintenance of the BioCNG Plant are not expected to generate any significant amount of waste, apart from the following:
   - Waste from conveyor belt;
   - Waste segregated from the wet waste at the time of laying it over on conveyor belt;
   - Oily contaminated rags from cleaning activities;
   - Used oil/waste oil from DG set or construction machinery.

3) ***Decommissioning Phase***: Waste will include demolition waste and obsolete machinery.

9.5.1.3. Waste management, handling and disposal

The non-hazardous and hazardous waste handling, management, and disposal measures during each phase of the project cycle are discussed below.

1) Construction Phase

All wastes produced from the project activities on site will be temporarily stored in designated waste storage areas. All wastes that cannot be reused or recycled will be collected by approved waste contractors and transferred to an appropriately licensed waste management facility for treatment and disposal. Following steps will be taken to manage the waste generated during construction phase:

- A waste inventory of various waste generated will be prepared and periodically updated.
- EverEnviro will provide/arrange for adequate sanitation facilities and septic tanks followed by soak pits to prevent groundwater contamination at project site for the proper management of domestic waste.
- EverEnviro will ensure collection, segregation of concrete, soil and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority as per the requirements of *Construction and Demolition (C&D) Waste Management Rules 2016*.
- Wherever applicable (in case of C&D waste generated more than 20 tons in one day or 300 tons per project in a month), submit waste management plan and obtain appropriate approvals from the local authority before starting construction or demolition.
- The excavated soil generated will be reused for site filling and leveling operations to the maximum extent possible.
- Biodegradables, Dry Waste (Plastic, Paper, metal, Wood) and Domestic Hazardous Waste (diapers, napkins, mosquito repellents, and cleaning agents) will be properly segregated and stored in designated colour-coded waste bins/containers as per the requirements of *Solid Waste Management (SWM) Rules 2016*.
- The scrap metal waste generated from erection of structures and related construction activities will be collected and stored separately in a stack yard and sold to local recyclers.
- Other Dry waste and Domestic Hazardous Waste will be collected by Government approved waste contractors and transferred to an appropriately licensed local waste management facility for treatment and disposal.

- Hazardous waste i.e., waste oil, greasing oil etc. will be collected and stored in leak proof drums (or similar sealed container) in an isolated area or secondary containments and subsequently sold to authorized recyclers (approved by UPPCB). Further, handling, labelling, storage and transportation of Hazardous waste will be done in line with the requirements of *Hazardous and Other Wastes (Management and Transboundary Movement) Rules (H&OW) 2016* (as amended). Necessary manifest for the same will be maintained.
- The Electronic wastes (i.e., electrical panels) generated will not be stored more than 180 days at Site and will be channelized through authorized collection center, dismantler, recycler etc. or through the designated take back service provider of the producer to authorized dismantler or recycler. The Company will maintain internal records as per the provisions of *E-Waste Management Rules 2022* (as amended).
- Material Safety Data Sheets (MSDS) for all applicable materials present on site will be readily available to onsite personnel.
- Biomedical waste generated at the Site will be stored in colored bags or containers in the manner as specified in Schedule I of *Bio-Medical Waste (BMW) Management Rules 2016* and EverEnviro will hand over segregated waste as per the *Schedule-I* to common bio-medical waste treatment facility for treatment, processing and final disposal.
- EverEnviro will ensure to not litter plastic waste and segregated storage of waste at source and handover segregated waste to registered waste pickers, registered recyclers, or waste collection agencies as per *Plastic Waste Management (PWM) Rules 2016* (as amended) and also Compliance of the Rules along with the State-specific Rules with respect to size, thickness and ban of Plastic carry bags and other material.

2) Operation Phase

Following measures to be taken during the operation, for management of waste include:

- EPC Contractor needs to have buyback agreements for damaged pipes, conveyor belts.
- Transportation of MSW and feedstock shall be undertaken as per specified procedures.
- Hazardous waste i.e., waste oil, greasing oil, etc. will be collected and stored in leak proof drums (or similar sealed containers) in an isolated area or secondary containments and subsequently sold to authorized recyclers (approved by UPPCB). Further, handling, labeling, storage, and transportation of hazardous waste will be done in line with the requirements of *H&OW Rules 2016*. Necessary manifest for the same will be maintained.
- The Electronic wastes (i.e., electrical parts) generated will not be stored more than 180 days at Site and will be channelized through authorized collection center, dismantler, recycler etc. The Company will maintain internal records as per the provisions of *E-Waste Management Rules 2022* (as amended).
- Proper segregation, periodic collection and disposal of the domestic waste to government-approved waste contractors and transfer to an appropriately licensed local waste management facility for treatment and disposal will be carried out.
- Proper drainage system will be provided to avoid waste water accumulation.
- Biodegradables, Dry Waste (Plastic, Paper, Metal, Wood) and general Municipal waste from office will be properly segregated and stored in designated colour coded waste bins/containers as per the requirements of *SWM Rules 2016*.
- The scrap metal waste generated from erection of structures and related construction activities will be collected and stored separately in a stack yard and sold to local recyclers.
- Other Dry waste and Domestic Hazardous Waste will be collected by government-approved waste contractors and transferred to an appropriately licensed local waste management facility for treatment and disposal.
- EverEnviro will ensure to not litter the plastic waste and segregated storage of waste at source and handover segregated waste to registered waste pickers, registered recyclers or waste collection agencies as per PWM Rules 2016 (as amended) and also Compliance of the Rules along with the State-specific Rules with respect to size, thickness and ban of Plastic carry bags and other material.
- Biomedical waste generated at the Site will be stored in colored bags or containers in the manner as specified in Schedule I of *BMW Rules 2016* and EverEnviro will hand over segregated waste

as per the *Schedule-I* to common bio-medical waste treatment facility for treatment, processing and final disposal.
- MSDS for all applicable materials present on site will be readily available to onsite personnel.

3) Decommissioning Phase

- EverEnviro will ensure collection, segregation of concrete, soil and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority as per the requirements of *C&D Waste Management Rules 2016*.
- Biodegradables, Dry Waste (Plastic, Paper, metal, Wood) and general Municipal waste will be properly segregated and stored in designated colour-coded waste bins/containers as per the requirements of *SWM Rules 2016*.
- The scrap metal waste generated from decommissioning activities will be collected and stored separately in a stack yard and sold to local recyclers.
- Other Dry waste and Domestic Hazardous Waste will be collected by Government approved waste contractors and transferred to an appropriately licensed local waste management facility for treatment and disposal.
- The Electronic waste generated will be channelized through authorized collection center, dismantler, recycler etc. or through the designated take back service provider of the producer to authorized dismantler or recycler as per the provisions of *E-Waste Management Rules 2022* (as amended).
- Biomedical waste generated at the Site will be stored in colored bags or containers in the manner as specified in Schedule I of *BMW Management Rules 2016* and EverEnviro will hand over segregated waste as per the *Schedule-I* to common bio-medical waste treatment facility for treatment, processing and final disposal.
- Hazardous waste i.e., waste oil, greasing oil, contaminated cotton rags etc. will be collected and stored in leak proof drums (or similar sealed container) in an isolated area or secondary containments and subsequently sold to authorized recyclers (approved by UPPCB). Further, handling, labeling, storage and transportation of Hazardous waste will be done in line with the requirements of *H&OW Rules 2016*. Necessary manifest for the same will be maintained.
- EverEnviro will ensure not to litter the plastic waste and segregate storage of waste at source and handover segregated waste to registered waste pickers, registered recyclers or waste collection agencies as per *PWM Rules 2016* (as amended) and also Compliance of the Rules along with the State-specific Rules with respect to size, thickness and ban of Plastic carry bags and other material.
- MSDS for all applicable materials present on site will be readily available to onsite personnel.

9.5.2. Stakeholder Engagement Plan (SEP)

Stakeholder Consultation is used as a tool to inform and educate stakeholders about the proposed project. Project activities and issues that need to be disclosed to the relevant stakeholders, include:

- Project timelines, progress/milestones and employment opportunities for the local population.
- Dissemination of information about the Grievance Redress Mechanism to all the stakeholders.
- Salient features of the operation and maintenance of the project.
- Issues related to Community Health and Safety and actions taken by the project proponent towards mitigation of the same.
- Environmental and social responsibility programs including those undertaken through CSR.

The different methods/tools that will be employed for stakeholder engagement to consult with each of the identified key stakeholder groups under the primary and secondary categories will be either one of the tools listed below or a combination of some of these depending on the category of stakeholders and the requirement of the project. The methods that will be used for obtaining the feedback of the different stakeholders are:

- Face to face discussions with individual stakeholders
- Public meetings/open house community forums like Gram Sabha, local health centers or the schools
- Formal closed-door meetings with the elected representatives or government functionaries

- Public notices through print in the form of flyers, posters, banners and public announcements.
- Formal correspondence through telephone or email.

EverEnviro has developed SEP for guiding stakeholder engagement across the project's lifecycle, demonstrating its commitment towards its stakeholders while adhering to IFC PS requirements. The SEP shall guide the process of engagement with the various stakeholder groups identified.

