

Contractor's Environmental and Social Assessment Report (C-ESA)

Sewerage Treatment Plant at Kankarbagh, Bihar

Jayachitra S
25/01/2023



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PROJECT

DEVELOPMENT AND OPERATIONS OF SEWAGE TREATMENT PLANTS AND SEWERAGE NETWORK AT PATNA, BIHAR

IMPLEMENTING AGENCY

NATIONAL MISSION FOR CLEAN GANGA

CLIENT



BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

PROJECT ENGINEER

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Abbreviations

BIADA	Bihar Industrial Area Development Authority
BMTPC	Building Materials and Technology Promotion Council
BSEB	Bihar State Electricity Board
BSPCB	Bihar State Pollution Control Board
BUIDCo	Bihar Urban Infrastructure Development Company
C - GRM	Community - Grievance Redressal Mechanism
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
DPR	Detailed Project Report
EC	Environmental Clearance
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EPF	Employees' Provident Funds
ESDD	Environmental & Social Due Diligence
E&S	Environmental and Social
ESI	Employees' State Insurance
ESIA	Environmental & social Impact Assessment
ESMP	Environmental and Social Management Plan
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
IFC PS	International Finance Corporations Performance Standards
LARR	Land Acquisition, Rehabilitation and Resettlement
LULC	Land use land cover
MoEF&CC	Ministry of Environment, Forests and Climate Change
NAAQS	National Ambient Air Quality Standards
NCEP	National Centre for Environmental Predictions
NH	National Highway
NRSC	National Remote Sensing Centre
PFD	Project Flow Diagram
SBR	Sequencing Batch Reactor
SH	State Highway
STP	Sewage Treatment Plant
WB	World Bank
WHO	World Health Organization

Executive Summary

1. Background

VA TECH WABAG Limited ("WABAG") has been awarded the contract by the Bihar Urban Infrastructure Development Company (BUIDCo), Government of Bihar for developing the Sewage Treatment Plant (STP) and its Network for the Kankarbagh zone of Patna, Bihar. The project is being developed under a Ganga River conservation mission named "Namami Gange" being managed by National Ganga River Basin Authority (NGRBA) with financial assistance from the World Bank.

'Namami Gange', is a Govt of India's Flagship Program with twin objectives of "Effective abatement of pollution, Conservation and Rejuvenation of National River Ganga.

Under this Program, a major initiative has been taken to develop an adequate sewage treatment infrastructure in Patna to meet the set twin objective of Effective abatement of Pollution, Conservation & Rejuvenation of River Ganga. Bihar Urban Infrastructure Development Corporation Ltd. (BUIDCO - A company owned by Government of Bihar to Implement and Accelerate urban infrastructure projects in the state) is the implanting agency of this project.

All Projects under NGRBP/Namami Gange are governed by Environmental and Social Management Framework (ESMF) developed to facilitate the management of environmental and social issues during planning and implementation phase. After the award of contract as per Environment and Social Management Framework (ESMF 2020), the selected DBOT/HAM contractor has to update the ESAMP based upon the detailed design of the Project and prepare a site specific ESIA&MP.

In accordance with the provisions of Environmental Impact Assessment (EIA) Notification 2006, Schedule I, the project is not required to obtain an Environmental Clearance (EC) from the State or Central Authority. Hence conduct of EIA is not mandatory.

The ESIA study was conducted using the World Bank Environmental & Social Framework and World Bank Group's Environmental, Health & Safety (EHS) General Guidelines (2007), and Guidelines for Water and Sanitation (2007) and was used as the basis for identification of impacts and recommending mitigation measures.

2. Brief Study of Allocated Land

Kankarbagh STP site is proposed in Pahari village in Kankarbagh, Patna District, Bihar within the existing STP site of Pahari STP at Pahari Village. The STP will be constructed over a total land area of six (6) hectares and in addition to the STP, it will include staff quarters, laboratory, and other administrative buildings. The allocated land belongs to Bihar Urban Infrastructure Development Corporation (BUIDCo). The identified sites are free from any form of encroachments.

3. Project Description

The STP has been designed for an Average Design Capacity of 50 MLD and a Peak Design Capacity of 112.5 MLD of influent (sewage) flow.

The sewage treatment is based on a biological treatment process. The sludge generated from the treatment plant shall be anaerobically digested to produce biogas which in turn will be used for generation of power through gas engines. The STP will include the following treatment stages and components:

#	Treatment Stage	Components
1.	Preliminary Treatment	• Stilling Chamber
		• Mechanical Fine Screen
		• Manual Fine Screen
		• Grit Distribution Chamber
		• Grit Chamber
		• Bypass
2.	Primary Treatment	• Primary Clarifier Distribution Chamber
		• Primary Clarifier
3.	Secondary Treatment	• Aeration Tank
		• Process Air Blower Area
		• Secondary Clarifier Distribution Chamber
		• Return Activated Sludge Sump
4.	Disinfection and Disposal	• Chlorine Contact Tank
		• Gas Chlorination System
		• Chlorine Leak Absorption System
		• Absorbent Tank
		• Caustic Solution Recirculation Pump
		• Chlorine Leak Blower
		• Treated Water - disposed to Pahari STP outlet channel and finally goes to "Khanua" drain.
5.	Sludge Handling	• Digester Feed Sump
		• Anaerobic Sludge Digester
		• Digested Sludge Sump
		• Centrifuge
		• Polymer Dosing System
		• Supernatant Sump and Pumps
6.	Biogas Handling and Power Generation	• Gas Holder
		• Biogas Scrubber
		• Biogas Flare
		• Biogas Engine- 635KVA capacity
7.	Heat Recovery System	• Hot Water Tank and Hot Water Recirculation Pumps
		• Jacket Water Waste Heat Recovery Unit
		• Exhaust Gas Waste Heat Recovery Unit
8.	Auxiliary Units Section	• Plant Water System
		• Bore Wells
		• Potable Water / Utility Water

Details of each process in the treatment system are provided in **Section 2.4** of the ESIA Report.

The project is at present in its pre-construction stage and the ongoing activities include levelling of site area and emptying of water from the existing tank in the site area. The project is estimated to be completed by January 2024.

4. Legal and Other Requirements

In accordance with the provisions of Environmental Impact Assessment (EIA) Notification 2006, Schedule I, the project is not required to obtain an Environmental Clearance under the Notification from the State or Central Authority. The land for the project has been allotted by Patna Municipal Corporation. Hence provisions of Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 are not applicable.

The key environmental, health and safety, employee welfare (social) regulations applicable to the project during construction and O&M phase are listed below:

Environmental Regulations

1. The Environment (Protection) Act, 1986
2. The Water (Prevention and Control of Pollution) Act, 1974
3. The Air (Prevention and Control of Pollution) Act, 1981
4. The Environmental Protection Second Amendment Rules 2002 (DG Set) & 2004
5. The Noise Pollution (Regulation and Control) Rules, 2000
6. The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2016
7. Construction and Demolition Waste Management Rules, 2016
8. Solid Waste Management Rules, 2016
9. E-Waste (Management) Rules, 2016
10. The Batteries (Management & Handling) Rules, 2001
11. Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules 1989
12. Public Liability Insurance Act 1991
13. The Bihar Ground Water (Regulation and Control of Development and Management) Act, 2006
14. Central Ground Water Authority Guidelines to regulate and control Ground Water Extraction in India dated 1 June, 2019

Occupational, Health & Safety Regulations

1. Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996
2. The Factories Act, 1948 and Bihar Factories Rules, 1950
3. Central Motor Vehicles Act 1988
4. Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010
5. The Static and Mobile Pressure Vessels (Unfired) Rules 1981
6. The Boilers Act, 1923 amended upto 2007

Employee and Labour Welfare Regulations

1. Child and Adolescent Labor (Prohibition and Regulation) Act, 1986 and Amendment Act 2016
2. Minimum Wages Act, 1948
3. The Equal Remuneration Act, 1976

4. Employees' State Insurance Act (ESI), 1948
5. The Employees' Provident Funds (EPF) and Miscellaneous Provisions Act, 1952 amended up to 1996
6. The Employee Compensation Act 1923 and Amendment Act 2009
7. The Payment of Gratuity Act, 1972
8. The Maternity Benefits Act, 1961
9. The Payment of Bonus Act, 1965
10. The Contract Labour (Regulation and Abolition) Act, 1970
11. The Industrial Disputes Act, 1947
12. The Private Security Agencies (Regulation) Act, 2005
13. The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013

The key provisions of the regulation that the project will need to fulfil during the construction phase and operation & maintenance phase is provided in **Section 3.1**.

The applicable compliance with the regulatory requirements to the project are as follows:

1. **Consent to Establish (CTE)** is required - Received from Bihar State Pollution Control Board for STP. (refer **Annex 1**)
2. Permission for use of water for construction purposes from irrigation department/CGWA (for Surface or Ground Water) respectively.
3. Labour license is required to be obtained before construction-**Labour license is obtained.**
4. Interstate Migrant license will be required if labour from other state is hired under project.

Investors Safeguards

The applicability of World Bank Environmental & Social Operational Policies (OP) to the project during construction phase and operation & maintenance phase has been assessed based on review of the project information and baseline studies. The following standards were found applicable to the project:

- Environmental Assessment (OP4.01/ BP4.01)
- Natural habitats (OP4.04/ BP4.04)
- Involuntary Settlement (OP4.12)
- Indigenous Peoples (OP4.10)
- Consultation and Disclosure (OP17.5)

4. Project Categorization

The Environmental and Social Management Framework (ESMF) classifies projects as High Risk, Substantial Risk, Moderate Risk or Low Risk based on the type, location, sensitivity and scale of the Project, the nature and magnitude of the potential E&S risks and impacts, the capacity and commitment of the Borrower to manage such risks and impacts and other relevant areas.

A detailed assessment on environmental and social impacts of the project is presented in **Chapter 6** of the ESIA Report. Based on the assessment, it is identified that:

- The project impacts during construction and O&M phase are expected to be few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- The project does not trigger involuntary resettlement.
- There are no Indigenous People in project influence area.
- The assessment also reiterates that the project will not adversely affect the livelihood.

- There are no Protected Areas (Wildlife Sanctuaries and National Parks) in project influence area.
- Based on the project activities and its location, the project is not expected to result in any irreversible or unprecedented impacts.

Hence, the project has been classified as **Moderate Risk**. The limited impacts likely to be on the environment will be mitigated by way of project specific environmental management plan.

5. Baseline Analysis

A three (3) km radius from the centre of the project was defined as the project influence area ("study area") for the conducting the baseline studies and impact assessment. The baseline analysis was conducted through a combination of secondary data processing and primary baseline environmental & social monitoring.

Rationale for defining a 3 km buffer area:

The extent of impacts arising from the project during construction and O&M phases will be local impacts and limited to immediate vicinity of the project area.

The rationale for delineating 3 km radius as the project influence area is listed below:

- A study of receptors present around the project area was conducted. A limited number of receptors were found present in the delineated project influence area that could potentially be impacted due to the project activities.
- Land for setting up the STP belongs to Patna Municipal Corporation. There were no encroachers or squatters identified on the allotted land.
- The source of water during construction will be a combination of ground water and tanker water. During operation and maintenance phase, the water used shall be a combination of ground water and recycled sewage (treated) water.
- Sewage treated in the STP shall be discharged as per statutory limits.
- The wastewater discharges and fugitive emissions are not expected to traverse beyond 3 km.

Thus, a 3 km buffer would be sufficient to study the impacts on the community and other sensitive receptors as indicated above

Meteorology

The monsoon season spans from July to October and the highest levels of precipitation are experienced in the month of October (197 mm). Maximum temperatures are experienced from April to July (>35 °C) and minimum temperatures are experienced from November to February (15-18 °C). The predominant wind direction is observed to be from south-west to north-east direction with higher wind speeds (5 – 10 m/s) are experienced from the west-north-west and west direction of the study area.

Physical Resources

The 24-hour average concentration of NO_x on two consecutive days of monitoring in the study area were observed to be well within NAAQS standard and WHO guideline values. The SO₂, PM_{2.5} and PM₁₀ levels were well within NAAQS standard values but exceeded the limits provided by the WHO guidelines at all locations monitored. The average ambient noise levels obtained for all the locations were observed to be exceeding the permissible limits of the CPCB standards and EHS guidelines for both day and night noise levels.

The study area falls under the high dense built fabric. The topography is flat plains as the study area is part of Indo-Gangetic flood plains with gangetic alluvium type soil. The predominant slope observed is from south-west to north-east.

The River Ganga is the nearest surface waterbody (aerial distance of approx. 1.02 km) and is located towards north of the study area. As per the Central Ground Water Board (CGWB), Patna Sadar falls under "critical" zone while Patna City falls under "safe" zone for ground water development. Although the project site falls under Patna City, it is in close proximity (approx. 1.08 km) to the boundary of Patna Sadar (critical zone). The ground water monitoring analysis showed parameters of TDS, Total alkalinity as CaCO₃ and Total Hardness as CaCO₃ (mg/L) are beyond acceptable limits at all locations while the parameters of Magnesium as Mg (mg/L) and Chloride as Cl⁻ (mg/L) were exceeding acceptable limits but were within permissible limits as per the BIS 10500 standards.

Natural Hazards

As per the Building Materials and Technology Promotion Council (BMTPC) Hazard maps, the study area is located in the Zone IV i.e. High Damage Risk Zone (MSK VIII) for Earthquake and the High Damage Risk Zone for cyclones. The study area is also located in an area vulnerable to floods.

Ecological Hazards

The study area does not comprise of Reserved/ Protected Forests. There are no Important Bird Areas (IBA) in the study area.

Economic Development

The major land cover in the study area is settlements (61%) followed by agriculture fallow land (38%). The study area is accessible from the State Highway (SH)-1 (Sadikpur-Pavera-Masaurhi) connecting to the National Highway (NH)-30 (Patna-Bhaktiyarpur Road). In addition, two national highways (NH 19 & 98) also pass through the Study area.

Agricultural Development

The study area lies within the 'Middle Gangetic Plain' agro-climatic zone of the country as classified by the Planning Commission of India. The major crops grown in the study area are paddy, wheat, gram, and seasonal vegetables.

Social and Cultural Resources

The average literacy rate in Patna District is 59.26%. The District has a high proportion (67.77%) of non-working population. There are no places of cultural heritage or archaeological importance and Scheduled Areas in the study area.

6. Stakeholder Consultation

Stakeholder Consultations were conducted in the nearby villages within 3 km from the site area. The consultations were conducted in the form of Focus Group Discussions with potential affected persons and discussions and interviews with key informants. The primary objective of stakeholder consultation was to understand the acceptance of the project and obtain impressions of the stakeholders about the project and discuss issues envisaged by the local community that may be encountered due to the project. The other objectives of the consultations included understanding of the existing local socio-economic status, social fabric, and local sensitive receptors. A summary of the consultations has been provided in **sub-section 4.8.2** of the ESIA Report.

7. Analysis of Alternatives

The proposed Kankarbagh STP is located on BUIDCo land in existing Pahari STP campus. Thus, aspects of land acquisition and resettlement are not triggered which also results in reduction of project costs.

As part of the project bidding process under NMCG programme, the Concessionaire DK Project is entrusted to implement and operate, the project within the allocated piece of Govt. land (Analysis of alternatives for siting STP for Kankarbagh Zone was conducted during DPR preparation phase and on the basis of availability of Govt. land. STP establishment site was confirmed on the basis of option analysis and best option was- *To collect the sewage from the Kankarbagh zone and carry it along NH-98 to treat it at a STP constructed in the area where the present Pahari STP is located. The distance of existing Pahari STP from Kankarbagh zone is about 4.2 Km and the natural slope is in the direction of the proposed sewage flow. Moreover, no obstruction like Railway crossing is present in the path of the sewage flow*), therefore no alternate sites were considered. Moreover, the proposed plant site is in accordance with Ministry of Environment, Forests and Climate Change, Government of India guidelines, i.e. there are no National Parks/Sanctuaries within 10 km radius of the proposed project site.

The proposed Kankarbagh STP is based on Activated Sludge Process (ASP) and has been approved by the State Development Authority as part of the bidding process. ASP systems have been successfully used to treat both municipal and industrial wastewater. They are uniquely suited for wastewater treatment applications characterized by low or intermittent flow conditions.

Further, the sludge generated from treatment will also be used for Biogas generation through an anaerobic digestion process which will further be used in a co-generation plant to produce heat and electrical energy and will be reused in plant operations thus reducing energy requirements.