Implementation of SEP

All communication with stakeholders shall be recorded in the form of minutes or any other relevant format across the project lifecycle. The following details on each stakeholder engagement should be maintained in the relevant format:

- Stakeholder group
- Location
- Date of communication
- Purpose of communication
- Mode of communication
- Stakeholder response
- Further action
- Reference document (if any)

9.5.3. Grievance Redressal Mechanism (GRM)

GRM is a process for receiving, evaluating and addressing grievances from the concerned stakeholders (Customers, contractors, suppliers, employees & workers, nearby community, regulatory authorities, NGOs, Media, etc.) at the level of the Company or Project. It assists in reducing and mitigating the anticipated risks that may arise with the project development. As part of its ESGMS EverEnviro, has developed a Grievance Handling and Redressal Framework with following objectives:

- To put in place a process of receiving, recording and resolving grievances from various stakeholders, in keeping with their unique profiles and socio-economic contexts.
- To ensure that comments, responses and grievances are handled appropriately in a fair and transparent manner, in line with company's internal policies, international best practice such as IFC Good Practice Note on Addressing Grievances from Project-Affected Communities (IFC)[44].

EverEnviro shall develop a site level grievance handling mechanism for resolving the grievances on the project site in line with the Grievance Handling and Redressal Framework of the Company. The project stakeholders will be made aware about the grievance redress mechanism. The grievances received will be recorded and actions will be taken as per the procedure provided in the framework. A Grievance Redressal Committee (GRC) at the Corporate level will be constituted. The number of grievances recorded along with their resolution status, will be reported to the corporate-level GRC on a monthly basis. The Committee will conduct periodic review meeting to evaluate the effectiveness of Grievance Handling procedure and its implementation process.

9.5.4. Supply Chain Management (SCM) Plan

As part of the project, ERMPL procures raw materials like cement, reinforced and structured steel, plant & machinery, diesel, consumables, and other repair & maintenance items from multiple vendors/suppliers. Further, the Plant will also be procuring feedstock from various farmers, dairy farms, etc., during its operations. Therefore, the Company expects the vendors/suppliers to be minimally in adherence to the legal requirements stipulated. In order to address E&S risks across the lifecycle of the project, ERMPL will identify and outline the minimum E&S requirements that will be expected of the vendors/suppliers and his personnel while carrying out activities for ERMPL.

[44] Please refer to the following link for Good Practice Note: https://www.ifc.org/content/dam/ifc/doc/mgrt/ifc-grievance-mechanisms.pdf.

EverEnviro has developed a Supplier Code of Conduct that will be applicable to all suppliers/vendors engaged by the Company. The vendors/suppliers will also be monitored on an annual basis or at the time of renewal of the agreement to ensure that vendor/supplier is consistent in meeting ERMPL's technical, financial and E&S requirements.

9.5.5. Storm Water Management Plan

The purpose of Storm Water Management Plan is to ensure prevention and control of any adverse impact caused by un-regulated storm water runoff from the main plant to the nearby natural drainage channels, surface water bodies, public and private properties. Following measures will be taken as part of the Plan:

- The peripheral drains will be provided outside the plant boundary during construction phase, which will prevent the silt contaminated surface run-off from site to enter into the adjoining lands.
- No surface run-off from within the plant site will be directly discharged into any nallah/water body.
- Soils, chemicals, fertilizers, animal waste, leaves, oil and grease, trash and other pollutants need to be restricted from mixing into the streams.
- Adequate arrangements for storm water management during construction period to be made to avoid sediment runoff from the site and to avoid water logging. Storm water channels to be provided with silt traps to avoid sedimentation of the channels.
- Storm water drains shall be designed considering natural topography and as per required regulations.
- No material storage, septic tanks, waste storage, labour resting areas, etc. will be located close to this drain.
- Workers will be trained on not using this drain or disposal of any waste in it.

9.5.6. Occupational Health and Safety (OHS) Plan

The purpose of this procedure is to:

a) Ensure that risk management is embedded in EverEnviro's culture and practices;
b) Ensure a systematic approach to risk management;
c) Ensure that hazards are identified, risks are evaluated and appropriate control measures are implemented and monitored;
d) To identify the opportunities to strengthen the OHS management system and improvement in the working conditions based on Hazard Identification & Risk Assessment;
e) Describe specific risk assessment methodologies that can be applied and against which compliance can be measured.

Scope

This procedure shall apply to all workplace hazards and risks, and all activities undertaken by EverEnviro and include:

a) The routine, and non-routine, activities of all persons having access to the project site;
b) Hazards associated with plant, machinery, and equipment;
c) Hazards associated with substances and materials in the workplace;
d) Hazards originating outside of the workplace that could adversely affect the work environment;
e) Hazards associated with inclement weather or emergencies;
f) The complete lifecycle of plant from specification through to decommissioning and disposal.

Hazard Identification & Risk Assessment with Identification of Opportunities (HIRAO)

The objective of the HIRAO process is to provide a systematic basis for the identification of hazards, risks, and controls with determination of opportunities associated with the project's activities and to ensure that all risks are maintained As Low as Reasonably Practicable (ALARP). The identification, implementation and maintenance of effective controls is key to ensuring that all workplace risks are appropriately managed. Employee and contractor participation, consultation and communication are key to a successful outcome.

The HIRAO process shall be broken down into the following basic steps:

- List down all activities / Operations (Routine, Non-routine activities and situations (like severe rain, extreme temperature, emergencies etc.) inside the plant and the activities and situations outside the plant which directly or indirectly controls the working conditions inside the plant.
- These activities and situations must include the infrastructure, machines, equipment, materials, substances and physical conditions of the workplace.
- Select the operation / activity which is to be considered.
- Describe the operation/activity which is to be carried out with machine or equipment being used and define the occupation (Like Driving, Brickwork, Rag picking, etc.).
- Brainstorm all the potential hazards and risks associated with the job.
- While listing the potential hazard, proper attention must be provided to design, testing, production process, assembly, delivery, maintenance, disposal, human factors and how the work is performed.
- During the listing of the hazards; a proper listing of past relevant incident (internal or external to the organization) including emergencies shall be done.
- All proposed changes in organization, operations, processes, activities and the OH&S management system shall be considered while performing HIRAO.
- Change of knowledge and information about hazards shall also be included in HIRAO.
- Identify the reason for hazard either by source, situation or Act.
- Identify the type of concerns / situations either an interested party is affected or a legal concern or an Emergency Situation.
- All Legal concerns and Emergency conditions must have the required control in place, should be categorized Un-acceptable irrespective of quantitative analysis, hence need not to calculate the risk rating. All legal concerns & emergencies shall also be identified as OHS risks.
- For each hazard, define the worst-case outcome based on the criteria defined in ***Table 61*** and the existing controls as defined in ***Table 62***.

Table 61: Criteria for evaluating the severity and probability of a risk

Weightage	Criteria for Severity	
	Severity (Injury/ Ill health)	**Explanation**
1	***Minor injury/slightly harmful***	First Aid required on job, Superficial injuries, Minor cuts, bruises, minor burns, temporary ill health, irritation from dust/noise/vibration etc., Nuisance/ Irritation/ Discomfort, Absenteeism from work for few hours but less than a shift or an assets / materialistic loss of less than Rs. 50,000/-
2	***Moderate injury/Harmful***	Multiple injuries, minor fractures, serious sprains, ill health leading to permanent minor disability, Absenteeism from work for more than a shift or a materialistic loss of More than Rs. 50,000/- or loss of company reputation at regional level
3	***Catastrophic injury/Extremely Harmful***	Death, Severe life shortening diseases, Occupational cancer, amputations, fatal injuries, Permanent Disability or a loss of company reputation on National / International level
Weightage	**Criteria for Probability**	
	Probability (Likelihood of an occurrence of a hazardous exposure)	**Explanation**
3	***Likely***	Hazardous exposure is expected to occur in ALL circumstances.
		(Continuous to once a day)
2	***Unlikely***	Hazardous exposure is expected to occur in MOST circumstances.
		(Once a week but not daily)

1	***Highly unlikely***	Hazardous exposure WILL PROBABLY occur in MOST circumstances.
		(Once a month or more but not weekly)

Source: EverEnviro's Annexures to ESMS

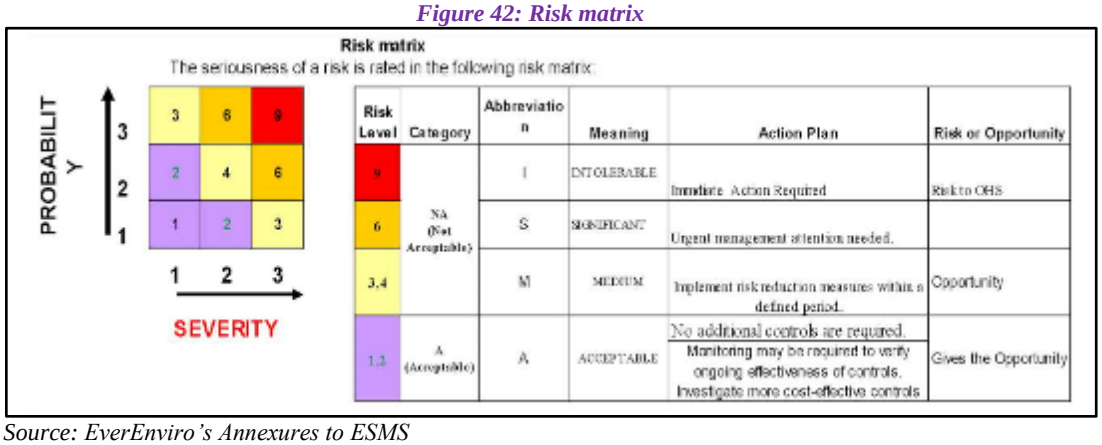
Table 62: Hierarchy of Controls

Hierarchy of Controls			
Level of Control	**Controls**	**Description**	**Concept**
A	***Elimination***	Elimination of process/dangerous operation, reorientation of work place, machines etc. so as to eliminate the hazards.	No Activity/No Man/No Machine/No Material than No Hazard. If no hazard than no RISK.
B	***Substitution***	Alteration/modification/replacement of machine, tolls, substances etc. so as to minimize/reduce the risk.	Change in type of hazard which has less Risk Level
C	***Engineering Control***	Automation, robotic operations, safety guards, limit switches, Auto Switch off Buttons, Warning Hooters, Warning Signals, Sensors, Human Sensors, Floor Mounted Ladders, Deployment of Competent Person etc.	Activity/Machine/Materials will be there and hence associated hazards too. Controls here are inbuilt with machine (mostly mechanical/alert/emergency indicators) to avoid contact of hazard and human.
D	***Administrative***	Signage, warnings, SOPs, OCPs, Work Instructions, Motivational program., Trainings, Penalties Etc.	Activity/Machine/Materials will be there and hence associated hazards too. Controls are mostly "WISH" in terms of display/trainings to control risks. If practice does not improve RISK Shall Happen.
E	***PPEs***	Correct type of Helmet, Nose mask, Aprons, Earmuffs/plugs, safety belts as per type of the hazards.	Minimum Shall be provided.