The treated effluent from the plant will be reused for plant water requirements and may also be provided to the nearby agricultural fields for irrigation purposes resulting in reduction of freshwater usage. However, BUIDCo has empaneled the consultants for preparing the DPR of "Reuse of treated Wastewater" for those STPs which are already commissioned or are in the process of commissioning.

8. Impact Assessment

Areas of No Impact

The project does not impact the following environmental and social components:

- There are no wildlife habitats, endangered flora & fauna within 3 km of the project site wherein the project activities have a potential to impact these sensitive receptors.
- No indigenous people/ tribal habitations will be affected by the project development.
- No cultural heritage sites will be affected by the project development.

Positive Impacts

The Kankarbagh STP project is being developed under a Ganga conservation mission named "Namami Gange". The proposed project will enable lowering of treatment loads and also increase the physical coverage of an underground sewer network. The Kankarbagh Zone is one of the highly populated and core areas of the city with no dedicated sewage treatment mechanism. The project will thus ensure adequate treatment and eventually lower pollution loads in the River Ganga. This will also ensure the channels are not flooded during monsoon thus preventing waterlogging and associated impacts.

The STP has also been designed in a way to promote and incorporate principles of resource efficiency and waste utilization. The sludge generated from the treatment process will be used to generate biogas which will be used for electricity and heating requirements in the STP operations. The treated sewage will also be reused for plant operations and may also be provided for irrigation of the surrounding agricultural fields resulting to minimize fresh water usage. However, BUIDCo has empaneled the consultants for preparing the DPR of "Reuse of treated Wastewater" for those STPs which are already commissioned or are in the process of commissioning.

The project would also generate employment opportunities for locals during construction and operation phases of the project.

Adverse Impacts

The adverse impacts identified during construction phase are of 'medium' and 'low' scale as most of them will be 'local' in extent and of 'short' duration limited to the period of construction. There will be no 'high' impacts due to the project on environment, occupational health & safety, and community health & safety during construction phase.

Project Development/ Planning Adverse Impacts		
Nature of Impact/ Activity	Impacted EHS Component	Impact Classification
1. Viewscape impacts due to proximity of settlements to the project area	Local community	Low
Construction Phase Adverse Impacts		
Nature of Impact	Impacted EHS Component	Impact Classification
1. Increase in fugitive dust emissions causing air pollution from site clearance, excavation, raw material transportation, storage of excavation spoil, use of fuel wood in labour camps	Ambient air quality, community health, worker health	Medium
2. Increase in concentrations of PM ₁₀ , PM _{2.5} , SO ₂ from burning of fuel in construction equipment, transportation vehicles and cooking in labour camps.		
3. Increase in ambient noise levels due to operation of construction equipment.	Worker health	Medium
4. Soil contamination due to improper management of construction waste, spills and leaks, absence of sanitation provisions in labour camp.	Soil quality, Ground water, Local community	Medium
5. Ground water pollution due to leaching of materials and waste into the soil	Ground water Local community	Medium
6. Exposure to physical, chemical hazards, exposure to noise, working with construction equipment, fugitive dust, emergencies at site	Construction workers	Medium
7. Exposure to migrant workers, air and noise pollution, project security personnel, obstruction to community activities and accidents caused in the nearby community due to construction activities	Local community	Medium

Construction Phase Adverse Impacts		
Nature of Impact	Impacted EHS Component	Impact Classification
8. Alteration of natural drainage pattern due to site levelling	Landform, local community	Low
9. Resource consumption such as water, fuel, causing depletion	Local community	Low
10. Loss of flora due to site clearance impacting avian fauna habitat	Flora, avian fauna	Low
11. Soil erosion due to site clearance	community health	Low
12. Obstruction to flows in open <i>Nallahs</i> and deterioration of water quality due to soil erosion and dumping of construction waste	Surface water quality, local community	Low

The adverse impacts during the Operation and Maintenance phase comprise only of 'medium' and 'low' scale as most of them are local in extent with a mix of 'short' and 'long' term impacts.

Operation and Maintenance Phase Adverse Impacts		
Nature of Impact	Impacted EHS Component	Impact Classification
1. Natural resource consumption causing depletion	Local community	Medium
2. Soil contamination due to leakages, spillages, and unscientific management of various types of waste	Soil quality Groundwater quality Local community	Medium
3. Air pollution through air emissions and odour generation from the operation of the treatment plant equipment and various treatment processes	Ambient air quality Local community	Medium
4. Leakages and overflows resulting contamination of soil, freshwater bodies, and groundwater	Surface water quality Groundwater quality Soil contamination Local community	Medium
5. Exposure to various occupational health and safety impacts including <ul style="list-style-type: none"> • Physical hazards • Biological hazards • Chemical hazards • Noise & vibration • Odour • Exposure to operational/natural/ manmade emergencies at project site 	Local community STP workers and employees Visitors to the STP	Medium
6. Community Impacts resulting from use of untreated wastewater, exposure to odour, resource depletion, influx of immigrant population, misbehaviour of	Local community	Medium

Operation and Maintenance Phase Adverse Impacts		
Nature of Impact	Impacted EHS Component	Impact Classification
security, and accidents and emergencies occurring in the STP		

9. Environmental and Social Management Plan

ESMP Budget

The total cost for implementing measures outlined in Environmental Management Plan and Environmental Monitoring Programme is as follows: -

Particulars	Cost in INR
EMP cost in Construction and Operation phase	2596530
ESMP Monitoring cost	1361000
Unidentified impacts	1000000
TOTAL	4957530
Forty Nine Lacs Fifty Seven Thousand Five Hundred Thirty only	

Institutional Arrangement

The overall responsibility of supervision and ensuring implementation of the ESMP will lie with WABAG during all phases of the project. The ESMP will be applicable to all Contractors and Sub- Contractors including labour contractors and their workers working in the project during all phases.

An Environmental, Health & Safety (EHS) Department will be constituted for the project. The environmental and occupational health and safety aspects of project construction and O&M will be managed by this department. The employee welfare and grievance mechanism will be managed by the Human Resources Department of the project. These departments will report to the Project/ Plant Manager of the STP. The EHS Department should comprise of an EHS Manager and EHS Engineer(s).

Management Actions

Based on the project and associated activities, and E&S impacts identified for the project (which includes environmental, occupational health and safety, community health and safety and social), management measures have been recommended covering all phases of the project. An E&S monitoring plan for construction phase and operation & maintenance phase of the project has also been developed. Refer **Section 7.3** of the ESIA Report for detailed set of actions recommended for management of all identified adverse impacts.

WABAG has a certified Integrated Management System (IMS) as per ISO 9001:2015, ISO 14001: 2015, and ISO 45001:2018 international standards. The management system developed at the corporate level is extended to the project. WABAG has accordingly prepared Construction Environment and Social Management Plan for the construction phase actions and work instructions. The Environment, Social, Health and Safety Management Plan for Kankarbagh STP has been developed by WABAG for the operation and maintenance phase operation control procedures.

Project specific Environment and Social Management Plans (ESMP)

It is developed with an aim to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts/risks and to propose enhancement measures. The plan covers –(i) Mitigation of potentially adverse impacts; (ii) Monitoring of impacts and mitigation measures during project implementation and operation; (iii) Institutional capacity building and training; and (iv) Compliance to statutory requirements.

Environmental Monitoring

The environmental monitoring programme has been devised with the following objectives: (i) To evaluate the effectiveness of the proposed mitigation measures and the protection of the ambient environment as per prescribed/ applicable standards for the Project; (ii) To identify the need for improvements in the management plans; (iii) To verify compliance with statutory and community obligations; and (iv) To allow comparison against baseline conditions and assess the changes in environmental quality in the Project area. **Refer Table-13** for detailed Environmental Monitoring schedule.

Reporting Mechanism for Environmental and Social Monitoring Program

A robust reporting system is functional in BUIDCo which provides the Project with the necessary feedback mechanisms to ensure quality and timely implementation of the works along with ensuring that the measures proposed in the Project's ESMP are implemented. The existing reporting system will be followed under this project also which ensures the regular flows of information from the Project site to the Project headquarters and, as necessary, to regulatory authorities and funding agencies.

Reporting will be done in the form of environmental checklist, incident record register, environmental and social performance reports on periodic basis (monthly and quarterly)

The monthly and quarterly reports of the ESMP compliance will be submitted to BUIDCo and SPMG. BUIDCo will share the quarterly ESMP compliance report to NMCG after review.

Stakeholder Engagement & Grievance Redress

A Stakeholder Engagement Plan is developed for the project that identifies the primary and secondary stakeholders under each stakeholder group (neighbouring communities, community representatives, industrial establishments, regulators, institutional stakeholders, and other groups), analyses the influence of each stakeholder and accordingly presents a Plan for engagement with the various stakeholders. Refer **Section 7.5** of the ESIA Report for the Stakeholder Engagement Plan.

The ESMP provides the structure and process to be followed by the project for redressing community grievances through a project level Community Grievance Redress Mechanism (GRM). The GRM is a platform to provide the affected communities a credible and effective channel of communication and allow them to communicate their grievances/concerns which they believe to be caused by the project activities. A Grievance Redress Committee (GRC) is to be established at the project level comprising of Project Head, E&S Officer from BUIDCo and a third-party representative. A Community Liaison Officer will be appointed for attending to community grievances and engaging with them on a regular basis. The GRM provides a procedure for receipt and recording of grievances, review and investigation of grievances by the GRC, grievance resolution, grievance closure, and redressal of anonymous grievances. The GRM will be publicized among the community stakeholders identified in the Stakeholder Engagement Plan. Contact details of the Community Liaison Officer and GRC will be made available through displays at the project site gate. All grievances will be reviewed and resolved by the GRC. Refer **Section 7.6** for details on the GRM.

1 Introduction

1.1 Background of the Project

VA TECH WABAG Limited ("WABAG") has been awarded the contract by the Bihar Urban Infrastructure Development Company (BUIDCo), Government of Bihar for developing the Sewage Treatment Plant (STP) and its Network for the Kankarbagh zone of Patna, Bihar. The project is being developed under a Ganga River conservation mission named "Namami Gange" being managed by National Ganga River Basin Authority (NGRBA) with financial assistance from the World Bank.

The 'Namami Gange Programme', is a as 'Flagship Programme' by the Union Government of India launched in June 2014 with a budget outlay of INR 20,000 Crore. The objective of the Programme is to accomplish the twin objectives of effective abatement of pollution, and conservation and rejuvenation of the River Ganga. Sewerage treatment infrastructure is one of the eight main pillars of the mission and approx. 63 sewerage management projects are under implementation and twelve(12) new projects are under planning and construction stages in the five (5) States of Bihar, Jharkhand, Uttarakhand, Uttar Pradesh, and West Bengal.

The city of Patna (Bihar State) is divided into six sewerage zones – KB (Zone I), Beur (Zone II), Saidpur (Zone III & IV-North), Kankarbagh (Zone IV), Pahari (Zone IV-South & V) and Karmalichak (Zone VI). Of these, KB and Kankarbagh at present, do not have operational STP's. Further, it was understood that city has only 20% of physical coverage of the underground sewer network, with minimal recordson the details and number of households connected to the sewers. The rest of the city, (~80% area) is dependent on an open drain network, which collects both sewage and drainage which is discharged through natural drains into the river Ganga or river Pun Pun, thereby resulting in excessive pollution. At present, to prevent water discharge of untreated wastewater, interception, and diversion (I&D) of the water is been carried out and the water is sent to the existing four (4) STP's of the City.

Thus, in a bid to lowering treatment loads and ensure adequate treatment, the construction of two STP's in the Digha (100 MLD capacity) and Kankarbagh (50 MLD capacity) Zones have been envisaged along with a well-connected underground sewer network.¹ The Kankarbagh zone has been created by taking parts from Beur and Pahari zone and covers a total of 886.50 hectares of the total Patna Municipal Corporation (PMC) Area with a total population of 2,13,389 persons as per the 2011 census.

The proposed STP (50 MLD) at Kankarbagh covered under HYBRID ANNUITY MODEL & is being developed under PPP mode.

1.2 Purpose of the Project

All Projects under NGRBP/Namami Gange are governed by Environmental and Social Management Framework (ESMF) developed to facilitate the management of environmental and social issues during planning and implementation phase. After the award of contract as per Environment and Social Management Framework (ESMF 2020), the selected DBOT/HAM contractor has to update the ESAMP based upon the detailed design of the Project and prepare a site specific ESIA&MP.

¹ Environment and Social Due Diligence Report for Proposed Sewage Treatment Plant (50 MLD) and Sewerage Network (150 km) at Kankarbagh Zone Patna, dated April 2018.

In accordance with the provisions of Environmental Impact Assessment (EIA) Notification 2006, Schedule I, the project is not required to obtain an Environmental Clearance (EC) from the State or Central Authority. Hence conduct of EIA is not mandatory.

The ESIA study was conducted using the World Bank Environmental & Social Framework (2017) and World Bank Group's Environmental, Health & Safety (EHS) General Guidelines (2007), and Guidelines for Water and Sanitation (2007) and was used as the basis for identification of impacts and recommending mitigation measures.

1.2.1 Reference Framework

The reference framework for conduct of validation of ESIA was:

- a) Applicable local, State, National environmental and social legal regulations
- b) World Bank Environmental & Social Framework (2017)
- c) World Bank Group's Environmental, Health & Safety Guidelines (WB-EHS) – General (2007), and Water and Sanitation (2007)

1.3 Approach and Methodology for ESIA

The approach and methodology for conduct of Environmental and Social Impact Assessment (ESIA) Study is presented in Figure 1 and described in the subsequent subsections.

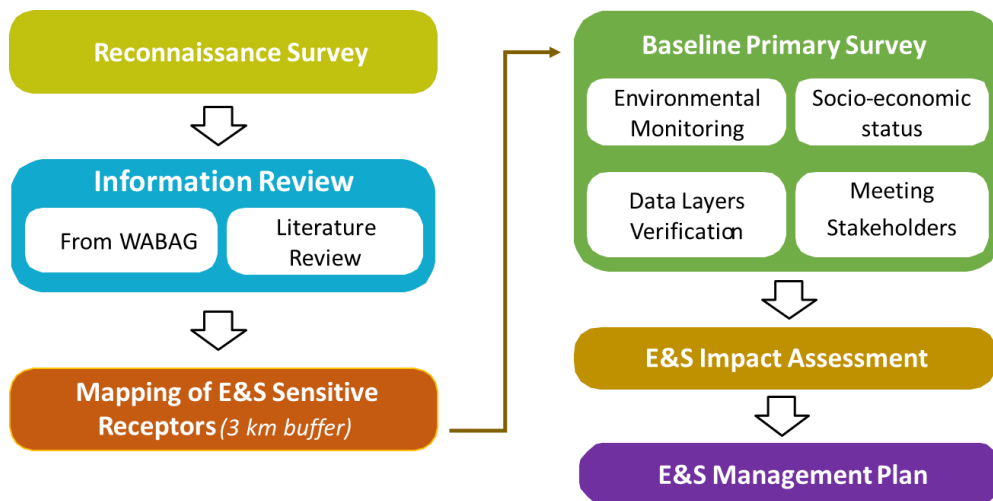


Figure 1: Approach and Methodology for ESIA

1.3.1 Reconnaissance of Project Area

A reconnaissance visits to the proposed STP project location and all associated components of the project was conducted from 16-21 March 2020 along with WABAG personnel from the Project office in Patna.

The purpose of the reconnaissance was to:

- Understand the fabric of the project area.
- Observe current activities that are carried out in the project area.
- Identify the presence of encroachers or squatters on the lands designated for the project.

Discussions were also conducted with the Project Head and the EHS Head to understand the project components, status of the project activities and availability of project specific studies/ documents.

1.3.2 Information Review

The following items were reviewed for preparation of the updated ESIA Reports:

- Project Environmental and Social Due Diligence report
- Environmental and Social Impact Assessment report
- Project design and description of project flow
- Finalized map of project components (STP, IPS, I&D, sewer network etc.)
- Construction approach and methodology
- Topographic survey drawings
- Project-specific HSE Plan for construction and O&M stages

In addition to the above mentioned items, secondary literature review was carried out in order to better understand the project area. These included archaeological sites, hospitals, religious places (temples/ mosques/ churches etc), schools/ colleges, water bodies, gardens etc.