Source: EverEnviro's Annexures to ESMS

- Assess the probability, severity, and level of risk with the existing controls in place for hazards.
- Based on risk matrix as ***Figure 42***, categorize in Acceptable and Un-Acceptable risks.

Figure 42: Risk matrix



Source: EverEnviro's Annexures to ESMS

- Discuss the remedial actions / additional controls and agree on most suitable and feasible solution based on hierarchy of control as per risk acceptance.
- Assess the residual risk following the implementation of the proposed actions or controls.
- Identify the OHS Risks & Opportunities based on the risk acceptance.

- Select the next area of the plant or the next job until the HIRAO is complete for the entire plant consisting of all activities.

Risk Acceptance

Based on the risk level, as derived from the ***Figure 42*** and assigned during the HIRAO assessment, the following actions shall be taken to ensure effective risk management.

a) Un-Acceptable

- If the residual risk is 9 (Intolerable), then the operation or activity shall require immediate action;
- If the residual risk is 6 (Significant) urgent management attention is needed. These risks give rise to OHS Risks.
- If the residual risk is 3 or 4 (Medium), then the plant has to implement risk reduction measures within a defined period. It allows for enhancing the OHS system to implement risk reduction measures.

b) Acceptable

- If the residual risk is 2, then monitoring may be required to verify ongoing effectiveness of controls. It also provides the opportunity to investigate more cost-effective controls.
- While if the residual risk is 1, then no additional control is required but to enhance the safety standard, it provides the opportunity to identify the full-proofing of the process.

Cross-Functional Team (CFT)

The selection of the CFT has a direct effect on the usefulness and quality of the HIRAO process. The CFT shall consist of personnel that are knowledgeable about the plant being considered, its operation and maintenance, the materials used and the activities to be undertaken. The team can be relatively small but it should contain sufficient knowledge and expertise to be able to identify all the hazards and the risks associated with the plant and the activities.

As a minimum, the assessment team should include: the equipment plant supervisor/equipment engineer or the process plant supervisor/process engineer for the plant; operations representatives (supervisor, senior operator); maintenance representatives (supervisor, senior technician) and an HSE representative. The HSE representative shall ensure consistency of approach and provide input on the hazards, risks and the potential severity of the consequences. Where specialized knowledge is required to address specific hazards or risks then additional team members can be temporarily included as necessary.

Roles and Responsibilities

A RACI chart for the HIRAO process is given in ***Table 63*** below. The RACI chart defines who is responsible and accountable for each step in the process and who needs to be consulted or informed.

Table 63: RACI Matrix for HIRAO process

Process Step	Project Manager	Engineers	CFT
Define the scope of the assessment	A	R	I
Form CFT	A	R	I
Select area, process or job	A		R
Identify the hazards	A		R
Identify the present controls	A		R
Assign probability and severity	A		R
Determine the current risk level	A		R
Identify remedial actions/controls	A	C	R
Identify the responsible party	A	C	R
Determine the residual risk	A		R
Review HIRAO for accuracy and completeness	A	R	C
Add HIRAO to the database	A	I	R
Verify controls are implemented	A	C	R

Source: EverEnviro's Annexures to ESMS
Legend: R: Responsible for carrying out activity, A: Accountable for outcome of activity, C: Must be Consulted, I: Must be Informed.

After completion of the HIRAO, it is the responsibility of the line management of the concerned project to:

a) Disseminate the key findings from the HIRAO and specifically highlight any medium or high risks and their associated controls;
b) To check that the identified controls have been implemented and are being complied with in the field. Checking the effectiveness of controls can be achieved through the inspection of documentation such as SOPs, method statements, work permits, inspection and maintenance records, training records, and direct observation.

Training Requirements

EverEnviro shall ensure that every employee/worker (direct or contractual) is aware of the EHS risks associated with the work being carried out at the site and is trained and competent in the relevant work practices and maintenance procedures. The Company shall also establish procedures to identify training needs and provide adequate safety training for all levels of employees including contractors. The safety training should provide staff with the knowledge and skills necessary for organising and managing occupational safety and health programmes; team leaders with leadership skills and knowledge to lead, implement and apply occupational safety and health activities; and workers with the knowledge, skills and right attitudes to enable them to work safely. Training proposed for the project includes but not limited to:

- Induction Training on Health and Safety covering
- HSE policy;
- Hazards and risks associated with operation and workplace;
- Control measure to eliminate or minimize HSE risks, including safe working systems and procedures; use of personal protective equipment; action to be carried out during emergency;
- Emergency response procedures, such as firefighting and evacuation procedure;
- Tool Box Training or pre-task briefings, highlighting hazards and the method of dealing with them;
- Special Job Hazard Training including entry into confined space and another hazardous environment; and
- Training on first aid

Documentation and Record Keeping

EverEnviro shall maintain data and records concerning the identification of hazards, assessment and control of risks of the ongoing activities. The document shall establish and maintain procedures for controlling all relevant EHS documents and data. Such documents can include but not limited to:

- EHS Policy;
- Hazard Identification Records;
- Risk Register;
- Licenses, Certificates, Permits;
- Control Methods including process control and machine design, safe work procedures, in-house work rules;
- Design Drawings;
- Organization Structure;
- HSE group meeting records;
- Training Records;
- Drill Reports;
- Inspection and Audit Records;
- Incident/ Accident Records; and
- Medical and Health Surveillance Records

9.5.7. Labour Management Plan

The Plan shall be implemented to ensure systematic identification and evaluation of risks associated with labour and working conditions. The labour and working conditions risk evaluation will consider gaps and absence of procedures and practices related to:

- Legal requirements
- Human Resources Policies and Procedures
- Working Conditions and Terms of Employment
- Workers' Organizations
- Non-Discrimination and Equal Opportunity
- Retrenchment
- Grievance Mechanism
- Child Labor
- Forced Labor
- Deployment of security
- Migrant labour (as applicable)
- Worker's accommodation (as applicable)
- Contractors and contract labour
- Personal Protective Equipment (PPE)
- Primary supply chain and risks of forced labour and child labour

Scope

This Plan describes the requirements and expectations in terms of compliance, reporting, roles, supervision and training with respect to labour and working conditions including camp accommodation (if required). This Plan shall be applicable to EverEnviro's contractors and sub-contractors, recognizing that Company's effectiveness in managing third parties will vary in accordance with the leverage Company is able to exercise.

Objectives

The objectives of this Plan are to:

- Promote fair and equitable labour practices for fair treatment, non-discrimination and equal opportunity of workers
- Establish, manage and promote a healthy management-worker relationship
- Protect workers' rights including migrant and third-party workers
- Promote healthy, safe, secure and comfortable accommodation that does not impact the local community in the surrounding area.

Labour and working conditions risks

ERMPL is committed towards providing good working conditions and adopting fair labour practices. The Company acknowledges that negligence towards providing appropriate labour and working conditions could lead to high levels of turnover and absenteeism leading to higher cost for recruitment and training. Worker productivity suffers with unsafe working conditions and lack of conducive environment. Poor working conditions can also lead to worker strikes that can be a drain on management time and resources causing delays and reputation damage. The Company has thus identified the risks related to potential labour and working conditions posed to the business during the construction and operation phases of project as presented in ***Table 64***.

Table 64: Potential risks in labour and working conditions in the Plant

Potential labour and working conditions	Potential negative impacts
Discrimination in Employment (e.g., abrupt termination of the employment, working conditions, wages, or benefits etc.	Discrimination Attrition Lower productivity and poor morale amongst staff.
Lack of awareness amongst managers and supervisors of worker's rights under the national labour laws or collective agreements.	Exploitation of workers Human rights violation Punishment/penalties and Loss of reputation

Forced labor or penalty labor through practices such as signing bonds, retaining caution money etc.	Exploitation of workers Human rights violation Punishment/penalties and Loss of reputation
Deployment of child labour	Exploitation of workers Human rights violation Non-compliance with stipulated working norms Punishment/penalties and Loss of reputation
Non-compliance with labor laws with respect to working hours, wages, social security measures, worker insurance, accident compensation	Exploitation of workers Non-compliance with stipulated working norms Punishment/penalties and Loss of reputation
Discrimination between migrant and non-migrant workers, misusing migrant worker's vulnerability.	Exploitation of workers Human rights violation Non-compliance with stipulated working norms Punishment/penalties and Loss of reputation
Differential treatment towards contract labour, especially in terms of wages, social security measures, worker insurance, accident compensation and working conditions.	Exploitation of workers Worker safety Non-compliance with stipulated working norms Punishment/penalties and Loss of reputation
Absence of procedure for workers to express their grievances.	Discrimination Disciplinary abuse and harassment
Harassment, intimidation, and/or exploitation, especially in regard to women	Exploitation and harassment of women work force
Lack of awareness or due diligence of supply chain labor risks in outsourced / contracted processes	Exploitation of workers.