1.3.3 Mapping of Sensitive Receptors

Based on the location and context of the project, a project influence area of 3 km radius from the centre point of the project location was defined as the project study area. The environmental and social (E&S) receptors sensitive to project development were identified and spatially represented by creating data layers using ArcGIS. Secondary data for mapping activities was sourced from recognized, publicly available databases. The outputs of the mapping exercise were used as input for planning the baseline primary survey.

1.3.4 Baseline Primary Surveys

The baseline primary surveys involved:

- Verification of data layers mapped using secondary data
- Baseline environmental quality monitoring
- Focus group discussion with project stakeholders
- Visit to relevant government department offices to confirm or collect data

1.3.5 Legal Requirements and IFC-PS

The national regulations on environment, health, and safety and social that are applicable to the project during pre-construction, construction, operation & maintenance phases, as well as key regulations that do not apply to the project were identified. The compliance requirements of each regulation by the Company (such as obtaining approvals, submitting monitoring reports, and storage of materials in a particular manner etc.) were further identified. The process followed during land allocation for the project and its compliance to legal requirements were also recorded.

1.3.6 Environmental & Social Impact Assessment

Based on the E&S sensitive receptors present in the study area and activities during different phases of the project (pre-construction, construction, operation, decommissioning), E&S impacts have been identified. The results of baseline primary surveys were used as input to identify impacts. The

vulnerability of the project area to earthquake and flood was also identified with reference to the Vulnerability Atlas of India.

For assessment of Environment & Social impacts of the project, Environment and Social Management Framework (ESMF), the World Bank Environmental & Social Safeguard Policies (2017) and WB-EHS – General and Water and Sanitation were referred.

1.3.7 Environmental and Social Management Plan

Based on the project and associated activities, and E&S impacts identified for the project (which includes environmental, occupational health and safety, community health and safety and social), management measures have been recommended covering all phases of the project (pre-construction, construction, operation and maintenance, and decommissioning).

For identification of management measures, the World Bank Group's EHS Guidelines General (2007), and Water and Sanitation (2007) have been referred. The general hierarchy for planning management measures i.e. elimination, substitution, engineering control, administrative control and personal protective equipment was adopted. The responsibility for implementation of the management measures and indicators for monitoring implementation and effectiveness of the measures are also presented along with a project-level Stakeholder Engagement Plan and Grievance Redress Mechanism.

1.4 Organization of the Report

The ESIA Report is organized into the following Chapters:

- **Executive Summary** provides a brief background of the project, applicable E&S national legal requirements, key impacts, and mitigation measures of the Project.
- **Chapter 1** provides a brief background about the project, specifying the need to undertake the ESIA study, reference framework for the assignment and approach adopted for undertaking the ESIA.
- **Chapter 2** gives details about the project location, various components and process flows of the project.
- **Chapter 3** outlines the application of Indian legal requirements on environment, health and safety and social aspects of the project. It also establishes applicability of the World Bank E&S Framework requirements and defines the risk category of the project.
- **Chapter 4** presents findings of the baseline studies conducted in the project influence area and secondary information collected to understand the existing environmental and social conditions. A summary of the stakeholder consultations and the approach adopted are also provided.
- **Chapter 5** presents the alternatives assessed and environmental and social good practices to be implemented by the project.
- **Chapter 6** presents E&S impacts identified across the project lifecycle.
- **Chapter 7** presents the Environmental and Social Management Plan (ESMP) to address the identified impacts.

The report is supported by **9 Annexures** that are referenced in the respective chapters.

2 Project Description

2.1 Project Location

The STP for the Kankarbagh zone is proposed to be set up in the Pahari village located in Patna District in the State of Bihar. Please refer **Annex 9** for the zonal map of Kankarbagh and **Figure 2** for the project location.

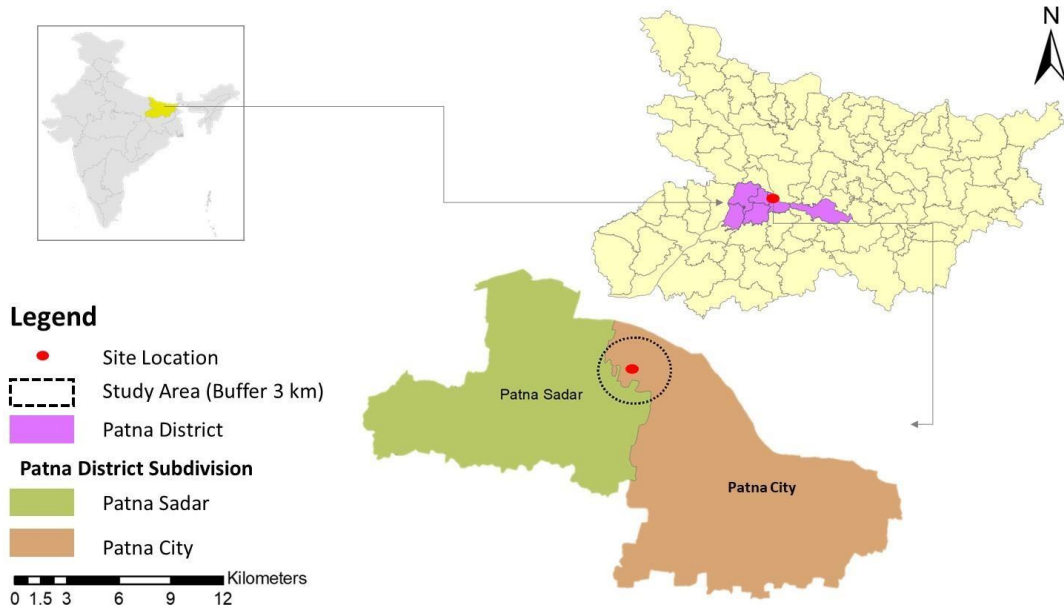


Figure 2: Administrative Boundaries and Project Location

The project area is accessible from the State Highway (SH)-1 (Sadikpur-Pavera-Masaurhi) connecting to the National Highway (NH)-30 (Patna-Bhaktiyarpur Road). The nearest airport to the project site is Patna Airport which is located at a distance of approx. 15.2 km to the west of the site. The nearest railway station is the Gulzarbagh Railway Station (approx. 3.8 km north of the site) while the major railway station is the Patna Saheb Railway Station (approx. 5.5 km north-east of the site).

2.2 Criteria for Site Selection

The site for the proposed Kankarbagh zone STP in the Pahari Village is located within the land area allocated for the existing Pahari Nalla STP developed under the 'Ganga Action Plan-II.' The designated land belongs to the Bihar Urban Infrastructure Development Corporation (BUIDCO) .

The criteria for site selection is based on availability of suitable land and extent of diversion of existing sewage flows. Previously there was no separate STP for this zone and was the part of the Beur and Pahari zone. Therefore, the sewage flow from this zone was designed to route to the STPs of Beur and Pahari zone for treatment. Later based on the population size and area, Kankarbagh Zone was created and under Namami Gange, a separate STP (50 MLD) and Sewerage Network was proposed for the entire zone. The proposed STP will collect sewage from two sewerage networks. The proposed STP will ensure diversion of the flow from the Pahari Nalla Outfall and Kankarbagh A (covering ward 29, 31, 35 & 44) to Kankarbagh B (partly covering ward 30). The sewage collected at Kankarbagh B will then be pumped to the proposed Kankarbagh STP. Refer **Figure 3**.

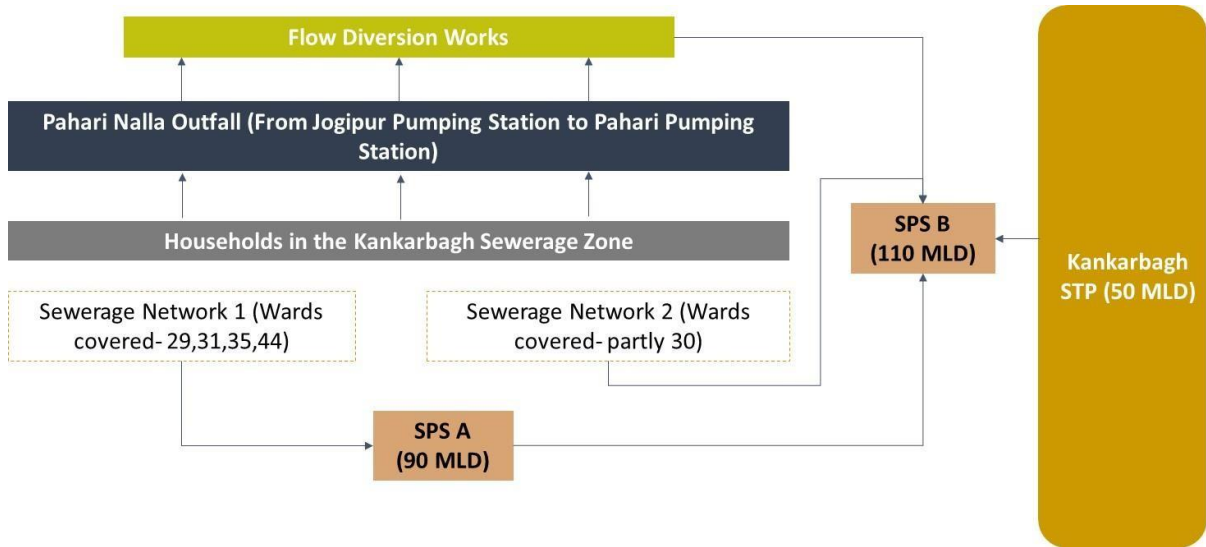


Figure 3: Sewerage System in Kankarbagh Zone



Premise allotted to WABAG for STP



Existing STP at Pahari

2.3 Project Design

2.3.1 Land Use of Site

The proposed Kankarbagh STP is located within the existing premises of the Pahari STP. Apart from the construction of the Kankarbagh STP, the total land area has been used for expansion (under construction) of the Pahari STP from 25 MLD to 60 MLD, staff quarters, laboratory, and other administrative buildings. In particular, it is estimated that a total of six (6) hectares of land will be used for the construction of the Kankarbagh STP and its supporting treatment infrastructure. The present site condition is as shown in the pictures below:



Construction work – Pahari STP



Construction work – Kankarbagh STP

Refer **Annex 2 & Annex 3** for the proposed Site Layout, Process Flow Diagram (PFD) and Process design calculation of the 50MLD KankarbaghSTP. The Annexes provide the project design, various units of the STP, capacities, and treatment flow. **Annex 4** is enclosed with sectional drawing of Kankarbagh STP.

2.3.2 Site Conditions

The STP and the treatment scheme has been designed considering the following climatic and topographic data.

Parameter	Details
1. Ambient Temperature	Minimum 15°C; Maximum 45°C
2. Design Sewage Temperature	Winter 20°C; Summer 30°C
3. Relative Humidity	Minimum 58%; Maximum 85%
4. Site conditions	Tropical
5. Natural Ground Level at Site	45.3 to 45.9 (Varies across plant area)
6. Finished Ground Level at Site	51.51m
7. Ground water table	3 m to 4 m
8. High Flood Level	51.51 m

2.3.3 Design Capacity

The STP has been designed for an Average Design Capacity of 50 MLD and a Peak Design Capacity of 112.5 MLD of influent (sewage) flow.

2.3.4 Raw & Treated Sewage Parameters

The Sewage Treatment Plant at Kankarbagh is designed considering the following influent sewage characteristics.

Parameter	Raw Sewage (Inlet)	Treated sewage (Outlet)	NGT Discharge Standard (Consent to Establish)
pH	6.0 - 8.5	6.5 - 9.0	5.5-9.0
BOD, mg/L	100 - 250	<20	<10
COD, mg/L	500	-	<50
TSS, mg/L	<500	<50	<20
Total Nitrogen, mg/L	-	-	<10
Total Phosphorus, mg/L	-	-	<1
Faecal Coliform MPN/100 ml	$10^6 - 10^7$	<1000	Desirable-100 & Permissible-230

Source: WABAGH, Process Description Document (10P155-B0012-1101)

As per regulatory compliances, all STPs are required to meet the NGT effluent standard. In case of Kankarbagh STP, a window of 2years has been allowed by Bihar State Pollution Control Board (BSPCB) to comply with the NGT effluent standards after the project actually starts its operation (**Refer Annex 7**)

2.3.5 Dewatered Digested Sludge Characteristics

Parameter	Details
Outlet concentration of dewatered sludge	More than 20% Solids
Faecal Coliform Limit, MPN/g of TS	Less than 20,00,000 MPN per gram of total dry solids (20,00,000 MPN/gTS)

2.4 Process Description

The sewage treatment is based on a biological treatment process. Further the sludge generated from the treatment plant shall be anaerobically digested to produce biogas which in turn will be used for generation of power through gas engines. The Kankarbagh STP is spread across six (6) hectares of land and will include the following treatment stages and components:

#	Treatment Stage	Components
9.	Preliminary Treatment	• Stilling Chamber
		• Mechanical Fine Screen
		• Manual Fine Screen
		• Grit Distribution Chamber
		• Grit Chamber
		• Bypass
10.	Primary Treatment	• Primary Clarifier Distribution Chamber
		• Primary Clarifier
11.	Secondary Treatment	• Aeration Tank
		• Process Air Blower Area
		• Secondary Clarifier Distribution Chamber
		• Return Activated Sludge Sump
12.	Disinfection and Disposal	• Chlorine Contact Tank
		• Gas Chlorination System
		• Chlorine Leak Absorption System
		• Absorbent Tank
		• Caustic Solution Recirculation Pump
		• Chlorine Leak Blower
		• Treated Water - disposed to Pahari STP outlet channel and goes to "Khanua" drain.
13.	Sludge Handling	• Digester Feed Sump
		• Anaerobic Sludge Digester
		• Digested Sludge Sump
		• Centrifuge
		• Polymer Dosing System
		• Supernatant Sump and Pumps
14.	Biogas Handling and Power Generation	• Gas Holder
		• Biogas Scrubber
		• Biogas Flare
		• Biogas Engine- 635KVA capacity
15.	Heat Recovery System	• Hot Water Tank and Hot Water Recirculation Pumps
		• Jacket Water Waste Heat Recovery Unit
		• Exhaust Gas Waste Heat Recovery Unit
16.	Auxiliary Units Section	• Plant Water System
		• Bore Wells
		• Potable Water / Utility Water

A block diagram of the proposed treatment scheme with the components as indicated above have been provided in **Figure 4** below.

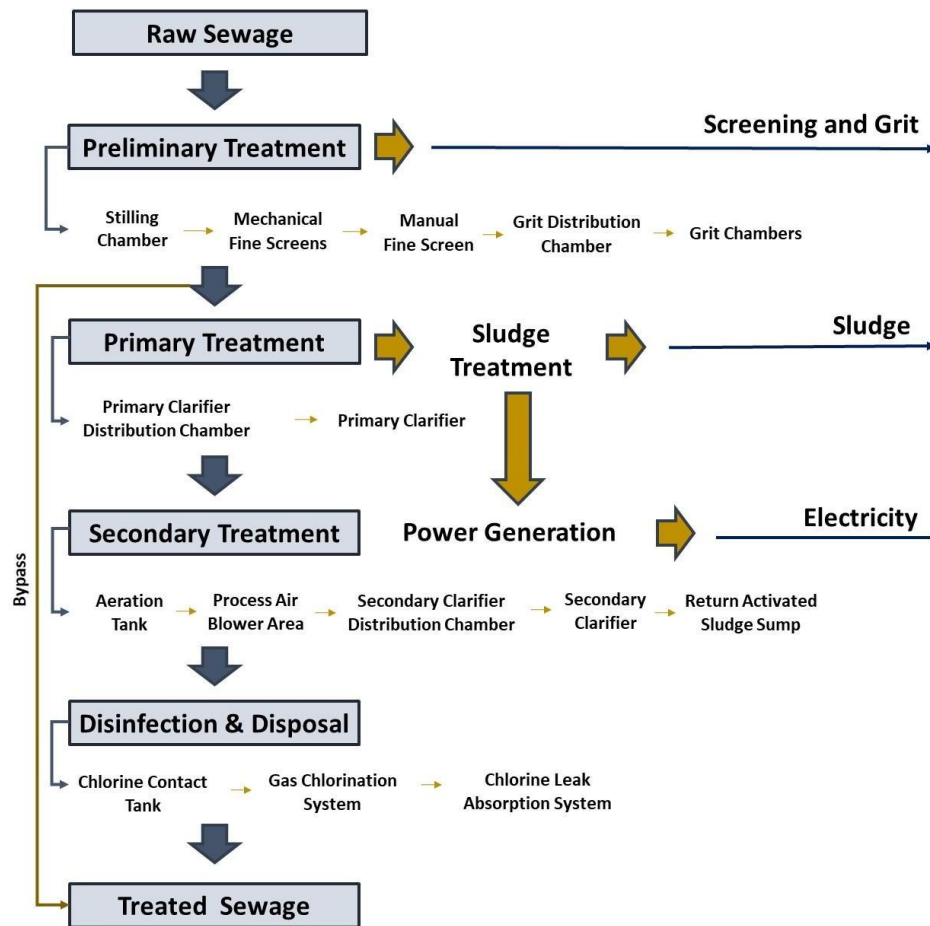


Figure 4: Block Diagram of Proposed Scheme

1. Preliminary Treatment

The preliminary treatment comprises of screenings and grit removal operations. During this operation, solid substances like floatables, rags, grit etc. are removed from the wastewater. This is achieved in two process steps:

- Fine solids and clogging constituents are removed from the sewage by fine screen units.
- In the grit chamber heavy particles (grit) with high settling velocities are removed by sedimentation.