Risk Assessment

The labour and working conditions risk will be assessed as 'High', 'Medium' or 'Low' based on consultation, so far as is reasonably practicable, with Plant Head, HSE In-charge and HSSE Team. The existing controls will be evaluated on two (2) criteria:

- Whether the control is well designed?
- Whether the control is effectively implemented?

The existing controls in place could be Procedures/ Practices/ Measurement & Monitoring Measures and their combinations. The criteria for evaluating existing controls are presented below:

Well-designed control?		Effectively implemented?	
Need improvement	3	Deficient	3
Adequate	2	Marginal	2
Strong	1	Effective	1

For labour and working condition aspects that are identified to have high or medium risk and the associated controls are assessed to be weak in terms of designed or are deficient in implementation will be considered to be of high-risk category under residual risk. A sample Terms of Employment, for engaging workers, is provided as ***Annexure-5*****.**

Workers Accommodation – Inspection of Accommodation Facilities

It was observed that labour camp has been established to provide temporary accommodations to all migrant workers on the site. The rented accommodations provided shall be inspected at frequent intervals to ensure that the facilities are well organized and maintained to acceptable and appropriate standards. The key areas are:

- Daily sweeping of rooms and houses shall be undertaken;
- Regular cleaning of sanitary facilities shall be undertaken;

- The kitchen and canteen premises shall be established under good hygiene conditions;
- Daily meal times shall be fixed for the labour;
- Smoking and alcohol consumption shall be prohibited in the workplace;
- Water logging shall be prevented at areas near the accommodation facilities and adequate drainage is to be provided;
- Checklists of the daily housekeeping schedule shall be maintained and displayed at toilets and kitchen.

9.5.8. Community Health and Safety Plan

Access control and barricading shall be done to prevent the entry of unauthorized persons which protect people from exposure to construction site activities and any possible accidents. Following additional mitigation measures shall be incorporated to avoid/reduce the potential impacts:

- Comprehensive traffic management plan should be prepared to avoid traffic congestion in the region.
- Efforts should be made to avoid heavy vehicle movement during peak traffic hours.
- Use of open ground, community properties, etc. for project activities or parking should not be done without proper permissions of concern authorities.
- Efforts should be made to avoid dismantling/misfunctioning of any community infrastructure like road, gas, telecommunication, etc. without prior permission of concern authorities and due intimation to community which will be affected.
- The work scheduled should be arranged to avoid any nuisance to nearby communities.
- Work area should be barricaded to ensure public safety and access to such area should be prohibited for locals and passers-by.
- Contractors should display appropriate signage in local language at the construction sites to make the travelers aware of the ongoing work.
- The segregation, storage and disposal of various solid and liquid wastes generated at site should be as per relevant applicable national regulations. Disposal of solid and liquid waste should be done at designated areas with proper permission from concern authorities.
- All construction machinery and equipment's should be operated and maintained regularly in such a way so that air emission, noise or vibration related impacts are minimal on nearby community.

9.5.9. Traffic Management Plan

A Traffic Management Plan is required for the management of traffic due to movement of vehicles for transport of equipment and material. Additional traffic on the village road can be managed by measures mentioned below.

- It is important that the project uses the designated roads and not the village roads for transportation.
- Scheduling of transportation vehicles at non-peak hours and also avoid school buses plying timings so as to avoid any traffic congestion.
- Only trained drivers with valid license shall be recruited by the Company for transfer of material.
- Training program for all the drivers, regarding awareness about road safety and adopting best transport and traffic safety procedures shall be provided before initiation of the decommissioning activities;
- Mitigation measures such as emphasizing on safety amongst drivers, adopting limits for trip duration and arranging driver roster to avoid overtiredness and avoiding dangerous routes and times of day to reduce risk of accident shall also be implemented;
- Regular maintenance of vehicles and use of manufacturer approved parts should be adopted to minimize potentially serious accidents caused by equipment malfunction or premature failure;
- Turning to the access road from the nearest arterial road to be maintained taking into consideration commuter's safety;
- Drivers will be adequately trained on the requirements of national & local legal requirements to drive a vehicle.

- All heavy vehicles like JCB, cranes, battery operated trolleys etc. to be provided with reversing siren and locked.
- Vehicles will not be allowed to park anywhere else outside the dedicated parking area. Parking area will be provided with oil and fuel adsorbent materials or drip trays in case of any leakages.

9.5.10. Emergency Preparedness & Response Plan

EverEnviro has established an Emergency Preparedness and Response Plan for identification of types of accidents and emergencies that may occur, giving due consideration to the area that may be impacted, communities and individuals who may be impacted, and detail out the response procedures, provision of equipment and resources, designation of responsibilities, communications and periodic training requirements to ensure effective response.

The prime objective of the emergency response plans is to ensure that the activities are carried out in the following priorities:

- Safeguarding lives
- Protecting the environment
- Protecting company and third-party assets
- Maintaining company image and reputation

Responsibilities

The Project Manager will be responsible for implementing the procedure on developing emergency preparedness and response plans and ensure that the plant has the Emergency Preparedness and Response Plan for the possible emergency scenarios relevant to the plant. The Project Manager will designate coordinators from the team personnel to address the specific issues that arise during an emergency. The number of coordinators will depend on the size of the plant, the manpower engaged as well as the potential of emergency envisaged. Multiple roles can be designated to a single person. Following are the coordination roles that are envisaged for the plant:

- **General Emergency Coordinator** – Assumes overall responsibility of managing any emergency incident. During an emergency incidence, General Emergency Coordinator will assess the severity of the emergency, mobilize the relevant team(s) and specific coordinators.
- **Transport Coordinator** – Responsible for evacuating personnel away from emergency site/project and coordinate with transport agencies.
- **Hospital Coordinator** – Responsible for coordinating with first aid team to identify casualties that require medical treatment and guide the ambulance.
- **Statutory (police/fire/security) Coordinator** – Responsible for coordinating with fire department in case of fire incident, local police in case of injury or fatal incident and other statutory authorities like labour officer, municipal corporation etc.
- **Welfare Coordinator** – Responsible for looking after the welfare of the employees including water arrangement, coordinating with families, etc.
- **Electrical and mechanical team** will respond to the alarm and decide to de-energize the plant if necessary.
- **Rescue teams** include fire rescue and stretcher team and will be guided by a local emergency leader.
- **Response teams** include the firefighting team, first aid team, ambulance or emergency vehicle driver and transport operator.

Procedure

The process of developing emergency preparedness and response plans will be through the following steps:

- Identification of all potential emergency scenarios applicable to the Plant
- Preparedness and response planning for all the potential emergencies identified
- Emergency plant shutdown procedure
- Evacuation planning
- Minimum emergency equipment availability
- Communication, trainings & capacity building
- Mock drills
- Community preparedness & response on emergencies

The following sections presents the activities to be undertaken under each of the steps.

1) Identification of all potential emergency scenarios

Depending on the Plant, its geographical location, and physical surrounding, the potential emergency categories will be identified. An indicative listing of such potential emergencies for this Plant are listed below:

Fire and explosion
Natural calamities such as cyclones, earthquakes, tsunami, flooding, etc.
Man-made such as bomb threat, terrorism, epidemic, etc.
Electrical shock
Gas leak (methane)
Vehicle collision

All identified potential emergency categories shall be documented.

2) Preparedness and response planning

A comprehensive and well-practiced plan is essential to respond to emergencies in an orderly and effective manner. The plant will ensure that for all the identified potential emergency scenarios, procedures are prepared for immediate implementation in the event of an emergency incident. For all the identified potential emergencies, preparedness and response plans will be developed which will cover all aspects of the action to be taken in the event of an emergency. The plan will minimally include:

- Individual or teams responsible for implementing a procedure
- The specific action to be taken by those at the location of the emergency to raise the alarm
- Initial action to contain and overcome the incident
- Procedures to be followed in mobilizing the resources, as required by the incident
- Actions to be taken to minimize the impact of the incident (Incident Control)

The plans will also include the actions to be taken post the emergency period. These actions are aimed at rehabilitation for return to normalcy.

Following general preparedness will be considered at the plant:

- Alarm systems (siren) will be maintained. The alarm system will be made known to all workers.
- Emergency lighting facilities will be available to aid evacuation at night and in poor lighting conditions.
- Means of escape will be provided in all work areas and storages and maintained and kept free from obstruction, at all times.

- Emergency evacuation signages (glow-in-the-dark labels) to be placed across the facility
- Daily attendance register of all personnel at site will be maintained.
- Visitor registers, including other personnel coming to the facility premises will be maintained.

3) Emergency plant shutdown procedure

Emergency plant shutdown procedure should be developed considering the processes implemented in the plant. The emergency shutdown procedure may include but not limited to):

- Shut down of part systems and equipment
- Isolation of electrical equipment
- Depressurization or blowdown
- Emergency ventilation control
- Feed control / stoppage

4) Evacuation planning

Many of the emergency incidences will require evacuation employees in the plant. First aid team to list all evacuation resources and/ or equipment assigned to the incident. Following considerations will be undertaken for evacuation:

- Depending on the type and extent of emergency, the evacuation may be carried out.
- Layout of the plant should be printed with the evacuation routes clearly marked.
- The plant will document safe exit plan and will have identified and demarcated all exit points.
- Adequate exit signages which are radiolucent (to ensure visibility in dark) will be placed in the plant which will direct the evacuees towards the location of exit.
- Safety Officer shall ensure the viability of evacuation equipment along with emergency and rescue equipment.
- In case of an emergency, the employees shall be evacuated to a nearby hospital.
- Employees will be trained and during the conduct of mock drills the safe evacuation from the plant will also be tested.
- The evacuation process will be overseen by the Safety Officer headed by Plant Head and will have assume communication with authorities needed to take any decision related to the evacuation process.