2. Primary Treatment

This section receives the screened and de-gritted sewage. In this part of treatment plant, substantial amount of influent suspended solids and a portion of influent BOD are removed in the Primary Clarifier.

3. Secondary Treatment

The secondary treatment converts soluble or dispersed organic wastewater constituents which are not removed during Primary Treatment, into biomass. The treatment process is implemented for the

removal of carbonaceous BOD removal using suitable microorganisms (bacteria) and supply of oxygen. The dissolved oxygen concentration maintained in the aeration tank shall be approx. 2 mg/l and air supply shall be carried out through air blowers. The aeration system comprising of blowers, fine bubble diffusers shall be designed to maximize oxygen transfer and to adapt to the changing oxygen demands in biological treatment system.

The mixed liquor from the aeration tank will be distributed to the secondary clarifier system to separate the activated sludge from the treated wastewater. The secondary clarifier system comprises of four (4) clarifiers. The settled biomass from the clarifiers is then removed while some of it is partly recycled through the Return Activated Sludge (RAS) Sump.

4. Disinfection and Disposal Section

Secondary Treatment Section is followed by a disinfection system based on Chlorination to reduce the coliform level present in the treated sewage to the desired levels. After disinfection, the sewage is disposed off to the river through disposal pipe / channel.

5. Sludge Handling Section

The sludge from the primary and secondary treatment process shall be used for the production of biogas. The sludge from the primary and secondary process are collected in the Digester Feed Sump which aids in keeping the sludge in suspension and prevents any settling. The Anaerobic Sludge Digesters aid in digesting the thickened sludge in the absence of air resulting in the production of biogas with approx. 60% methane. The digested sludge is then transferred to the Digested Sludge Sump by gravity and dewatered using a centrifuge based system. Supernatants from digester, centrifuge feed sump and from centrifuge are received at the supernatant sump and pumped to the primary clarifier distribution chamber.

6. Biogas Handling Section

The biogas generated by the anaerobic digestion process will be used in co-generation plant in order to produce heat and electrical energy.

To ensure continuous supply of generated biogas, a gas holder of adequate capacity shall be constructed. Prior to utilization, the biogas shall be passed through the biogas scrubber plant where the Hydrogen Sulphide (H₂S) and Sulphur Dioxide gas (SO₂) will be removed. Caustic Soda solution shall be used for the biogas scrubbing so as to reduce the hydrogen sulphide present in biogas. The spent caustic would then be regenerated in a Biological Aerobic Reactor and recycled back to the scrubbing process. Pure elemental sulphur will be recovered as a by-product.

Gas flares (2 nos.) with drip trap, pressure regulator, flame arrestor and pilot burner will be installed to burn the biogas produced from the treatment plant under emergency conditions. Capacity of the flares will be 120% of gas generated from the plant. The biogas engine capacity is 635KVA in KKB plant

Biogas Engine shall be installed for generation of electricity from biogas. Cogeneration system will be provided inside the Gas Engine Building. Heat Recovery units, cooling system and Biogas Engines shall be housed in the Biogas Engine Building. Biogas engine supplied will include required exhaust ducting, HT radiator, Wet Ventilation System, Fresh and used lube oil system, Cooling water circuit for HT and LT system and Cooling water filling system.

7. Heat Recovery Section

A seasonal variation in the incoming raw sewage is expected during winter and summer season. For optimum performance of the Anaerobic Sludge Digester, the temperature in the digesters needs to be

maintained at approx. 35°C. In order to maintain this temperature, the incoming sludge to digester will be heated to 35°C, when the incoming temperature is lower than 35°C. The hot fluid required for heating shall be generated from the waste heat available from the GasEngine.

8. Auxiliary Units Section

The auxiliary units of the STP shall consist of the Plant water system, Bore wells, Potable water/ utility water.

Plant water pump shall be provided to serve the plant water need which included the water required for screens, grit washer, sludge line flushing water and landscaping at site. This water shall be sourced from the treated sewage.

Bore Well Pumps are provided for pumping fresh groundwater to a Service/Potable Water Tank. The water shall be used for multiple applications such as polymer solution preparation, human domestic potable needs, laboratory potable water needs, admin building and toilet flushing.

The potable water from the tank shall be softened in a Water Softener. Regeneration of the Softener shall be carried out using brine solution pumped using the Diaphragm Type Brine Transfer Pumps.

The softened water shall be used for applications such as engine LT, HT circuit, chlorine leak absorption, scrubber system, hot water recirculation tank and for other soft water requirements

2.5 Project Phasing and Schedule

A project phasing schedule has been developed for the overall project and is as provided below:

CONSTRUCTION PLAN & MILESTONE SCHEDULE (KANKARBAGH STP)						
Project : Kankarbagh STP						
Activity	Kankarbagh STP	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Project Part: KKB STP						
- Engineering	6.00%	5.9%	0.1%			
- Civil Works	49.00%	7%	15%	12%	8%	7%
- MEI Works (Supply + Erection)	45.00%	7%	5%	8%	12%	13%
		20%	20%	20%	20%	20%

The Cost for Kankarbagh STP Project (HAM) CAPEX- is Rs. 70.3 Cr and OPEX is Rs. 18.6 Cr.

2.5.1 Current Project Phase

The pre-construction activities are currently ongoing and can be understood through the photos presented in **Figure 5**. A visit was conducted to the project site as part of the ESIA site visit. The ongoing pre-construction activities included levelling of site area and emptying of water from the existing tank in the site area.



Figure 5: Site Photos of Pre-Construction Activities

3 Legal and Other Requirements

The E&S legal requirements applicable to the project at the national, state, and local level covering various components through the lifecycle of the project have been identified in the **Section 3.1**. Similarly, the investor requirements have also been identified in **Section 3.2**.

3.1 E&S Legal Requirements for STP Facility

The environmental regulations in India are drafted to address protection of environment and natural resources that form the input to any project or activity as well as for management and handling of pollutants released from a project or activity.

The Ministry of Environment, Forests and Climate Change (MoEF&CC) constituted under the Environment Protection Act at the central government level is the nodal agency for planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes. The State Pollution Control Boards, constituted under the Water Act, are responsible for implementing provisions of the Acts and Rules addressing prevention and control of pollution. Over a period of time their scope has been widened to all forms of pollution.

The key environmental and social regulations that an infrastructure project needs to be screened against are as follows:

- Environmental Clearance – In accordance with the provisions of Environmental Impact Assessment (EIA) Notification 2006, Schedule I, the STP project is not required to obtain an Environmental Clearance under the Environmental Impact Assessment Notification 2006 from the State or Central Authority.
- Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR Act) – The land for the project has been allotted by Patna Municipal Corporation. Hence provisions of Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 are not applicable.

3.1.1 Applicable Environmental Regulations

Regulation	Brief	Action Required	Compliance status
1. Environment (Protection) Act, 1986	The Act has been framed as an umbrella Act which provides for both protection and improvement of environment. A number of Rules, Notifications and Authorities are formulated under this Act for prevention of pollution, and protection of environmentally sensitive locations.	Construction and O&M Phase: Submit an environmental audit report for the financial year ending the 31 st March in Form V to the BSPCB under each of the Consent Orders granted to the project and/or its components	The project is envisaged to generate dusts, fumes, gaseous emissions, noise pollution during both construction and operation of the project. Thus, as per regulatory requirement, these potential pollution sources shall require to be maintained within emissions and discharge norms set out by BSPCB and accordingly report is required to be submitted.

2. Water (Prevention and Control of Pollution) Act, 1974	The Act provides for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country	<p>Construction Phase:</p> <ul style="list-style-type: none"> • A Consent to Establish for KB STP from BSPCB for carrying out construction activities has been obtained. • Monitor ambient air levels at regular intervals to ascertain process are within the permissible limits <p>O&M Phase:</p> <ul style="list-style-type: none"> • Obtain a Consent to Operate from Bihar State Pollution Control Board for operation of the Sewage Treatment Plant 	CTE is obtained and the compliances as per the CTE conditions will be shared as monthly/quarterly report. Environmental Monitoring will be conducted as per schedule mentioned in this report
3. Air (Prevention and Control of Pollution) Act, 1981	The Act provides for prevention, control, and abatement of air pollution from an establishment and primarily addresses outputs of development activities.	<p>Construction Phase & O & M Phase:</p> <ul style="list-style-type: none"> • Diesel generator set should be provided with acoustic enclosure • Monitor DG stack emission levels at regular intervals to ascertain operations are within the permissible limits • Diesel generator stack height should meet the specifications in the Consent order. 	The DG sets will be installed with emission standards in compliance with the CTE NOC received from BSPCB.
4. Environmental Protection Second Amendment Rules 2002 (DG Set) & 2004	The Rule provides regulations to control noise limits and emission limits for a Diesel Generator.	<p>Construction Phase:</p> <ul style="list-style-type: none"> • Adopt measures to control and mitigate noise levels from construction equipment and activities. • Monitor ambient noise levels at regular intervals to ascertain operations are within permissible limits. <p>O&M Phase:</p> <ul style="list-style-type: none"> • Monitor ambient noise levels on a periodic basis (at least once a year) to ascertain operations within permissible limits. 	Fitness certificate of equipment will be checked regularly for validity. Noise monitoring at construction sites to be ensured as per environmental monitoring plan. Provision for noise enclosures or barriers for high noise machineries, equipment.
5. The Noise Pollution (Regulation and Control) Rules, 2000	It provides for regulations to control ambient noise levels in public places from sources such as industries/ construction works/ community events, etc.	<p>Construction and O&M Phase:</p> <ul style="list-style-type: none"> • Obtain an Authorization from the BSPCB for handling and management of hazardous waste mainly generated in the switchyard and from DG sets (if any) for backup power. • Comply with conditions of the authorization. • Store hazardous waste (waste oil, oil & grease laden cotton, empty 	Making arrangement for proper segregation, storage and disposal of such wastes; Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids; Using impervious surfaces for refuelling areas and other fluid transfer areas;
6. The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2016	Hazardous Waste Management Rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, use reprocessing, collection, conversion, and offering for sale, destruction, and disposal of Hazardous Waste.	<p>Construction Phase:</p> <ul style="list-style-type: none"> • Diesel generator set should be provided with acoustic enclosure • Monitor DG stack emission levels at regular intervals to ascertain operations are within the permissible limits • Diesel generator stack height should meet the specifications in the Consent order. 	Making arrangement for proper segregation, storage and disposal of such wastes; Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids; Using impervious surfaces for refuelling areas and other fluid transfer areas;

		<p>paint tins, spent filter, spent media etc.) on impermeable surfaces protected from environment</p> <ul style="list-style-type: none"> • Segregate the hazardous and nonhazardous waste • Dispose hazardous waste to an authorized Transfer, Storage and Disposal Facility. 	<p>Providing portable spill containment and clean-up equipment on site and training in the equipment deployment; and Training workers on the correct transfer and handling of fuels and chemicals and the response to spills. Compliances of CTE/CTO regarding will be ensured by finding the authorized agencies for the disposal of hazardous waste.</p>
7. Construction and Demolition Waste Management Rules, 2016	<p>The Rules apply to every waste resulting from construction, re-modelling, repair, and demolition of any civil structure of individual or organization or authority who generates construction and demolition waste such as building materials, debris, and rubble.</p>	<p>Construction phase:</p> <ul style="list-style-type: none"> • Submit a Waste Management Plan with approvals from the local authority before starting construction or demolition • Collection, segregation of concrete, soil and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority 	<p>As reported the C&D waste generated during the construction activities will be stored separately at a designated area within the STP complex and can be reuse a portion of the C&D waste for backfilling activity if required. Otherwise, disposal will be done at designated place (transport nagar) provided by BUIDCo via PMC letter no.-2950, dated-26/12/22. Refer Annex 6.</p>
8. Solid Waste Management Rules, 2016	<p>The Rules were framed with an objective to segregate, collect, dispose, process, and treat municipal solid waste generated from a various areas including cities, townships, and private and government establishments. The Rules classifies various types of waste generators and outlines their duties.</p>	<ul style="list-style-type: none"> • Segregate the waste into three (3) streams, bio-degradable, non-biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities • Do not throw, burn or bury the solid waste generated, on streets, in open public spaces outside the premises or in the drain or water bodies. • Pay user fee for solid waste management, as specified in the bye-laws of the local bodies. • Do not burn any horticulture waste. 	<p>Wastes generated from site offices and camp site is collected through municipal waste collection trucks.</p> <p>Other solid wastes will be disposed at a designated place (transport nagar) provided by BUIDCo via PMC letter no.-2950, dated-26/12/22. Refer Annex 6.</p>

<p>9. E-Waste (Management) Rules, 2016</p>	<p>The primary objective of the Rules is to ensure channelization of E-waste generated in the country for environmentally sound recycling which is largely controlled by the un-organized sector who are adopting crude practices that results into higher pollution and less recovery, thereby causing wastages of precious resources and damage to environment.</p> <p>The Rules apply to every manufacturer, producer, consumer, bulk consumer, collection centres, dealers, e-retailer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts, and spares which make the product operational</p>	<p>Construction and O&M phase:</p> <ul style="list-style-type: none"> • Ensure e-waste generated is channelized to authorized collection center's or registered dismantler or recycler or; returned to pick-up or take back services provided by producers. Maintain records of e-waste generated in Form 2. • e-waste like bulbs, tubes and other electrical items 	<p>E-waste waste will be hardly generated during construction phase.</p> <p>During O&M, it can be possible if replacement of electronics will be required. If so, these wastes will be collected and stored separately and its management will be done as per conditions of CTE norms.</p>
<p>10. The Batteries (Management & Handling) Rules, 2001</p>	<p>The Rules were notified with the primary objective of channelizing the used lead acid batteries for environmentally sound recycling. These provisions of the Rules apply to every manufacturer, importer, re-conditioner, and assembler of such batteries to ensure that used batteries are collected back and sent to registered recyclers.</p> <p>Responsibilities are also fixed on other stakeholders such as dealers, recyclers, bulk-consumers, and auctioneers to maintain records and file annual returns</p>	<p>Construction & O&M Phase:</p> <ul style="list-style-type: none"> • Deposit used batteries with the dealer, manufacturer, importer, assembler, registered recycler, and re-conditioner or at the designated collection centers. • Lead batteries like troche light batteries, DG set batteries, and so on 	<p>Whatever wastes under this category will be generated during O&M phase will be disposed through authorized agencies.</p>

<p>11. Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules 1989</p>	<p>The Rule was notified with a primary objective of preventing chemical accidents from industrial activities and mitigate impacts of chemical accidents. It classifies various hazardous chemicals based on its chemical characteristics and outlines measures to be taken for safe usage and storage of the chemicals.</p>	<p>O&M Phase:</p> <ul style="list-style-type: none"> • Take adequate steps to prevent major accidents and to limit their consequences to persons and the environment. • Provide persons working on the site with information, training, and equipment to ensure their safety. • Prepare on-site emergency plan and conduct mock drills. • Notify local authorities in case of a major accident to authority 	<p>Special care will be taken during chlorination for disinfection of treated water and storage of chlorine tonner will be done as per Pollution Control Board norms.</p>
<p>12. Public Liability Insurance Act 1991</p>	<p>The main objective of the Public Liability Insurance Act 1991 is to provide for damages to victims of an accident which occurs as a result of handling any hazardous substance. The Act applies to all owners associated with the production or handling of any hazardous chemicals.</p>	<p>O&M Phase:</p> <ul style="list-style-type: none"> • Obtain insurance policy against the liability for handling hazardous substance specified in the Act and submit copy of the same to BSPCB • In addition to the premium, every owner shall pay the insurer for being credited to the Relief fund. <ul style="list-style-type: none"> ○ Copy of the same shall be submitted to SPCB ○ Renewal before expiry of validity period 	<p>Applicable during O & M phase.</p>
<p>13. The Bihar Ground Water (Regulation and Control of Development and Management) Act, 2006</p> <p>14. Central Ground Water Authority Guidelines to regulate and control Ground Water Extraction in India dated 1 June, 2019</p>	<p>An Act to promote water conservation, and tree cover and regulate the exploitation and use of ground and surface water for protection and conservation of water sources, land and environment and matters.</p>	<p>Construction Phase:</p> <ul style="list-style-type: none"> • Approval from Authority for digging bore well for water withdrawal during construction. CGWB applied and yet to receive approval • Obtain permission from Local Authority for cutting of trees. • Ensure protection of trees and their branches while developing their infrastructure or carrying on their activities <p>O&M Phase:</p> <p>Approval from Authority for digging borewell for water withdrawal during O&M.</p>	<p>NOC is available</p>

3.1.2 Applicable Social Framework Regulations

Regulation/Policies	Brief	Action Required	Compliance status
Applicable World Bank policies			
OP 4.12/BP 4.12 – Involuntary Resettlement	The project entails no land acquisition but it may impact (minimal) livelihood of non- title holders at STP site.	Cash compensation as defined in First Schedule of RFCTLAR&R Act, 2013 or any state policy Detailed ARAPis conducted and compensation based on World Bank guidelines and State Social act is calculated Compensation will be provided to the Project Affected Persons (PAPs)	No land acquisitions.
Applicable State Policies			
Bihar Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement rules 2014 (BLARR Rules 2016)	Land required for the project shall be acquired as per the provisions of the rules.	Applicable if land will be acquired	
Bihar Raiyati Land Lease Policy (2014)	Government can acquire the land on lease through this policy. This is time saving approach and now days Govt. of Bihar is acquiring the land on lease for most of the projects.	Applicable if land will be acquired	

3.1.3. Applicable Occupational, Health & Safety Regulations

Regulation	Brief	Action Required	
1. Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	An Act to regulate the employment and conditions of service of building and other construction workers. The Act stipulates health, safety, and welfare measures and for other matters connected therewith applicable to the construction workers	Construction phase: <ul style="list-style-type: none"> Registration with Labor Department (for recording maximum number of workers to be present at site during construction) Engagement of Contractor registered with the Labour Department Ensure that Contractor employs measures on worker health and safety during construction 	BOCW license and Labour license are available.

<p>2. The Factories Act, 1948 and Bihar Factories Rules, 1950</p>	<p>The main objective of the Act is to ensure adequate safety measures and at the same time also to promote health and welfare of the workers employed in factories as well as to prevent haphazard growth of factories. The Act is applicable to any factory using power & employing 10 or more workers.</p> <p>The Act along with Rules (state specific) outlines requirements to ensure occupational safety, health, and welfare of workers at work place</p>	<p>O&M phase:</p> <p>Applicability of factories license with respect to the operations of the STP should be confirmed with the local office of the Factories Inspectorate. If found applicable, the following key actions would require to be undertaken:</p> <ul style="list-style-type: none"> • WABAG should apply to the obtain license to work in a factory (Form No. 4) from Factories Inspectorate (DISH). • Obtain an approved factory layout/ plan from Factories Inspectorate (DISH) • Conduct structural stability of building by competent and authorized Civil/Structural Engineers • Obtain Fire NoC from Chief Fire Officer • Conduct health check-up of employees and/or non-employee workers • Establish Occupational Health Centre based on number of workers • File Annual Factory Returns for the calendar year every year before 31 January of the next year. • Adhere to Bihar Factories Rules (BFR), 1950 on labour safety and welfare. 	<p>During O & M phase needs to be ensured by the site team and the status and progress needs to be submitted in the EMP compliance report.</p>
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<p>3. Central Motor Vehicles Act 1988</p>	<p>An Act that regulates all aspects of road transport vehicles. It also seeks to consolidate and amend the law relating to motor vehicles.</p> <p>The Act provides in detail the legislative provisions regarding licensing of drivers/conductors, registration of motor vehicles, control of motor vehicles through permits, special provisions relating to state transport undertakings, traffic regulation, insurance, liability, offences and penalties, etc.</p>	<p>Construction phase:</p> <ul style="list-style-type: none"> Construction equipment and transport vehicles (owned or hired) should possess valid driver's license; registration, permit for transportation, fitness certificate, and insurance <p>O&M phase:</p> <ul style="list-style-type: none"> Vehicles used (owned or hired) should possess valid driver's license; registration, permit for transportation, fitness certificate, and insurance 	<p>Records are available at site and reported in quarterly ESMP compliance report also.</p>
<p>4. Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010</p>	<p>The regulation 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.</p>	<p>Construction phase and O&M phase:</p> <p>Employ safety measures specified in the Regulation for all electrical work</p> <p>All earthing systems to be tested for resistance during the dry season once every year.</p> <p>Periodic inspection of LT/HT installation - at least once in five years</p> <p>Approval from Electrical Inspector for operation of generating unit >10 kW.</p> <p>Fire buckets filled with clean dry sand, ready for immediate use for extinguishing fires, in addition to fire extinguishers suitable for dealing with electric fires to be kept at site</p>	<p>This is complied at site. The fire buckets and fire extinguishers are available at site</p>

<p>5. The Static and Mobile Pressure Vessels (Unfired) Rules 1981</p>	<p>These SMPV rules stipulate various safety guidelines for the storage and transport of compressed and liquefied gases filled in pressure vessels.</p>	<p>O&M phase:</p> <ul style="list-style-type: none"> • The vessel shall contain the following fittings: <ul style="list-style-type: none"> ○ pressure relief ○ shut-off and emergency shut-off valves ○ liquid level gauging device ○ pressure gauge • All vessels shall be hydraulically tested by a competent person at a pressure marked on the vessel in an interval of 5 years. • Vessels to be stored in accordance to distances specified under the Rule. • Electrical wires shall not pass over any storage vessel. Electrical wires installed within safety zone shall be insulated cables of approved type. 	<p>The Compliance will be ensured at site during O & M phase.</p>
<p>6. The Boilers Act, 1923 amended upto 2007</p>	<p>The Act stipulates requirement for safety of steam boilers and steam pipes. The Act identifies defines boilers and further aids in classifying them as IBR and non-IBR boilers. It also outlines management and safety measures for operation.</p>	<p>O&M phase:</p> <ul style="list-style-type: none"> • Every boiler has to be registered with the Chief Inspector of Boilers 	<p>The Compliance will be ensured at site during O & M phase.</p>

3.1.4 Applicable Employee and Labour Welfare Regulations

Regulation	Brief	Action Required	Compliance status
<p>1. Child and Adolescent Labor (Prohibition and Regulation) Act, 1986 and Amendment Act 2016</p>	<p>An Act to prohibit the engagement of children in certain employments and to regulate the conditions of work of children and adolescents in certain other employments.</p>	<p>Construction and O&M phase:</p> <ul style="list-style-type: none"> • Ensure that child labor is not engaged for any activity 	<p>Labour record detail indicated that no child labour was hired at site.</p>

2. Minimum Wages Act, 1948	An Act to provide for fixing minimum rates of wages in certain employments to ensure level of income for a worker which will provide a basic standard of living including good health, dignity, comfort, education and provide for any contingency	Construction phase and O&M phase: Ensure payment of wages to workers (employed, on contract, through a contractor) as per minimum wages notified	the regulatory provision under Minimum Wages Act, 1948 will be applicable for the proposed project related activity. Wage register is maintained at site.
3. The Equal Remuneration Act, 1976	An Act to provide for the payment of equal remuneration to men and women workers and for the prevention of discrimination, on the ground of sex, against women in the matter of employment and for matters connected therewith.	Construction phase and O&M phase: <ul style="list-style-type: none"> • Pay equal remuneration to employees of all genders performing same work or work of a similar nature. • Employer will not make any discrimination while making recruitment for the same work or work of a similar nature, except where such work is prohibited or restricted by or under any law for the time being in force 	The equal remuneration act is complied in the site and the records are evident.
4. Employees' State Insurance Act (ESI), 1948	An Act to provide for certain benefits to employees in case of sickness, maternity and injury during employment and to make provision for certain other matters in relation thereto. The ESI is a self- financing social security and health insurance scheme for Indian workers.	Construction phase and O&M phase: <ul style="list-style-type: none"> • Ensure deduction and payment of ESI for workers (employed, on contract, through a contractor) 	Complied and records at site
5. The Employees' Provident Funds (EPF) and Miscellaneous Provisions Act, 1952 amended up to 1996	The EPF is a social security mechanism to ensure employees better future on retirement and of dependents during death. It seeks to provide for institution of provident funds, pension funds and deposit linked insurance funds for employees in factories and other establishments.	Construction phase and O&M phase: <ul style="list-style-type: none"> • Ensure deduction and payment of provident fund for workers (employed, on contract, through a contractor) 	Complied and records at site
6. Employee Compensation Act 1923 and Amendment Act 2009	This Act aims at providing financial protection in form of insurance/medical benefits to workmen and their dependents in case of accidental injury by means of payment of compensation by the employers.	Construction phase: Ensure that Contractor obtains insurance for construction workers O&M phase: Obtain insurance for workers (employed, on contract, through a contractor)	Complied and records at site

7. The Payment of Gratuity Act, 1972	An Act to provide for a scheme for the payment of gratuity (type of retirement benefit) to employees engaged in factories, mines, oilfields, plantations, ports, railway companies, shops, or other establishments	O&M phase: Payment of gratuity to employees as per requirements under the Act	
8. The Maternity Benefits Act, 1961	An Act to regulate the employment of women in certain establishments for certain periods before and after child-birth and to provide for maternity benefit and certain other benefits.	O&M phase: Ensure provision of leaves as specified in the Act.	
9. The Payment of Bonus Act, 1965	The Payment of Bonus Act, 1965 provides for the payment of bonus to persons employed in certain establishments, employing 20 or more persons, on the basis of profits or on the basis of production or productivity and matters connected there with.	O&M phase: Payment of bonus for an accounting year as per provisions of the Act	
10. The Contract Labour (Regulation and Abolition) Act, 1970	An Act to regulate the employment of contract labour in certain establishments and to provide for its abolition in certain circumstances and for matters connected therewith	Construction phase and O&M phase: Engagement of Contractor registered with the Labour Department	The proposed project activity will engage contractual workers during the construction phase as well as operations and maintenance (O &M) phase. Under this act registration for license is necessary before engagement of any workers at Project site.
11. The Industrial Disputes Act, 1947	An Act to make provision for the investigation and settlement of industrial disputes, and for certain other purposes. The objective of the Act is to secure industrial peace and harmony by providing mechanism and procedure for the investigation and settlement of industrial disputes by conciliation, arbitration and adjudication which is provided under the statute.	O&M phase: Provisions of the Act are to be followed during laying-off of workers	
12. The Private Security Agencies (Regulation) Act, 2005	An Act to provide for the regulation of private security agencies in India.	Construction phase and O&M phase: Ensure security agencies hired are registered under the PSARA Act	

13. The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013	An Act to provide protection against sexual harassment of women at workplace and for the prevention and redressal of complaints of sexual harassment and for matters connected therewith or incidental thereto.	<p>Construction phase and O&M phase:</p> <p>Constitute an Internal Complaints Committee.</p> <p>Develop a procedure for recording and resolving complaints related to sexual harassment.</p> <p>Conduct enquiry on receipt of complaint as per the procedure.</p> <p>Submission of Annual Report to the District Officer with details on the number of cases filed and their disposal.</p>	In case, female labor will be hired in future and any GBV related issues comes up, this will be resolved through channel of GRM. BUIDCo ICC committee will handle it at 2nd tier.
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3.2 Word Bank Operational Policies

3.2.1 Application of World Bank Operational Policies

The applicability of World Bank Environmental & Social Safeguard Policies to the project has been assessed based on the review of the project information and baseline studies.

WB Operational Policies	How the World Bank Operational Policies is Applicable	Statement on Applicability
Environmental Assessment (OP4.01)	OP. 4.01 is applicable for all infrastructure projects under Namami Gange Programme. The activities include, construction of new 50 MLD STP and associated structure at Kankarbagh in Pahari STP campus with sewerage network.	Applicable
Natural habitats (OP4.04)	Treated Water will be disposed to Pahari STP outfall which in turn connect to Khanua Nallah .	Applicable
Pest Management (OP4.09)	It is expected not to require major pest management measures.	Not Applicable
Physical Cultural Resources (OP4.11)	This policy may be triggered by sub-projects under this in those areas where cultural property, historical, religious and unique natural value-this includes remains left by previous human inhabitants and unique environment features may be affected during widening and strengthening work of the sub-projects.	Not Applicable
Involuntary Settlement (OP4.12)	The project entails no land acquisition.	Not Applicable
Forests (OP4.36)	There are no forest areas within Patna which may be affected by the project construction works. As such the WB OP 4.36 will not be triggered.	Not Applicable
Indigenous Peoples (OP4.10)	The policy is not triggered as the geographical areas in consideration are not likely to have indigenous people as defined by the Bank policy.	Not Applicable

Safety of Dams (OP4.37)	The policy is not triggered as it will not involve the construction or maintenance of dams as defined by the Bank policy.	Not Applicable
Consultation and Disclosure (OP17.5)	For all Category A projects, the borrower needs to consult with the project affected people and beneficiaries about environmental and social concerns related to the project. Therefore, OP 17.5 will be triggered.	Applicable

3.2.2 World Bank Group's EHS Guidelines

The IFC Performance Standards 3 refers to World Bank Group's EHS Guidelines. The following Guidelines will be applicable to the STP:

- a) General EHS Guidelines (April 2007)
- b) EHS Guidelines for Water and Sanitation (December 2007)

3.3 Project Categorization

The Environmental & Social Management Framework (ESMF) classifies projects as High Risk, Substantial Risk, Moderate Risk or Low Risk, taking into account the following:

- The type, location, sensitivity and scale of the Project including physical considerations.
- The nature and magnitude of the potential E&S risks and impacts, including the type of development (greenfield or brownfield, e.g. rehabilitation, maintenance or upgrading activities); the nature of the potential risks and impacts (e.g. whether they are irreversible, unprecedented or complex); resettlement activities; presence of Indigenous Peoples; and possible mitigation measures considering the mitigation hierarchy.
- The capacity and commitment of the Borrower to manage such risks and impacts in a manner consistent with the World Bank operation policies.
- Other areas of risk that may be relevant to the delivery of Environmental & Social mitigation measures and outcomes, including the nature of the mitigation and technology being proposed, considerations relating to domestic and/or regional stability, conflict or security.

The project is classified as **Moderate Risk** for the following reasons:

- The project impacts during construction and O&M phase are expected to be few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- The project does not trigger involuntary resettlement.
- There are no Indigenous People in project influence area.
- There are no Protected Areas (Wildlife Sanctuaries and National Parks) in project influence area.
- Based on the project activities and its location, the project is not expected to result in any irreversible or unprecedented impacts.

A detailed assessment of the impacts has been presented in the **chapter 6** of this report.

4 Baseline Environmental and Social Status

4.1 Approach for Baseline Studies

For conducting baseline studies, the study area was delineated, environmental and social (E&S) sensitive receptors were identified through secondary data processing and baseline environmental monitoring was conducted for collecting primary data.

4.1.1 Project Influence Area

A three (3) km radius from the centre of the project was defined as the project influence area ("study area") for the conducting the baseline studies and impact assessment. The study area was defined based on the nature and mode of impact of project development on the E&S sensitive receptors. Refer **Figure 6**. The rationale for defining the 3 km buffer is presented below.