5) Identification of emergency response organization

a) **Site Safety Committee**: EverEnviro shall constitute a Site Safety Committee that will be headed by Project Manager. All other members of this committee will be designated. The Committee will meet at least once every month and will discuss the emergency Preparedness of the plant. The meeting agenda minimally will be the following:

- Any emergency and incident addressed
- Status of Emergency Preparedness Equipment
- Test and verification of Emergency Preparedness Equipment undertaken
- Coordination and liaison with external agencies
- Mock drills conducted and outcomes
- Associated investigation report review
- Adequacy of the existing EPRP

The meeting outcomes will be recorded as minutes of the meeting and the records will be maintained.

b) **Emergency Control Centre (ECC)**: In case of an emergency, the Site Safety Committee members will assemble at the ECC. As informed, the ECC location has been identified near the security gate. The Command Centre will be equipped with the latest copies of the emergency response plans, communication devices and will have ready access to transport at all times. Every plant will also identify the evacuation teams. The team members will be trained in Evacuation procedures as laid down in Plant Evacuation Plan. All emergency equipment will be available at ECC and documented. During an emergency, the ECC will be activated, and the designated members will reach the designated location at the earliest possible.

6) Identification of emergency equipment

EverEnviro shall provide adequate emergency equipment that will be required for abatement and containment of impacts arising out of the emergency incident. Emergency equipment will comprise devices for (not limited to):

Emergency treatment: First-aid box, self-contained breathing apparatus
Emergency communication: Telephones, walkie-talkies, public address systems
Early detection and alarm system: smoke detectors and alarm systems
Emergency lighting
Fire abatement: Fire hydrant system (including distribution and fire hoses), Fire extinguishers, sprinkler system, fire beater, fire suit
Flammable gas detectors: CBG storage is to be provided with flammable gas detectors which shall activate visual and audible alarm
PPEs: Electrical gloves, masks, goggles, safety helmets, safety shoes, fire suits, breathing apparatus
Others: Rescue kit, spill care kit, folding stretchers, rescue ladders, barricade tape.

An updated list of emergency equipment will be maintained at the plant. Routine inspection/monitoring will be carried out by competent persons to ensure that all emergency equipment and plant are in operational condition and accessible in case of an emergency.

7) Communication, trainings and capacity building

Communication, training and capacity building on emergency preparedness is considered of paramount importance by the Company and towards these various modes may be used. The communication on emergency response will be intended for all employees and contractual workers. The content of communication will be decided based on the role envisaged for the stakeholders and on the need-to-know basis. Following mandatory Signage will be displayed at prominent work locations:

- Dos and Don'ts in case of emergency incidents
- Safety Instruction Signage (Safe Assembly Point, First-aid centre, emergency phone numbers etc.) at prominent locations on project site to create emergency awareness
- All persons at the plant, including contract workers, will be provided with induction and ongoing training to ensure they have a general awareness of the emergency preparedness plans and the capability to undertake their roles and responsibilities in the event of an emergency incidence.
- The training coverage will at the minimum include:
  a) General duties, roles and responsibilities in case of emergencies
  b) Emergency functions of the organisational structure
  c) Emergency procedures
  d) Emergency equipment

All trainings to workers will be conducted in language(s) easily understood by the workers. Such workers who may be involved in firefighting or evacuation will be trained to build competence in use firefighting systems and correct evacuation techniques.

8) Communication preparedness & response on emergencies

EverEnviro shall identify the communities located in close proximity to the plant that may be impacted due to their potential operational emergencies. For such emergency incidents that may impact the community, the preparedness and response measures planned for the plant to address these emergencies should be communicated.

9) Mock drills

The emergency action plan shall be tested on a regular basis through Mock Drills to test the response procedures which includes but not limited to:

- Firefighting using equipment that will be available in an emergency
- Co-ordinated operation with outside bodies
- Evacuation
- Spill containment and clean-up

- Speed of mobilisation of emergency teams

Mock drill schedule will be developed for the plant. Unannounced drills will also be held, followed by discussions aimed at highlighting any deficiencies encountered. Evacuation drills are considered an essential part of mock drill and will help to minimise panic in an actual emergency. These drills could include outside emergency response agencies, as applicable.

9.6 E&S Management and Monitoring Plan (ESMMP)

The ESMMP has been developed following the delineation of impacts and mitigation measures. These measures will be adopted by the project proponent and imposed as conditions of contract of the sub-contractor employed for respective phases of the BioCNG project. The mitigation measures suggested during operations will be made part of the regular maintenance and monitoring schedule. The ESMMP includes the following:

- Mitigations suggested for adverse E&S impacts and associated risks;
- Institutional arrangement - management tools and techniques for the implementation of E&S impacts and risk mitigations;
- Monitoring and reporting of requirements and mechanisms for the effective implementation of the suggested mitigations;
- Monitoring arrangements for effective implementation of suggested mitigations for the proposed project; and
- Reporting and Documentation requirements to the regulatory agencies and funding institutes.

Table 65 provides below elaborate ESMMP for pre-construction, construction, operation and decommissioning phases.

Table 65: E&S Management and Monitoring Plan during Pre-Construction, Construction, Operation and Decommissioning Phases

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
PRE-CONSTRUCTION PHASE								
1	***Permit Compliance***	Non-compliance to various regulatory and environmental permits required and pertaining to the BioCNG project or there could be legal implications to ERMPL	EverEnviro shall obtain various environmental permits such as NOC for abstraction of groundwater (if applicable), Factory License, and Consent from SPCB.	Project Manager	ERMPL shall ensure that periodic EHS audits are conducted to verify permit requirements and associated compliances.	As per required permit	-	Legal Register maintained at site
2	***ESMMP Implementation***	Inadequate implementation of ESMMP by contractor	Site-specific environment management system and procedures shall be prepared before construction work commences. Social, environment, health and safety organization chart shall be prepared at corporate and site-specific levels Proper procedure shall be developed for training of personnel & contractor, ESMMP	Site Manager	EverEnviro and its contractors shall ensure periodic audits are conducted to verify the implementation and effectiveness of the management systems	Before the construction begins.	-	Report from Site Manager to Project Manager

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			monitoring and reporting.					
CONSTRUCTION PHASE								
1	***Construction and strengthening of access roads;*** ***Construction of digesters, admin building, canteen, compressor building, etc. structures***	Change in land use from agricultural land to industrial land Change in topography Inadequate implication of ESMMP by Contractor	Construction activities to be restricted to designated area Contractor shall follow all stipulated conditions for pollution control as suggested in ESMMP and as per the regulatory requirements Equipment conforming to the latest noise and emission control measures shall be used. PUC Certificates for all vehicles and machinery shall be made available for verification whenever required On completion of construction activities, land used for temporary facilities such as temporary labour camp should be restored to the extent possible The land use in and around permanent	Project Manager Site Manager	Monitor the extent of construction activities and vegetation clearing activities	Weekly monitoring	-	Report from Site Manager to Project Manager

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			project facilities not to be disturbed					
2	▪ ***Vehicular movement*** ▪ ***Piling and excavation work***	▪ Excavation can disturb the original topography of the area which can further lead to soil erosion.	▪ Excavated material to be stock piled and used for backfilling of foundations, etc.; ▪ Vehicles will utilize existing roads to access the site.	Project Manager Site Manager	To identify if any remedial measure is required on site for soil conservation to prevent soil erosion.	Weekly monitoring	-	Monitoring checklist to be maintained on-site by Site Manager
3	▪ ***Painting of structures*** ▪ ***Storage and transport of construction materials, oil and lubricants, hazardous waste, etc.*** ▪ ***Waste generated from Site Office***	▪ Soil Contamination due to dispersion of construction material and oil leaks/ spillages from vehicles and machinery operating at site and due to improper handling of domestic sewage	▪ Painting of the structures to be done only after covering the land beneath with impervious material (HDPE Liners) ▪ Ensure that no unauthorized disposal of used oil/waste oil and other hazardous waste is undertaken at the site and log book to be maintained for quantity and type of hazardous waste generated and disposed off through authorized vendor(s) ▪ Store hazardous materials like fuel for DG sets, paints, thinners, lubricating oil	Site Manager Safety Officer	▪ Site Manager to monitor painting activities, storage of hazardous material (including hazardous waste) with adequate labelling and secondary containment during construction phase to prevent soil contamination on site.	Daily monitoring	Workers involved in painting of structures to be briefed about the need to prevent contamination. Training for storage and handling of hazardous material on site to be provided to workers.	▪ Training calendar for trainings during construction phase to be developed and implemented on site. ▪ Training records for prevention of contamination to workers to be maintained on site. ▪ Log book for quantity and type of hazardous

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			and used oil in an isolated room with an impervious surface and a secondary containment system with a spill control kit Store and label hazardous materials like diesel, lubricating oil, paints, etc., as per the statutory provisions of *MSIHC Rules 1989* under the *EPA 1986*, as amended to date Temporary paved areas to be constructed to be used while refueling the machinery. In case of any accidental spill, the soil will be cut and stored securely for disposal with hazardous waste Designated area to be provided for MSW and daily collection and period disposal to be ensured Construction and Demolition Waste to be stored separately and be periodically collected by an		Site inspection of storage yards for MSW and C&D wastes. The workforce to be sensitized to handling and storage of hazardous substances viz. fuel oil, machine oil/fluid etc. The workers engaged in handling of hazardous substances to be briefed about the possible hazards and the need to prevent contamination.			waste generated to be maintained by site personnel.