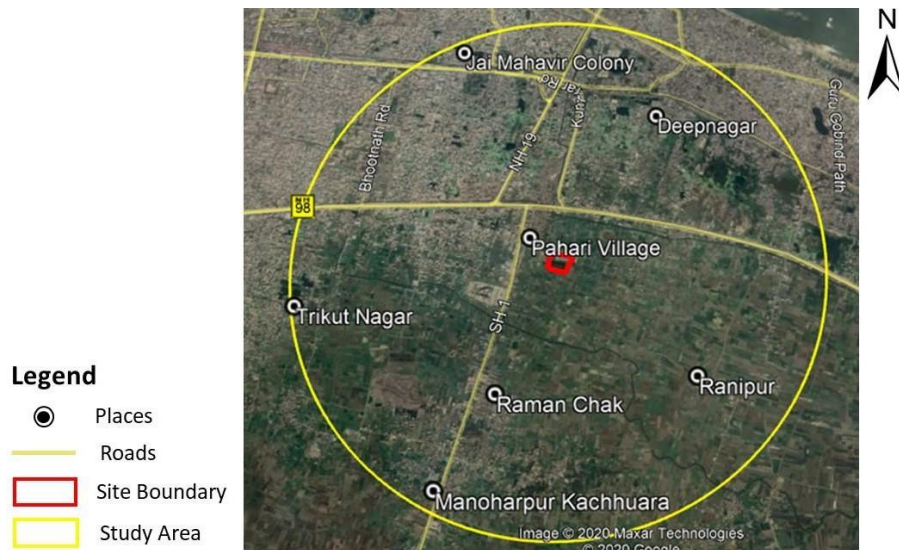


Figure 6: Site Boundary and Study Area

Rationale for defining a 3 km buffer area:

The extent of impacts arising from the project during construction and O&M phases will be local impacts and limited to immediate vicinity of the project area.

The rationale for delineating 3 km radius as the project influence area is listed below:

- f) A study of receptors present around the project area was conducted. A limited number of receptors were found present in the delineated project influence area that could potentially be impacted due to the project activities.
- g) Land for setting up the STP belongs to Patna Municipal Corporation. There were no encroachers or squatters identified on the allotted land.
- h) The source of water during construction will be a combination of ground water and tanker water. During operation and maintenance phase, the water used shall be a combination of ground water and recycled sewage (treated) water.
- i) Sewage treated in the STP shall be discharged as per statutory limits.
- j) The wastewater discharges and fugitive emissions are not expected to traverse beyond 3 km.

Thus, a 3 km buffer would be sufficient to study the impacts on the community and other sensitive receptors as indicated above.

4.1.2 Identifying Environmental and Social Sensitive Receptors

The sensitive receptors in the study area defined above were identified by undertaking a mapping exercise. These include:

- Settlements
- Water bodies
- Archaeological sites
- Tribal/Scheduled Areas
- Defence installations
- Highway/airports/railway station
- National Parks/Wildlife Sanctuaries
- Reserved/Protected Forest
- Ecological Sensitive Areas
- Important bird areas
- Ground water development status
- Socio-economic analysis
- Cropping pattern
- Meteorology

The Important Bird Areas were identified as per database created by Bombay Natural History Society, Birdlife International and eBird Hotspots. Archaeological sites were identified as per information provided by the Archaeological Survey of India (which includes world heritage sites, excavations, state protected monuments and museums).

The classification of the project area under natural hazards zones were also identified such as earthquakes and cyclones (based on hazard maps prepared by Building Materials and Technology Promotion Council).

Land use land cover (LULC) analysis was carried out using LISS-III imagery freely accessible from National Remote Sensing Centre (NRSC – Bhuvan) and Landsat 8 from USGS. The LULC includes the following layers:

- Agricultural Fallow
- Agriculture Cropland
- Deciduous/Scrub/Semi-Green Forest
- Built-up
- Wetlands/Waterbodies/Rivers/Streams

4.1.3 Baseline Environmental Monitoring Sampling Plan

The sampling locations were selected based on monitoring protocols developed with reference to the Central Pollution Control Board (CPCB) Guidelines for baseline environmental quality monitoring (ambient air, ambient noise, and water). The groundwater samples were collected from existing tap water sourced from bore wells on-site and off-site. Airquality monitoring stations were identified based on the wind pattern as well as the existing and potential traffic flow in the study area. Noise monitoring locations were chosen based on their proximity to sensitive receptors such as settlements, roads, existing and potential traffic movement, and wind pattern in the study area.

The number of samples for baseline environmental monitoring, parameters and frequency has been provided in **Table 1** below.

Table 1: Environmental Monitoring Samples

Aspect	Number of samples	Parameters
Ambient Air Quality	3 locations and two sample at each location for 48 hours	4 parameters to be analyzed (PM ₁₀ , PM _{2.5} , SO ₂ , NO _x).
Aspect	Number of samples	Parameters

Ambient Noise Quality	3 locations for 24 hours with hourly averages in dB(A)	-
Groundwater	2 locations 1 sample at each location	Parameters as per IS 10500:2012 Drinking Water Standards (36 parameters including physical, bacteriological, and heavy metals).

The monitoring results were analysed in comparison to national standards and the guideline values provided by the World Bank Group EHS General Guidelines. A detailed description of the baseline environmental monitoring is provided in the **sub-section 4.3**.

4.1.4 Site Visit

A five (5) day field visit was conducted to the study area for understanding the site context, validating the sensitive receptors identified through the desktop review, conducting baseline environmental monitoring, and holding stakeholder consultations. A brief description of the activities carried out is presented below:

- a) Opening meeting with WABAG representatives – Discussions were conducted with WABAG representatives to understand the project timelines, project operations, components siting, material handling and process flows, waste management practices etc.
- a) Verification of data layers – The sensitive receptors in the study area mapped during the desk-based exercise were verified on site through visual inspection during transect walks. During the site visit, local E&S sensitive receptors were also identified in addition to those identified through desktop review.
- b) Stakeholder Consultations – Interactions were carried out with project stakeholders including (but not limited to) local authorities and neighbouring communities to understand existing community infrastructure, presence of cultural heritage sites and local areas of importance (temples, mela grounds, community activity areas). The stakeholders were also appraised on the development of the STP and its benefits in management of pollution in the River Ganga. Response to queries of the stakeholders on the above mentioned aspects was also carried out. The consultations were conducted around the study area in small informal groups. The consultations were conducted during the ongoing pandemic across the country. Adequate safety measures were employed and thus conducted in small groups. The consultations were carried out using a semi-structured questionnaire.
- c) Baseline environmental monitoring – based on the sampling plan described in sub-section 4.1.3.

4.2 Meteorology

Satellite derived climate data for nine (9) locations in and around the study area was acquired from National Centre for Environmental Predictions (NCEP) Database and has been utilized for identifying the meteorology of the study area. It has been established through various research that satellite derived data corresponds to observed data for any location.

4.2.1 Rainfall

The annual mean rainfall across the study area over 30 years (1984 to 2013) shows variations and ranges between 1,084 – 1,127 mm from north-east to south-west direction.

The **Figure 7** presents the variation in mean rainfall for 30 years over twelve months of the year. The monsoon season spans from July to October and the highest levels of precipitation are experienced in the month of October (197 mm).

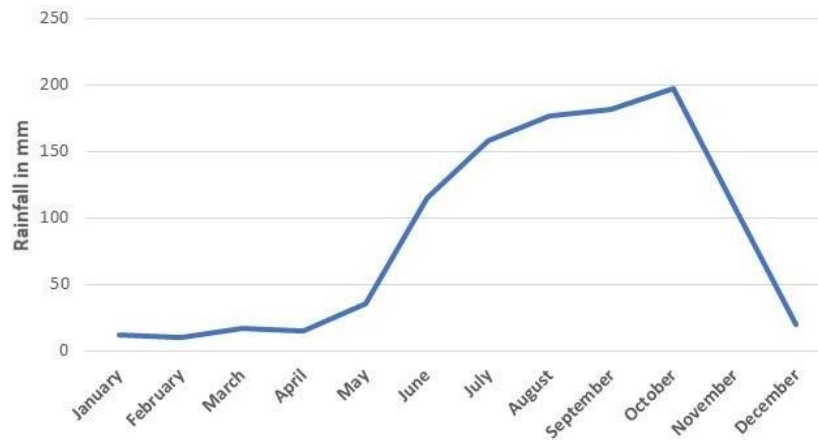


Figure 7: Variation in Rainfall in Project area

4.2.2 Temperature

The annual mean temperature across the study area is studied for 30 years. **Figure 8** presents the variations of temperature maximum, minimum and mean across twelve months of the year. Maximum temperatures are experienced from April to July (>35 °C) and minimum temperatures are experienced from November to February (15-18 °C).

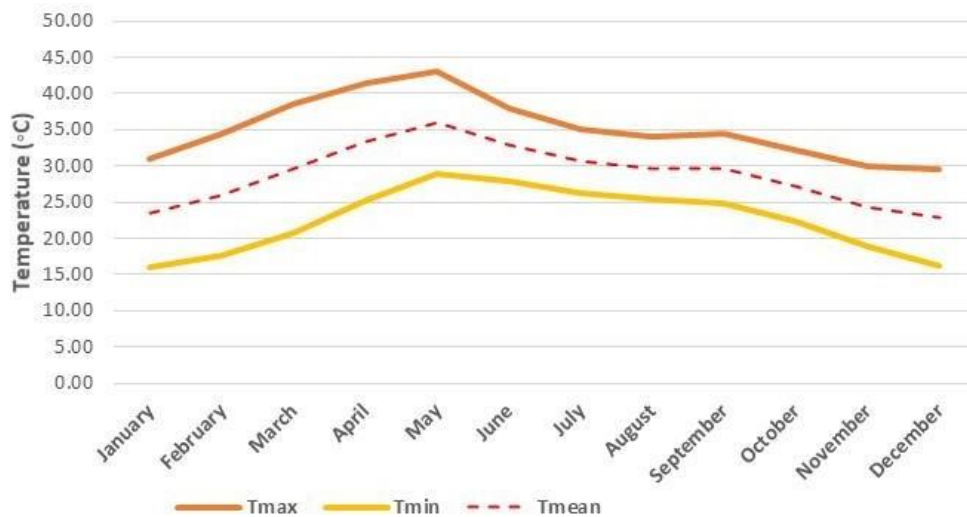


Figure 8: Temperature Variation in Project Area

4.2.3 Wind Speed

The predominant wind direction is observed to be from south-west to north-east direction. Refer **Figure 9** for the annual wind rose at Patna² indicating the direction of wind flow in terms of number of hours per year. Higher wind speeds (5 – 10 m/s) are experienced from the west-north-west and west direction of the study area.

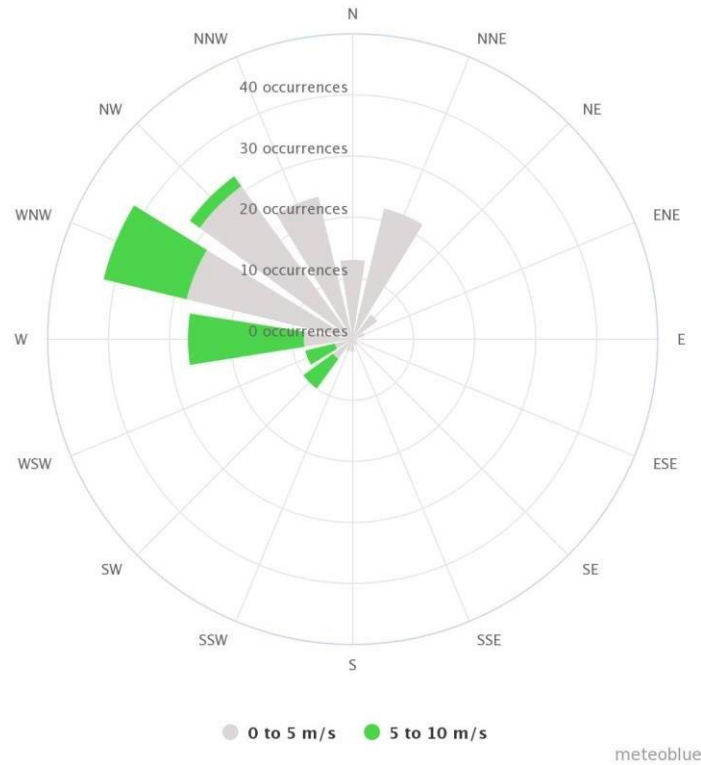


Figure 9: Wind Rose Diagram, Patna

4.3 Physical Resources

4.3.1 Air Environment

The baseline air quality was monitored at three locations. The siting of the air quality monitoring stations was carried out based on the prevalent wind direction and presence of sensitive receptors. The criteria for selection of each monitoring station is also given below. Refer **Figure 10** for locations of the monitoring stations. One location (AAQ1) is located in the downstream direction while two locations (AAQ2 and AAQ3) are located in the upstream direction of wind.

Monitoring Locations	Criteria for selection
AAQ 1 – Outside Main gate, Kankarbagh STP	The location chosen was at the main entrance of the project site. The location represents the baseline condition and is located in the downstream end of the wind direction.
AAQ 2 – Yadav Colony, Kankarbagh	The locality chosen is a settlement located in the second highest predominant wind direction of the site (West – North-West) and was in close proximity to the site.

2 <https://www.meteoblue.com> retrieved on 05.11.2020.

Monitoring Locations	Criteria for selection
AAQ 3 – Service road, near SH 1	The location chosen was in the upstream of the impact zone and is adjacent to the highway. It was understood that this shall be the major access route to the project site.

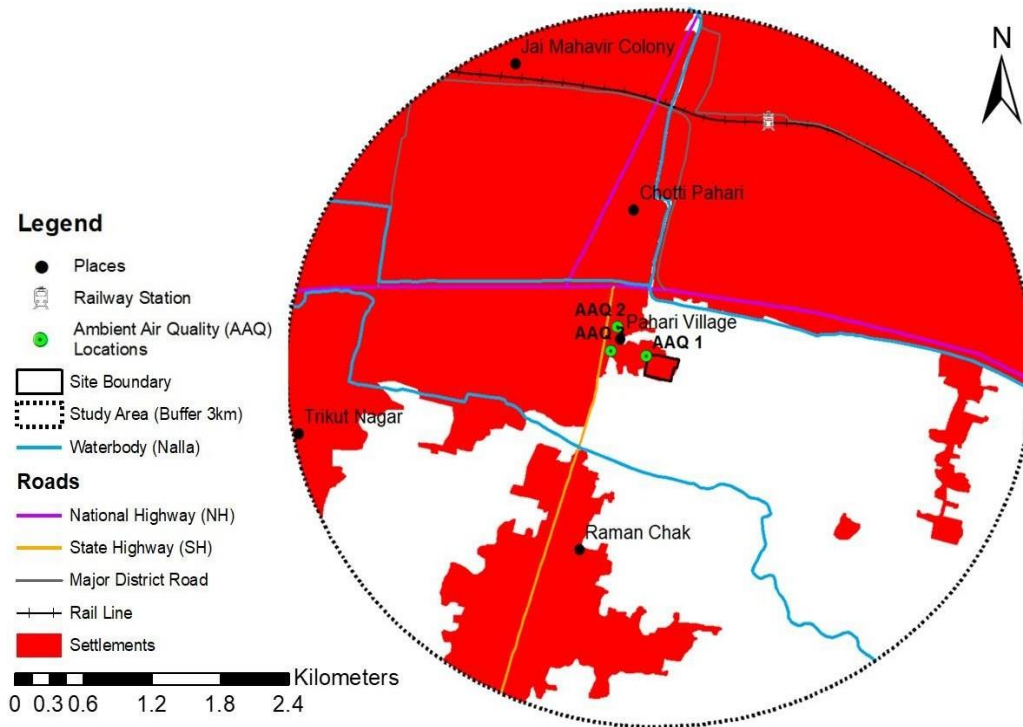


Figure 10: Ambient Air Quality (AAQ) Monitoring Locations

Summary Table of Monitoring Results

The ambient air monitoring stations.

Table 2: Ambient Air Quality Monitoring Result

Parameters	CPCB Standard (24 hours)	WHO Guidelines	Result					
			(AAQ 1)		(AAQ 2)		(AAQ 3)	
			Outside Main gate, Kankarbagh STP	Yadav Colony, Kankarbagh	Service road, near SH 1	Day 1	Day 2	Day 1
PM ₁₀ µg/m ³	100	50	86.48	82.26	60.28	62.86	76.38	75.34
PM _{2.5} µg/m ³	60	25	48.75	45.86	37.84	40.24	56.42	54.18
SO ₂ µg/m ³	80	20	32.46	28.80	24.6	20.12	39.05	42.48
NO _x µg/m ³	80	40	22.48	24.16	18.66	18.42	32.29	29.15

Analysis of Monitoring Results

The pollutant concentrations in the ambient air in the study area were compared with National Ambient Air Quality Standards (NAAQS) of Central Pollution Control Board (CPCB) and WHO guideline values provided in the World Bank Group’s General EHS Guidelines. Refer **Table 2**. The 24-hour average concentration of NO_x on two consecutive days of monitoring in the study area were observed

to be well within NAAQS standard and WHO guideline values. The SO₂, PM_{2.5} and PM₁₀ levels were well within NAAQS standard values but exceeded the limits provided by the WHO guidelines at all locations monitored.

4.3.2 Ambient Noise Level

The baseline ambient noise levels were monitored at three locations for 24 hours. Siting was carried out based on the potential high traffic routes and location of sensitive receptors around the project area. The criteria for selection of monitoring station is presented below. Refer **Figure 11** for locations of noise monitoring stations.

Monitoring Locations	Criteria for selection
N1 – Near Main gate, Kankarbagh STP	The location chosen was in close proximity to the main entrance of the project site. The location represents the baseline condition.
N2 – Yadav Colony, Kankarbagh	The location is a residential area (sensitive receptor) located in close proximity to the project site.
N3 – Service road, near SH 1	The site chosen is located adjacent to the highway and will be used as the major access route to the project site.

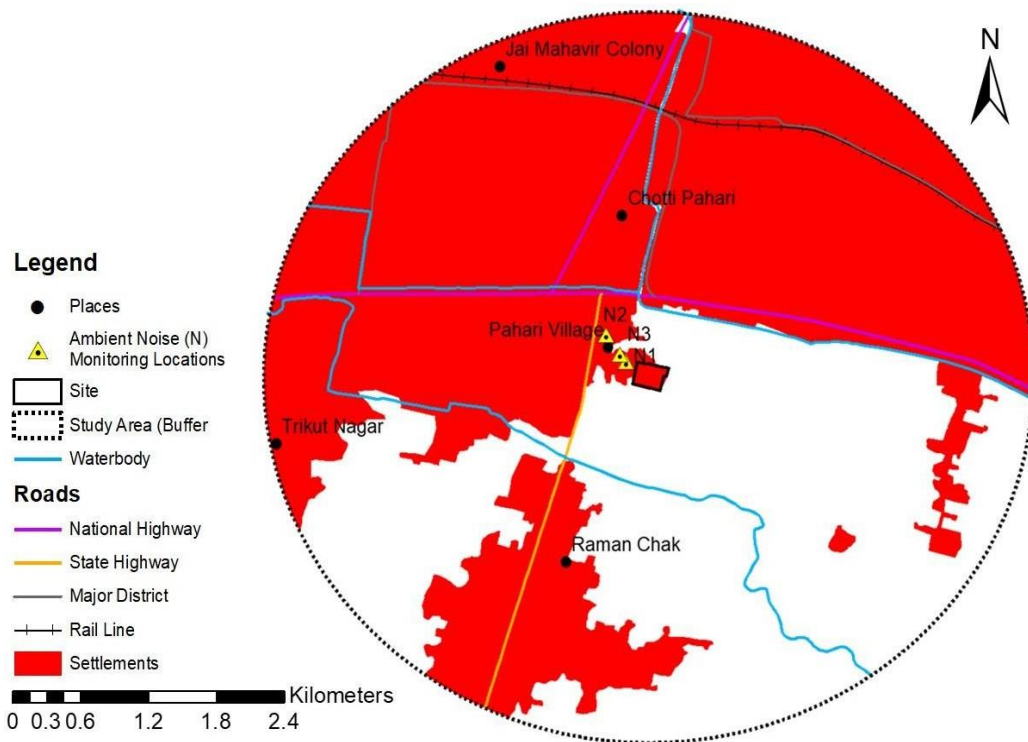


Figure 11: Ambient Noise (N) level Monitoring Locations

Summary Table of Monitoring Results

Ambient Noise Monitoring locations.

Table 3: Noise Level Monitoring Results

Receptor	Parameters	CPCB Standards	EHS Guidelines	Result		
				(N1) Near Main gate, Kankarbagh STP	(N2) Yadav Colony, Kankarbagh	(N3) Service road, near SH-1
Residential Area	Noise Level Day dB(A)	55	55	55.75	55.43	-
	Noise Level Night dB(A)	45	45	47.38	45.59	-
Commercial Area	Noise Level Day dB(A)	65	55	-	-	64.66
	Noise Level Night dB(A)	55	45	-	-	55.27

Analysis of Monitoring Results

The ambient noise levels monitored at site were compared with CPCB standards for ambient noise (for residential, commercial, industrial, and silent zones) and World Bank Group's EHS Guidelines (refer **Table 3**). The average ambient noise levels obtained for all the locations were observed to be exceeding the permissible limits of the CPCB standards and EHS guidelines for both day and night noise levels.

4.3.3 Topography and Soils

The site boundary and study area (buffer 3 km) fall under the urban Patna (Patna Sadar and Patna city). The study area falls under the high dense built fabric. However, vast open agricultural plots are observed in the north, south and east of the project site while settlements are observed to the west. The topography is flat plains as the study area is part of Indo-Gangetic flood plains. The predominant slope observed is from south-west to north-east. The average slope across the site is 5.4% from south-west to north-east and average slope is 2.4% from south-east to north-west. The type of soil found is gangetic alluvium. However, since the project is a brownfield project and there is no change in existing landuse, no baseline soil analysis was conducted.

4.3.4 Surface Water

The **Figure 12** presents the water network (nalla) in the study area. As seen in the map, there is no immediate surface water body within the study area and hence no baseline environmental monitoring for surface water quality was conducted. The River Ganga is the nearest surface waterbody (aerial distance of approx. 1.02 km) and is located towards north of the study area.

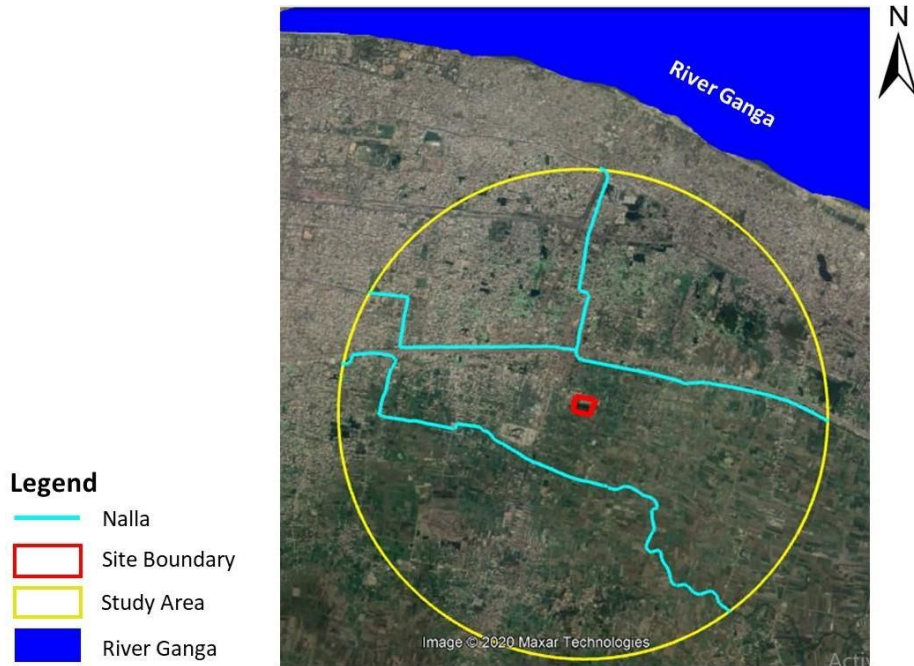


Figure 12: Location of Surface Water

4.3.5 Ground Water Development

The study area falls under the Patna District and specifically in two sub-districts - Patna Sadar and Patna city. As per the 'Dynamic Ground Water Resources of India' dated June 2017 published by Central Ground Water Board (CGWB), Patna Sadar falls under "critical" zone while Patna City falls under "safe" zone for ground water development. Refer **Figure 13**. Although the project site falls under Patna City, it is in close proximity (approx. 1.08 km) to the boundary of Patna Sadar (critical zone).

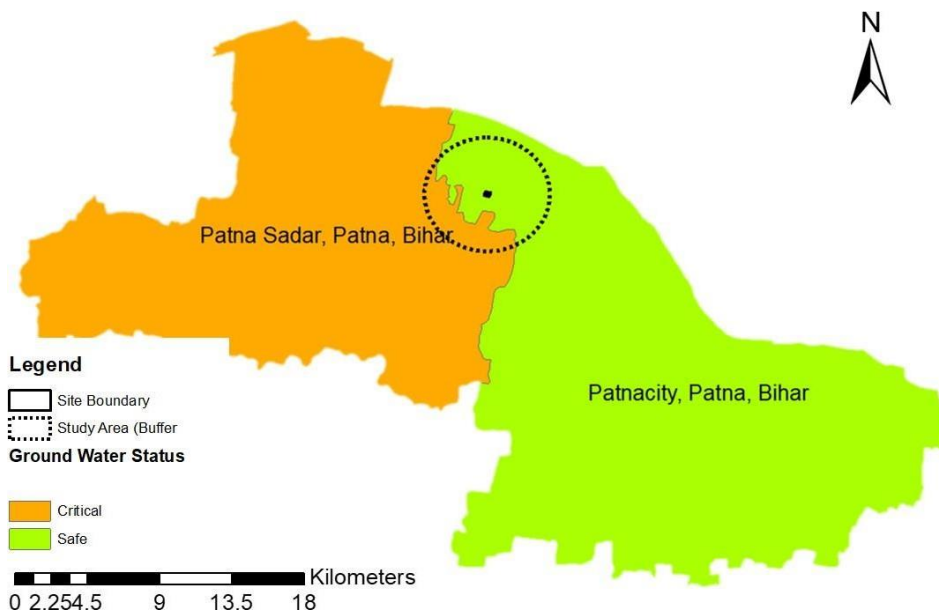


Figure 13: Ground Water Status

The baseline groundwater quality in the project influence area was monitored at two locations. These locations were selected with the objective of obtaining baseline values with one location on-site and

the other off-site. The criteria for selection of sampling location is presented below. Refer **Figure 14** for groundwater monitoring locations.

Monitoring Locations	Criteria for selection
GW 1 – On site, Bari Pahari, Kankarbagh	Proximity to site location
GW 2 – Off site, Bari Pahari, Kankarbagh	

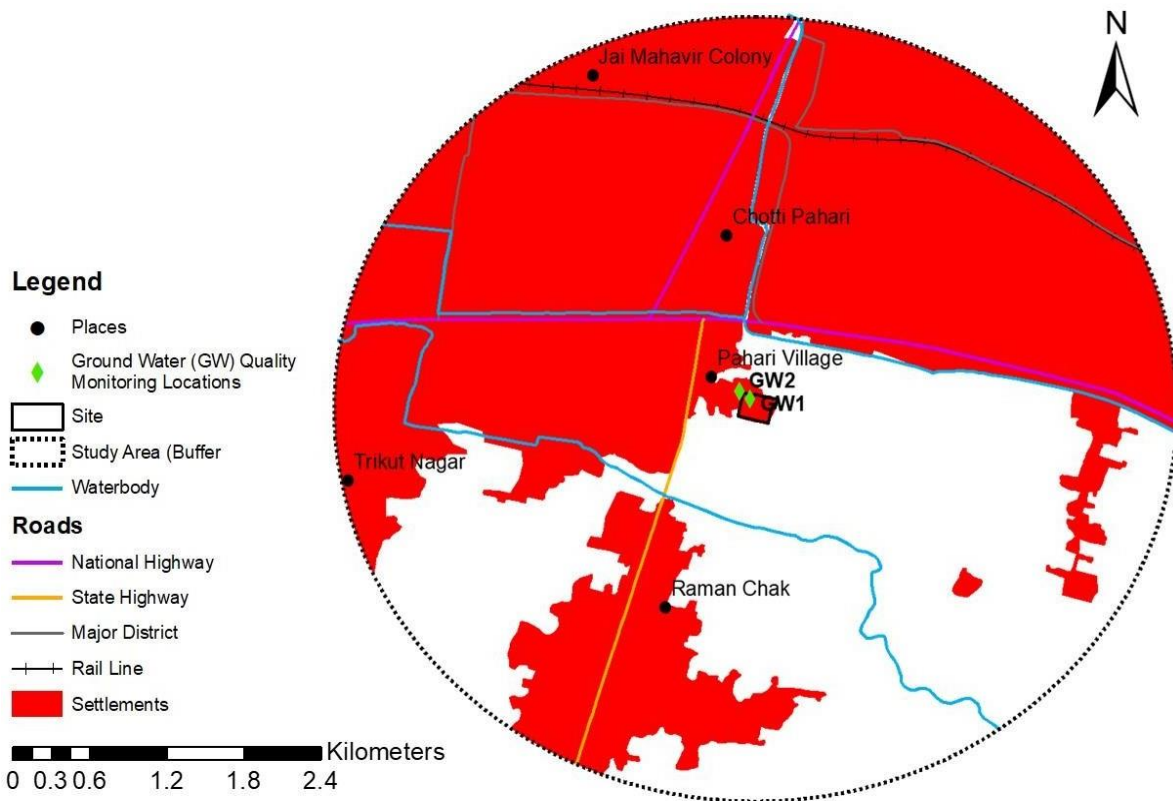


Figure 14: Ground Water (GW) Monitoring Locations

Summary Table of Monitoring Results

The ground water monitoring locations.

Table 4: Ground Water Quality Monitoring Result

Parameter	IS 10500:2012		Result	
	Acceptable Limit	Permissible Limit	On-site (GW 1)	Off-site (GW 2)
Colour (Hazen)	5	15	1.24	1.06
Taste	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity (NTU)	1	5	1.2	1.4
pH at 25 °C	6.5-8.5	No relaxation	7.59	7.4
Total dissolved solids (mg/L)	500	2000	465	478
Total alkalinity as CaCO ₃	200	-	174.2	194.1

Parameter	IS 10500:2012		Result	
	Acceptable Limit	Permissible Limit	On-site (GW 1)	Off-site (GW 2)
Total Hardness as CaCO ₃ (mg/L)	200	600	322.04	399.84
Calcium as Ca (mg/L)	75	200	43.904	101.136
Magnesium as Mg (mg/L)	30	100	67.587	72.585
Chloride as Cl ⁻ (mg/L)	250	1000	30.039	64.923
Sulphate as SO ₄ (mg/L)	200	400	38.67	53.91
Iron as Fe (mg/L)	0.30	No relaxation	0.27	0.28
Manganese as Mn (mg/L)	0.1	0.3	BLQ	BLQ
Fluoride as F (mg/L)	1	1.5	0.87	0.99
Copper as Cu (mg/L)	0.05	1.5	0.02	0.05
Residual Chlorine (mg/L)	0.2 - 1	-	Nil	Nil
Zinc as Zn (mg/L)	5	15	1.28	1.56
Phenolic Substances (mg/L)	0.001 -0.002	-	Nil	Nil
Aninic Detergent (mg/L)	0.2 – 1	-	BLQ	BLQ
Mineral Oil (mg/L)	0.5 - NR	-	Nil	BLQ
Arsenic as As (mg/L)	0.01	0.05	0.012	0.009
Cadmium as Cd (mg/L)	0.003	No relaxation	BLQ	BLQ
Total Chromium as Cr (mg/L)	0.05	No relaxation	BLQ	BLQ
Cyanide as CN (mg/L)	0.05	No relaxation	Nil	Nil
Lead as Pb (mg/L)	0.01	No relaxation	Nil	Nil
Selenium as Se (mg/L)	0.01	No relaxation	Nil	Nil
Mercury as Hg (mg/L)	0.001	No relaxation	Nil	Nil
Pesticides (mg/L)	Absent	-	Nil	Nil
Nickel as Ni (mg/L)	0.02	-	BLQ	BLQ
Boron as B (mg/L)	0.5	-	0.86	0.65
MPN Count/100 ml	10	-	6	8
E.Coliform Count // 100	Nil	-	Nil	Nil

BLQ – below limit of quantification, LOQ – limit of quantification

Analysis of Monitoring Results

The parameters analysed in the ground water sample were compared with IS 10500:2012 drinking water standards. Refer **Table 4**. The parameters of Total dissolved solids, Total alkalinity as CaCO₃ and Total Hardness as CaCO₃ (mg/L) are beyond acceptable limits at all locations while the parameters of Magnesium as Mg (mg/L) and Chloride as Cl⁻ (mg/L) were exceeding acceptable limits but were within permissible limits at GW1 and GW2, respectively. All other parameters were well within the acceptable limits prescribed by the standards.