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			authorized vendor, treatment and storage facility.					
4		▪ Dispersal of contaminants	▪ Cover the loose construction material to avoid being carried into adjacent areas by wind. ▪ Store all kinds of waste in a shed provided with weather protection and is away from natural drainage channels. ▪ In case of any accidental spillage, the contaminated soil to be immediately collected and stored or disposal as hazardous waste.	Site Manager	▪ Monitoring of storage of construction material on site to prevent any contamination by spillage or being carried away by wind/ storm/ rain.	Daily monitoring	Training for storage and handling of construction material on site to be provided to workers to prevent dispersal of contaminants.	▪ Maintaining training records on site.
5	***Soil Quality Monitoring***	▪ Soil quality monitoring performed	▪ Soil quality to be monitored	HSE Manager	▪ Soil quality monitoring	Annually	-	▪ Soil quality monitoring records
6	***Drinking water provision for workers***	▪ Water-borne diseases by consumption of contaminated water	▪ Water quality to be monitored for the water procured through tankers	HSE Manager	▪ Water quality testing as per BIS Drinking Water Standards IS 10500:2012.	Annually		▪ Drinking water quality monitoring records
7	***Water Use***	▪ Depletion of water resource ▪ Possibility of contaminated	▪ Adequate permits for groundwater extraction ▪ Machinery and vehicles to be	Site Manager/ O&M Team	▪ Entire workforce to be sensitized	Monthly		▪ Report from Site Manager to Project Manager

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
		runoff from site entering the nearby water bodies	thoroughly checked for presence of leaks, if any. Provide storm water drains		to optimal use of water; Storm water drains to be checked regularly to prevent clogging; A record for daily supply and consumption of water to be maintained in order to assess usage and wastage of water			Training and inspection records maintained by Site Manager
8	***Movement of vehicles***	Pollutants (Sox, NOx, PM) discharge into surrounding air from exhaust emission of construction vehicles.	All the project vehicles to have a valid Pollution Under Control (PUC) Certificate and to be regularly maintained. Vehicular speed to be limited 10-15 km/hr on site to reduce the potential for dust generation. Idling time of vehicles to be reduced to the extent possible.	Site Manager HSE Manager	Monitoring record/187e commen to be maintained for all vehicles. All project vehicles are to be monitored for a valid PUC Certificate	PUC of vehicles to be checked during initiation of project. Weekly maintenance of vehicles.		PUC Certificate Vehicle maintenance and inspection records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
					and regular maintenance. Monitoring of vehicles carrying construction material for use of tarpaulin sheets during transportation.			
9	***Construction activities such as foundation, excavation work and site clearance***	Fugitive emissions	Tarpaulin sheets to be used to cover construction material during transportation and in storage area. Water sprinkling to be done on and near the project activities to control air pollution.	Site Manager	Monitoring of loose construction material and stockpiles. Monitoring of water sprinkling schedule and activity to control air pollution.	Daily	Training to site workers for use of tarpaulin sheets and water sprinkling to prevent air emissions.	Training records Water sprinkling records
10	***Exhaust emissions from diesel generator (DG) sets***	Point source pollution	DG sets to have appropriate stack height as per CPCB norms. DG sets, construction machineries and other	HSE Manager	Monitoring of DG stack emissions	Monthly	Training for use of DG and other machineries on site	DG set emission monitoring records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			equipment to be turned off when not in use. ▪ Exhaust emissions of construction equipment to be in compliance with the emission standards set by MoEF&CC/ CPCB.					
11	***Air quality monitoring***	▪ Air quality monitoring	▪ Use dust control measures, low-emission machinery, and monitor air quality to have a minimum impact on air quality due to Construction activities.	HSE Manager	▪ Air Quality Monitoring as per NAAQS; WBG EHS Guidelines	Quarterly		▪ Air quality monitoring records
12	***C&D activities, Operation of machineries and DG sets, vehicular movements***	▪ Impact on Noise levels in the study area (Increase in noise level)	▪ Mobile noise sources such as cranes, earth moving equipment and HGVs to be routed in such a way that there is minimum disturbance to receptors. ▪ Only well-maintained equipment to be operated on-site; ▪ Inherently quiet construction equipment and machines to be used to maintain the noise level to minimum.	Site Manager HSE Manager	▪ Nosie Quality monitoring ▪ Ensure that noise emissions of construction equipment comply with emission standards. ▪ Verify the license, permits and consents issued to construction	Quarterly		▪ Noise emission monitoring records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			▪ Only limited construction activities are to be carried out during night-time. ▪ All loud and sudden noises to be avoided wherever possible and fixed noise sources are to be located at least 50m away from the site boundary. ▪ Rubber padding/noise isolators are to be used for construction equipment/machinery. ▪ Temporary noise barriers are to be provided surrounding the high noise generating construction equipment. ▪ The personnel involved in high noise generating activities to be provided with personal protective devices to minimize their exposure to high noise levels. ▪ Construction vehicles and machinery to be well maintained and not kept idling		material supplier at least once in 3 months. ▪ Random inspect the vehicles used for transporting construction material to see if they are complying with the recommended mitigation measures.			

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			▪ Minimal use of vehicle horns and heavy engine breaking in the area to be encouraged when not in use.					
13	***Vehicular movements to the project Site Parking of the project vehicles***	▪ Adverse impacts on the community ▪ Risk of traffic-related accidents and injuries and increased pollution ▪ Improper parking causes nuisance to others	▪ Only trained drivers with valid license to be recruited by the construction contractor/ EverEnviro.	Site Manager	▪ Monitoring of training records for drivers training and onsite inspection of drivers' conduct	Once in a week onsite inspection of drivers' conduct Quarterly Monitoring of training records	Training programs are to be conducted once every three (3) months for all the drivers to raise awareness about road safety and adopt the best transport and traffic safety procedures.	▪ Driver training records
14	***Working at heights*** ***Working with live electrical components*** ***Operation of cranes and other mechanical lifting equipment***	▪ Encounter with live electrical wires. ▪ Injury, near misses and fatalities for labour contracted on site	▪ All material will be arranged systematically with proper labeling and without any protrusion or extension onto the access corridor. ▪ Loading and unloading operation of equipment to be done under the supervision of a trained professional;	Site Manager HSE Manager	▪ Regular monitoring of use of PPE by workers on site. ▪ An accident reporting and monitoring record	Daily or as and when required.	Weekly Training to workers for use of PPE and emergency response measures.	▪ Training records of workers for use of PPE on site. ▪ Monitoring records of use of PPE by workers on site. ▪ Inspection records.

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			▪ The contractor to ensure that no person is engaged in driving or operating lifting appliances unless he is sufficiently trained, competent and reliable, possesses the knowledge of inherent risks involved in the operation and is medically examined periodically; ▪ The contractor to ensure that machinery is equipped with a legible, durable load chart that shows the manufacturer's recommended load configurations and maximum load weights; ▪ All the workers to be provided with personal protective equipment (PPE) such as helmets, safety glasses with side shields, hard hats, safety shoes, gloves, ear muffs, safety belts, safety harness etc.		should be maintained. ▪ Monitoring of Permit to Work system			▪ Incident Accident Records ▪ Training records of Permit to Work to workers

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			▪ Excess waste debris and liquid spills to be cleaned up regularly to avoid slips and falls; ▪ Clear traffic ways to be made to avoid driving of heavy equipment over loose scrap. ▪ Controlling vehicle traffic through use of one-way traffic route, establishment of speed limits, and on-site trained flag people wearing high visibility vests or outer clothing covering to direct traffic. ▪ Appropriate permits to work to be provided for electrical work, hot work, working at height on site.					
15	***Labour health & safety***	▪ Working hours and hygiene ▪ Ill health or injury	▪ Pre-induction health check-up for all workers on-site ▪ Stretch breaks and rest to be mandatory to reduce overexertion. ▪ Hygienic sanitation facilities to be provided for workers on site.	HSE Manager	▪ Conducting health check-ups ▪ Monitoring of working hours and hygienic conditions maintained on site.	Daily		▪ Report of medical check-up ▪ Workers attendance records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
		▪ Emergency response	▪ Fire alarm system to be installed at the construction site. ▪ Fire extinguishing equipment to be provided in adequate number on site to handle any possible fire outbreaks; ▪ Fire and emergency drills to be undertaken on site ensuring participation from all the workers on site. ▪ Information regarding the nearest police station, hospital and fire station to be displayed on the site.	Site Manager HSE Manager	▪ Regular monitoring of firefighting equipment on site.	Monthly	Weekly Emergency response training/ Mock drills are to be undertaken on site with participation from all the workers on site.	▪ Fire drill records ▪ Emergency training records
16	***Waste generation, handling, and disposal***	▪ Hazardous/ non-hazardous waste during construction phase may have adverse impacts on surroundings/ work force and adjacent communities. ▪ Storage and handling of	▪ Ensure preparation and implementation of Waste Management Plan on site for hazardous and non-hazardous waste. ▪ Segregated waste storage area for hazardous and non-hazardous waste to be maintained on site. ▪ Agreement with authorized vendors of UPPCB for transport	HSE Manager	▪ Monitoring of hazardous and non-hazardous waste ▪ Storage area for proper storage of waste and detection of any leaks/ spillage/ emissions	Weekly Monitoring of storage area Monthly monitoring of implementation of waste management plan on site.	Weekly training to workers for handling and storage of hazardous and non-hazardous waste.	▪ Worker's training records ▪ Waste storage area monitoring records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
		hazardous waste on-site may trigger legal implications	and disposal of hazardous waste. Avoid or minimize the potential for community exposure to hazardous materials and substances that may be released by the project. Waste (Hazardous/ non-hazardous) management Plan to be prepared and implemented by site management. Any kind of hazardous waste generated to be managed, stored, and disposed of as per the *H&OW Management Rules 2016*.		Monitoring of authorizations obtained by vendors for hazardous waste handling and disposal.			
17		Accumulation of wastewater	Areas meant for washing to be provided with a proper drainage system to avoid wastewater accumulation.	Site Manager HSE Manager	Monitoring of waste water drainage channels for any leakages and water accumulation.	-	-	Inspection records/photographs of wastewater drainage channels.
18		Waste storage and disposal	Segregation of waste to be done by storing different kinds of waste	HSE Manager	Monitoring of waste storage area	Weekly	Weekly Training to workers for	Training record of workers

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			in respective colour coded bins. Lubricating oil, waste oil and used oil to be stored in leak proof tanks on paved impervious surface and a secondary containment system. Ensure proper storage of construction waste and make arrangements for regular disposal of waste to the local municipal waste disposal site.		Ensure proper storage and disposal of construction waste.		storage of waste in segregated bins, and storage and handling of hazardous and construction waste	Monitoring records of hazardous, non-hazardous, domestic and construction waste
19	***Construction activities, movement of vehicles***	Displacement of fauna, disorientation & restriction of movements of fauna and migratory species	Control movements of vehicles and people inside the project area. Use low light beams in vehicles.	Site Manager	-	-	-	-
20	***Illumination of project area, roads***		Fix light angles properly, illuminations should not spread outside the project area.	Site Manager	-	-	-	-
21	***Health of labour***	Labour management	Labour Management Plan will contain guidelines on movement outside the labour camps during	Site Manager	STD/AIDS awareness training to labour workforce	Daily	Induction day	Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			off hours. The contractor will also impart training on STD/AIDS to the labour and other employees.					
22	***Transport and communication***	▪ Impact on traffic	▪ Care will be taken to caution incoming traffic to facilitate ease of movement. ▪ Proper signage to be provided to the project site. ▪ Additionally, clean-up of debris and clearance of blockages will information on the dates commence immediately after project completion to remove any potential obstacles that might create traffic hazards.	Site Manager	Debris clearance	Weekly	-	Monthly reports by Site Manager on adherence to the Labour Management Plan.
23	***Livelihood, health and safety***	▪ Impact of labour influx/ migrant workforce	▪ Contractor will provide camp facilities to the migrant workforce as stipulated in the Labour Management Plan ▪ Provisioning adequate arrangements of drinking water, lighting, ventilation, bedding, bathing and	Site Manager HSE Manager	▪ Monitoring of labour camps ▪ Health check-up records	Monthly	Monthly	Proper maintenance of labour register with easily identifiable columns for local and migrant labour

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			other basic facilities in the labour camps • Ensuring proper health check-ups of all labourers employed at the project site • Providing separate toilet facilities for men and women at the accommodation as well as site; and • Facilitating healthcare services and medical care in case of sickness.					
24	***Engagement of Contractor and workforce***	• Child labour • Forced labour	• Before engagement of workers under the contractors, the Site Manager has to verify the age and address of all workers through review of their identity proofs. • All records are to be maintained onsite including the workforce's premedical check-up records.	Site Manager HSE Manager	• Monitor the EHSS performance of the Contractors	Monthly	Induction	Records of all the contractors and labours engaged at project site
25	***Working conditions***	• Terms of Employment • Payment of Wages	• All workers are to be provided with induction training wherein details of their terms of employment	Site Manager HSE Manager	• Monitor wage payment provided to workforce			• Report from Site Manager • Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
		▪ Working Conditions ▪ Non-Discrimination and Equal Opportunity ▪ Grievance Mechanism	such as daily working hours (8 hours in total) with breaks; weekly offs; overtime work (and wages – at the rate of twice the ordinary rate of wages.); do's and don'ts within the project area; ESI (if applicable); use of toilet facilities; grievance mechanism and identity of grievance officer, sensitization of local customs, besides health and safety aspects are discussed. ▪ Attendance records are to be maintained for all workforce engaged onsite ▪ Security personnel stationed at the entry gate to the project site are to record each worker's entry and exit to the project site ▪ Wage registers are to be maintained depicting the break-up of working days, ESI		and assess that no discrimination is done in terms of workers' gender ▪ Monitor the wage registry and verify it's in line with the attendance records			

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			and overtime wages provided ▪ Grievance records are to be maintained onsite ▪ Display boards providing the name and contact details of the Grievance Officer are to be displayed onsite in local languages for the benefit of the workforce. ▪ Ensure that waste bins are provided onsite for disposal of waste for use by the workforce.					
26	***Accommodations***	▪ Worker's accommodation	▪ Ensure that the labour camp provided to the workforce are adequate and have different living quarters for males, females and families. ▪ Ensure that there are adequate toilets (1:15 person) and bathing facilities at the rented accommodations and that these facilities are kept clean at all times. ▪ Ensure that adequate electricity and clean drinking water are	Site Manager HSE Manager	▪ Monitor the adequacy and facilities of the labour camp provided	Fortnightly	-	▪ Report from Site Manager to Project Manager

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			supplied to the labour camp. ▪ Ensure that adequate waste collection and disposal is installed and implemented at the rented accommodations ▪ Ensure that the workforces are sensitized to the local customs and dos and don'ts to be adhered while residing in these labour camps. ▪ Ensure that proper firefighting provisions are provided in the labour hutments.					
27	***Security personnel***	▪ Conflict with local community	▪ Ensure that verification process of all security guards is undertaken prior to engagement onsite ▪ Ensure that adequate female guards are engaged onsite ▪ Ensure that behavioural training is provided to the security personnel regarding communication with local community and	Site Manager HSE Manager	▪ Training records ▪ Entry and exit records	Fortnightly	Behavioural training for interacting with local community Mock drills	▪ Report from Site Manager ▪ Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			sensitization towards local customs are imparted prior to deployment onsite. ▪ Ensure that besides the regular work expected from the security personnel, knowledge of emergency numbers, site personnel and grievance officer identity and contact details are also familiarized. ▪ Ensure that all entry and exit of workforce and visitors are recorded. ▪ Ensure participation of the security personnel in mock drills.					
28	***Risk of Flooding***	▪ During heavy rainfall, the plant may face an increased risk of waterlogging and flooding	▪ Proper stormwater drainage system shall be provided to ensure efficient water flow and prevent any adverse impacts from potential flooding	Site Manager	▪ Site inspection	During monsoon period	-	▪ Inspection records/ photographs
OPERATION PHASE								
1	***Feedstock variability***	▪ Fluctuations in feedstock quality and quantity	▪ Diversify feedstock sources to reduce reliance on a single source	Procurement Head Site Manager	▪ Regular monitoring of incoming feedstock	Daily	Regular training to feedstock	▪ Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
		▪ Changes in moisture content ▪ Presence of contaminants in feedstock ▪ Delays/ interruptions in feedstock supply	▪ Ensure MoU/ agreement with feedstock suppliers ▪ Conduct IEC activities ▪ Utilize a mix of feedstocks (e.g., Paddy straw, cattle dung, chicken litter, etc.) to balance variations ▪ Adjust the feedstock mix based on seasonal availability and characteristics ▪ Regularly analyse incoming feedstock for key parameters such as moisture content, volatile solids content, etc. ▪ Implement quality control checks at the source to ensure feedstock meets specifications. ▪ Implement effective inventory management strategies to buffer against short-term fluctuations in feedstock supply.		for signs of contamination, spoilage or foreign materials ▪ Maintain records of quantity and type of feedstock received ▪ Copy of agreements/ MoU and records of IEC activities conducted		handling workers	▪ Copy of agreements/ MoU ▪ IEC activities conducted
2	***Process and Domestic***	▪ Improper watewater discharge may	▪ Provision of ETP for treatment of process	HSE Manager	▪ Monitoring of inlet wastewater	-	-	▪ Inlet and Outlet water

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
	wastewater generation	lead to contamination of soil and water resources	wastewater and reuse of treated water Collection of sewage into a septic tank with a soak pit arrangement		and outlet treated water quality Monitoring of wastewater discharge network to prevent contamination of local soil and water resources.			monitoring records Septic Tanks/Soak pits cleaning records and ETP operation records
3	***Equipment malfunction***	Digester upset due to changes in operating conditions such as temperature, pH, etc. Breakdowns in critical equipment Corrosion of equipment due to exposure to corrosive gases	Conduct routine inspections of all digester components Implement a proactive maintenance schedule for all critical equipment including cleaning, repairs and replacements Utilize automated control systems to maintain optimal operating conditions within the digester Implement early warning systems to detect potential problems such as changes in gas	Site Manager	Monitoring of equipment and process parameters	Daily	-	Monitoring records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			production, temperature fluctuations, etc.					
4	***Water requirement***	▪ Depletion of water resource ▪ Groundwater depletion due to over-extraction of water	▪ Logbook for water consumption to be maintained. ▪ Use treated waste water for plant operations from ETP and nearby STP, as feasible	O&M Team Site Manager	▪ Water log book ▪ Site inspection to be carried out to inspect the sustainable use of water	Monthly	-	▪ Report from Site Manager to Project Manager
5	***Risk of Flooding***	▪ During heavy rainfall, the plant may face an increased risk of waterlogging and flooding	▪ Stormwater drainage system shall be inspected, cleaned and properly maintained to prevent waterlogging and flooding	Site Manager	▪ Site inspection	During monsoon period	-	▪ Inspection records/ photographs
6	***O&M during equipment maintenance***	▪ Fatalities during maintenance, electrical operation ▪ Risk of damage due to fire and other natural disasters	▪ Use of safety harnesses, and lowering/ raising tools for working at heights. ▪ Development and implementation of Permit to Work. ▪ Presence of sand buckets and fire extinguishers on the site. ▪ Workers to know how to use fire extinguishers.	HSE Manager Safety Officer Site Manager	▪ Site inspection ▪ Monitoring of emergency preparedness measures	As and when required	Workers are to be trained for use of PPE, implementation of Permit to Work and emergency response procedures on site.	▪ Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			▪ Regular electrical safety training to workers; ▪ Implement LOTO system; ▪ Use work equipment or other methods to prevent a fall from occurring. ▪ PPEs should be provided to workers handling electricity and related components ▪ Fire detection and alarm systems to be placed on site. ▪ Evacuation plan/ Safety or emergency management plan/ Identification of nearest hospital, fire station, and police station in the emergency management plan. ▪ Display the emergency numbers (ambulance, fire station) on the site.					
7	***Worker living conditions***	▪ Child labour ▪ Forced labour ▪ Terms of payment	▪ Implementation of corporate HR and governance policies with ESMS	HSE Manager	▪ In-house Team including Project Manager,	Annually	Induction	▪ Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
		▪ Non-discrimination ▪ GRM			Site Manager			
8	***Ecology and Biodiversity***	▪ Contamination of Yamuna River due to discharge of hazardous material, organic waste, leachates or waste water from plant, leading to adverse impact on aquatic flora and fauna including migratory birds	▪ Prevent any discharge to drains flowing to Yamuna River to avoid adverse impact on aquatic flora and fauna. ▪ Conduct awareness & training program among workers about biodiversity conservation	HSE Manager	▪ Daily Site inspection ▪ Record of awareness/ training campaign	Monthly	awareness/ training campaign for workers	▪ Site inspection records ▪ awareness/ training campaign records
DE-COMMISSIONING PHASE								
1	***Demolishing Activities***	▪ Increased noise level on site.	▪ Restriction of high noise-making activities only during the daytime. ▪ Provide PPE to workers working near high noise-generating sources.	HSE Manager	▪ Ensure that the noise emissions from decommissioning activities comply with the emission standards set	Daily	Workers to be trained for working hours to avoid noise and use of PPE to prevent noise exposure.	▪ Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
					out by MoEF&CC/ CPCB.			
2	***Vehicle movement*** ***Transportation of dismantling structure***	Vehicular emissions	▪ Regular maintenance of project vehicles and other machinery to be carried out. ▪ Speed limit of vehicles to be not more than 10-15 km/hr on unpaved roads to avoid dust emission.	Site Manager	▪ One time before decommissioning of the project. ▪ Regular monitoring of vehicle speed during the decommissioning phase.	Daily	Drivers to be trained for vehicle maintenance to prevent noise generation	▪ Training records
3	***Handling of demolition material***	Fugitive dust emissions	▪ Material to be stockpiled against wall to work as a windbreak. ▪ Sprinkling of water on unpaved areas. ▪ Cover the dismantled or extracted surface or sub-surface material with tarpaulin sheet before transporting the same.	HSE Manager	▪ Regular monitoring of stockpile of demolition and decommissioning material on site for fugitive emissions.	Daily	Workers are to be trained to prevent emissions from the site	▪ Training records
4	***Dismantling and demolishing***	Fatalities during decommissioning phase	▪ Appropriate PPEs to be used during decommissioning activities.	Site Manager	▪ Regular monitoring of use of PPE by workers	Daily	One time before the decommissioning of the project	▪ Training records

S. No.	Project Activities	Risks and Impacts	Mitigation Measures	Responsibility for ensuring implementation of suggested measures	Monitoring	Timeline/ Frequency of Monitoring	Training	Reporting or Documentation
			▪ Duration of the work to be clearly defined to the labours. ▪ Workers to be informed about the expected schedule and completion of each activity.					

9.7 ESMMP REVIEW PROCESS

This ESMMP is an environment and social management tool which needs to be reviewed every six (6) months to address any changes in the organization, process or regulatory requirements. Following the review process, the ESG Manager, after discussion with Project Manager and Site Manager will be responsible for making the amendments in the ESMMP and subsequently, seeking approval from the senior management. The amended ESMMP would be communicated to all the staff including the contractual workers.

10. CONCLUSION

This environmental and social impact assessment has been conducted to evaluate the impacts associated with the EverEnviro's BioCNG Plant proposed at Praygraj, Uttar Pradesh. The impact assessment has been conducted in compliance with IFC PS on Environmental and Social Sustainability and World Bank group EHS guidelines, including relevant National and State legislative requirements and international guidelines/conventions.

10.1 PROJECT CATEGORIZATION AS PER IFC'S PERFORMANCE STANDARDS ON ENVIRONMENTAL AND SOCIAL SUSTAINABILITY

As part of the review of E&S risks and impacts of a proposed investment, IFC uses a process of E&S categorization to reflect the magnitude of risks and impacts. These categories are:

- ***Category A***: Business activities with potential significant adverse E&S risks and/or impacts that are diverse, irreversible, or unprecedented.
- ***Category B***: Business activities with potential limited adverse E&S risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- ***Category C***: Business activities with minimal or no adverse E&S risks and/or impacts.
- ***Category FI***: Business activities involving investments in financial institutions (FIs) or through delivery mechanisms involving financial intermediation.

The Proposed Project has been recommended to be categorised as **Category B** as per the IFC's categorisation criteria.

Category Justification

The BioCNG Project has been recommended to be categorized as Category B as per the IFC categorization criteria. Selection of Category B is based on the following reasoning:

a) ***Project***: BioCNG is a clean technology project that uses waste for converting it into energy. The land has been leased from PMC for a period of 25 years therefore no land acquisition has taken place for this project.

b) ***Waste generation***: A small proportion of the waste generated during construction phase will be hazardous that may include waste fuel, grease and waste oil containing rags. Used transformer oil which is also categorised as hazardous waste will be generated from the plant. If not properly managed, solid waste could create impacts on soil quality. However, the impact magnitude has been assessed as low as such impacts are manageable through effective hazardous and other waste management measures.

c) ***Wastewater discharge***: Approximately 20 KLD domestic sewage and 127 KLD process wastewater is expected to be generated from the Plant. Therefore, impact significance on water quality has been assessed as high without mitigation measures. However, the Plant shall discharge its domestic sewage through septic tanks and soak pits, and ETP of capacity 140 KLD shall be provided for treatment of process wastewater. Treated water shall be utilized in for Gardening and Plantation within the plant, remaining treated water shall be discharged to nearby STP of 42 MLD, for further treatment and final disposal. The Plant shall install necessary pipeline/drains and ensure necessary permissions from concerned authorities and agreement with STP administration for discharge of treated water to the STP.

d) ***Air quality***: Construction activities will increase fugitive dust emissions during site clearance and other activities such as levelling, grading, excavation works, piling and increased plying of vehicles will increase vehicular emissions, and therefore, impact significance on air quality has been assessed as medium without mitigation measures. The air emissions during operation phase of the project are expected to be limited to occasional use of DG sets and plying of vehicles.

e) ***Noise quality***: Construction will cause increased noise levels due to activities such as grading, excavating and drilling for foundations, concrete batching, construction of ancillary structures, and operation of diesel generators, material movement and site clean-up, and construction equipment like dozer, scrapers, concrete mixers, generators, pump, drills, etc.,

therefore noise during construction phase has been assessed as medium without mitigation measures. Noise during operation phase is expected to be limited to plying of vehicles to and from the site for transportation of waste and feedstock and running of project-related utilities.

f) ***Ecology:*** The site is located nearby Yamuna River which attracts variety of avian species, including migratory birds. However, no significant impact is envisaged on ecology and biodiversity of the are due to the project activities.

g) ***Indigenous People:*** There are no indigenous communities that are being impacted due to the project in the study area.

10.2 CONCLUSION

The Bio-CNG project is a clean technology initiative that converts waste into energy, offering a sustainable solution with minimal environmental impact. The project does not require land acquisition, ensuring that there are no displacement concerns. Further, the project site does not coincide with or overlap any designated areas [such as Legally protected areas i.e., Wildlife Sanctuary (WLS), National Park (NP), Eco sensitive Zones (ESZs), etc. or internationally recognized areas viz., Key Biodiversity Areas (KBAs), etc.], further reducing environmental risks. Available data suggests that the construction, operation, and decommissioning of the plant are likely to result in limited environmental and social impacts, all of which can be effectively managed through well-established mitigation measures. This makes the project suitable for classification as an IFC Category B project.

Based on the ESIA and surveys conducted for the Project, it can be safely concluded that associated potential adverse environmental and social impacts can be mitigated to an acceptable level by adequate implementation of the measures as stated in the ESIA Report. Adequate provisions shall be made in the Project to cover the environmental mitigation and monitoring requirements, and their associated costs.

The E&S Management and Monitoring Plan (ESMMP) describes mitigation measures for impacts specific to Project activities and also discuss implementation mechanism. Project specific management plans are also provided for certain Project activities such as waste management, stakeholder consultation etc. To conclude, the implementation of ESMMP/Management plans will help EverEnviro in complying with its internal E&S requirements as well as National/State E&S regulatory framework in addition to meeting IFC PS requirements.