4.4 Natural Hazards

Seismology – The study area lies in Zone IV i.e. High Damage Risk Zone (MSK VIII) according to the Building Materials and Technology Promotion Council (BMTPC) Earthquake Hazard Map. The region has not experienced any major earthquake in the last decade.

Cyclones – The study area lies in the Very High Damage Risk Zone B (50 m/s) according to the BMTPC Wind and Cyclone Hazard Map. The project location experiences cyclones periodically, latest being in May 2020.

Floods – The study area is located in an area vulnerable to floods according to the BMTPC Flood Hazard Map.

4.5 Ecological Resources

4.5.1 Protected Areas/Forests

There are no Reserved/Protected Forests present in the study area. There are no national parks, wildlife sanctuaries and Ramsar sites around the project site. Furthermore, there are no ASI sites located within the project influence area.

4.5.2 Important Bird Areas

There are no Important Bird Areas (IBA) and e-Bird hotspots located in the study area.

4.5.3 Ecology/Flora and Fauna

There are two major forest types in Bihar: Tropical Moist Deciduous and Tropical Dry Deciduous. Sal (*Shorea robusta*) is the major forest species, which covers about 55% of the forest area in the State. (Ministry of Environment and Forests 1999).

The most common flora found within the region include Peepal (*Ficus religiosa*), Sal (*Shorea robusta*), Kendu (*Diospyros melonoxylon*), Salai (*Bosewellia serrata*), Bahera (*Terminalia bellirica*), Mahua (*Maduca Indica*). The other species of flora found are *Holarrhena antidysenterica*, *Ziziphus xylopyrus*, *Flemingia Chappar*, *Butea superba*, *Butea parviflora*. The common fauna in the area mainly include Gangetic Dolphins, Flying foxes, Hyenas, Wild Dogs, Monkeys, Squirrels etc.

4.6 Economic Development

4.6.1 Land Use Land Cover

Land Use Land Cover (LULC) classification has been conducted for the entire study area comprising of project area and the study area. Refer **Figure 15** and **Figure 16**. It can be observed that the major land cover in the study area is settlements (61%) followed by agriculture fallow land (38%).

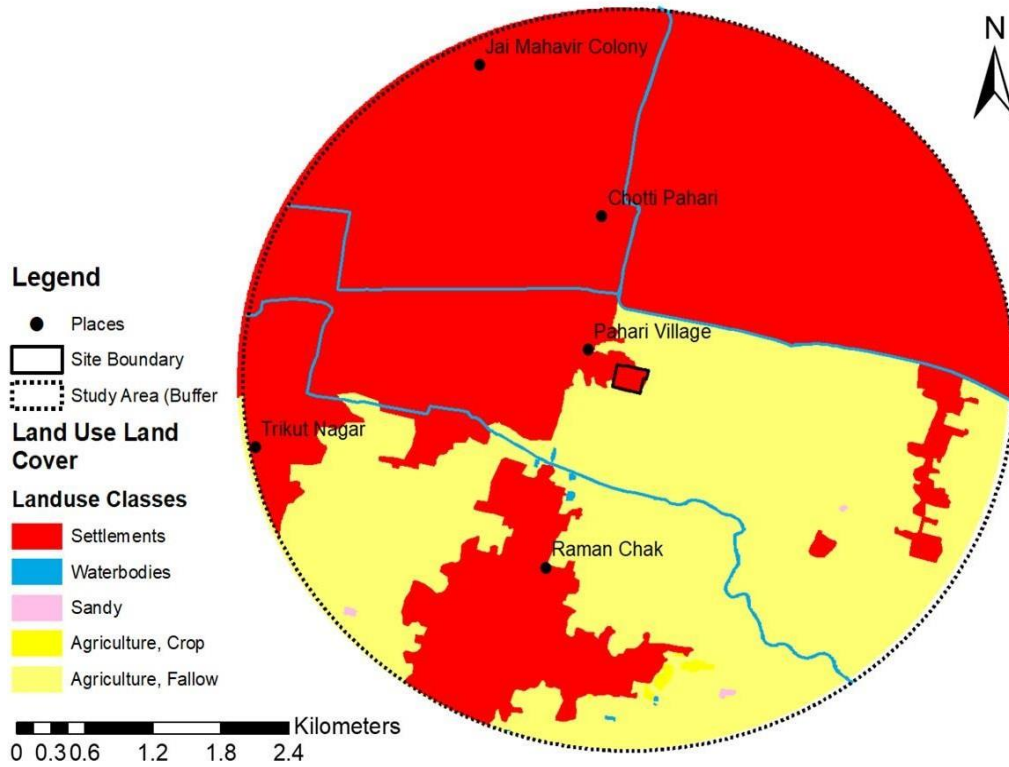


Figure 15: Land Use Land Cover of Study Area

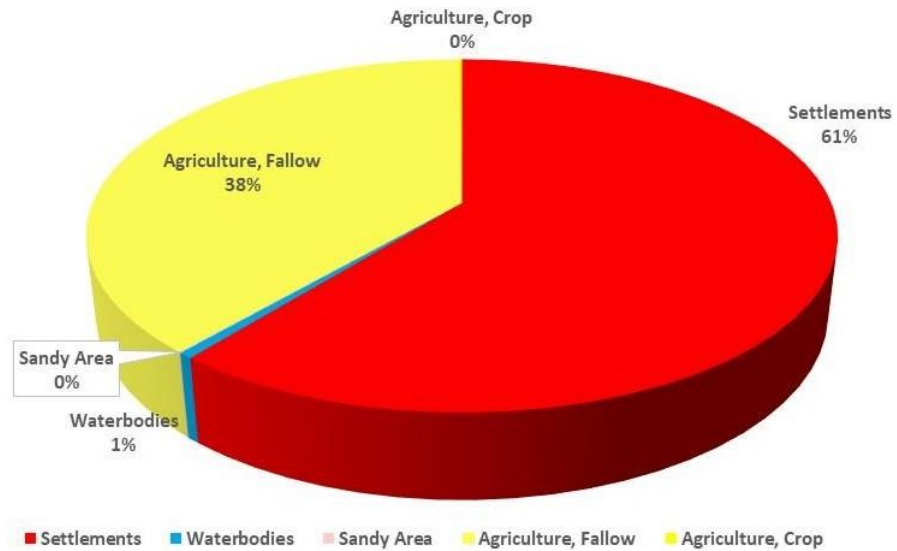


Figure 16: LULC Analysis

4.6.2 Transportation

The Patna District is among the leading districts in terms of share (5.2 %) in total State Highway (SH) network. The project area is accessible from the State Highway (SH)-1 (Sadikpur-Pavera-Masaurhi) connecting to the National Highway (NH)-30 (Patna-Bhaktiyarpur Road). In addition, two national highways (NH 19 & 98) also pass through the Study area.

The nearest railway station is the Gulzarbagh Railway Station (approx. 3.8 km north of the site) while the major railway station is the Patna Saheb Railway Station (approx. 5.5 km north-east of the site). The nearest airport to the project site is Patna Airport which is located at a distance of approx. 15.2 km to the west of the site. Refer **Figure 17** for transport network in study area.

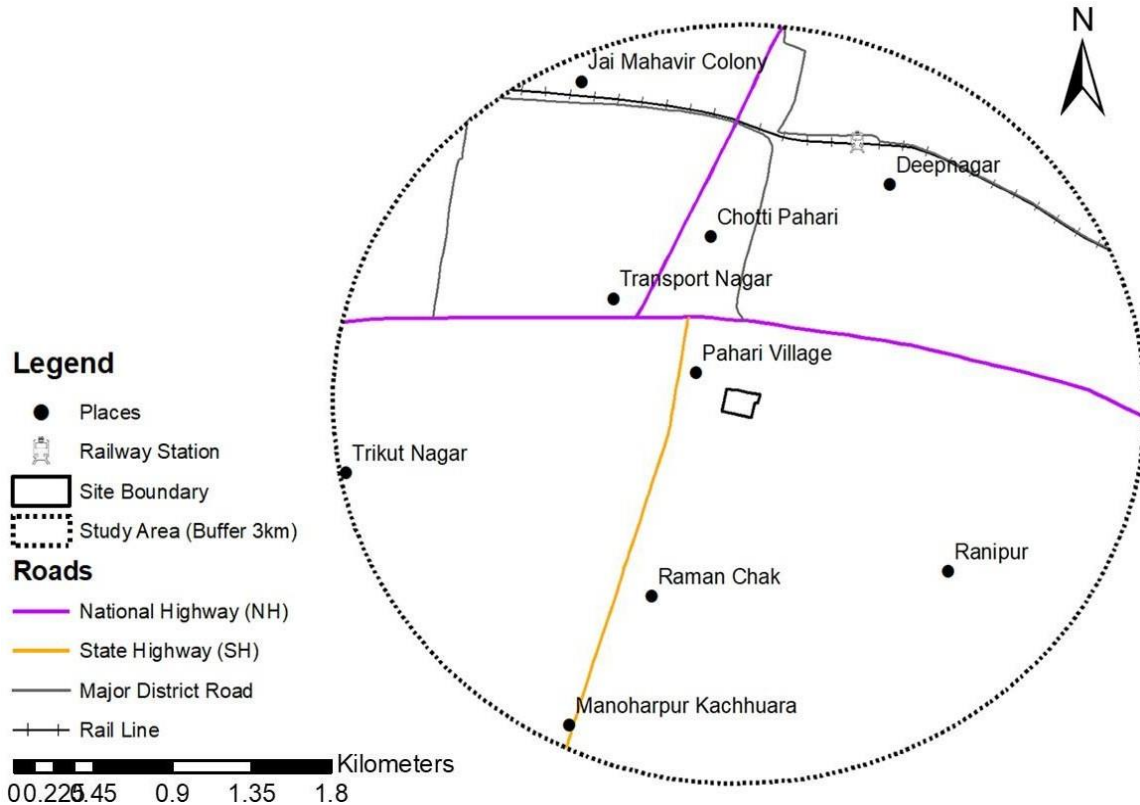


Figure 17: Transportation Network in Study Area

4.6.3 Industrial Development

The economy of Patna has seen sustained economic growth since 2005. As of 2015, GDP per capita of Patna was ₹1,06,000 and its GDP growth rate is 7.29 per cent. The rate of urbanization was as high as 43.1 percent in Patna.³ This growth has been due to the increased businesses in the Fast-Moving Consumer Goods (FMCG) industry, agriculture related industries and service sector. Eight (8) industrial clusters are under development in the City under the Chief Minister Micro and Small Industries Cluster Development Scheme, one of which includes an apparel park in the City.

The areas towards the north and west are densely fabricated with residential and commercial establishments and the areas towards the south and east of the study area comprise of agriculture. Minimal to no industrial establishments are observed in the study area.

4.6.4 Agricultural Development

Bihar is an agriculture dominated State with 80% of the population engaged in farming or agri related activities. The study area lies within the 'Middle Gangetic Plain' agro-climatic zone of the country as classified by the Planning Commission of India. The major crops grown in the study area are paddy, wheat, gram, and seasonal vegetables.

³ <https://patna.nic.in/economy/> retrieved on 16.10.2020.

4.6.5 Power Sources

The Bihar State Electricity Board (BSEB) is responsible for the management of generation, transmission, distribution, and other electricity-related activities in Bihar. The power supply in the study area is distributed via BSEB, Patna Division.

4.7 Social and Cultural Resources

Socio-economic analysis has been conducted for the Patna District and its sub-divisions using Census of India data for 2011⁴. The literacy rate and occupational pattern in the study area are also presented in the subsequent sub-sections. The City of Patna is divided into six sub-divisions and 23 community development blocks. The study area falls under two sub-divisions – Patna Sadar and Patna City

4.7.1 Population and Communities

The population density (persons/sq. km.) in Patna District including Patna (rural) and (urban) population has been presented in **Figure 18**. The population density in Patna District (Rural and Urban) is 1823.38 persons/sq.km while the population density in Patna (urban) is 9321.24 persons/sq.km.

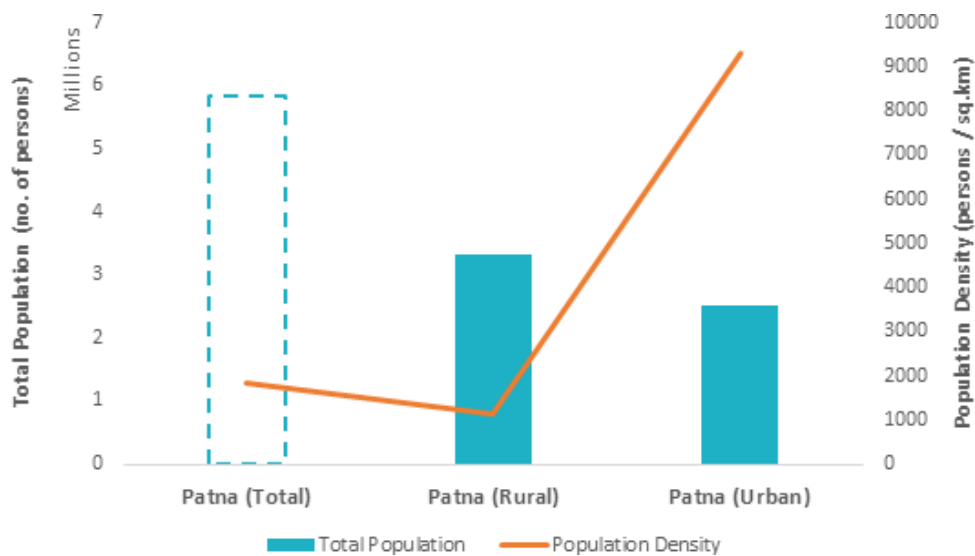


Figure 18: Population Density in the Study Area

The average literacy rate in Patna District is 59.26%. The average female literacy rate in the district is 51.87 % while the male literacy rate is 65.88 %. The male literacy rate was observed to be higher than the female literacy rate across the district, both in the urban and rural centre. Refer **Figure 19**.

⁴ More recent demography data is not available with the District Statistical Office.

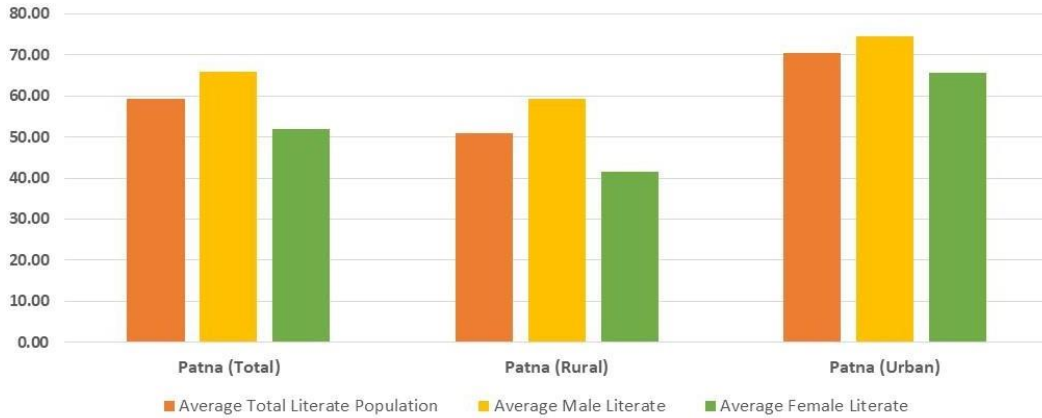


Figure 19: Literacy rate in Study area

4.7.2 Scheduled Areas

There are no Scheduled Areas in the study area.

4.7.3 Scheduled Caste and Scheduled Tribes

The proportion of Scheduled Castes (SC) and Scheduled Tribes (ST) in the study area has been presented in the **Figure 20**. The study area has notable proportion of SC population. The ST population in the district, including rural and urban is negligible. The SC population is found highest in Patna (rural) 19.98% compared to Patna (urban) with 10.21%.

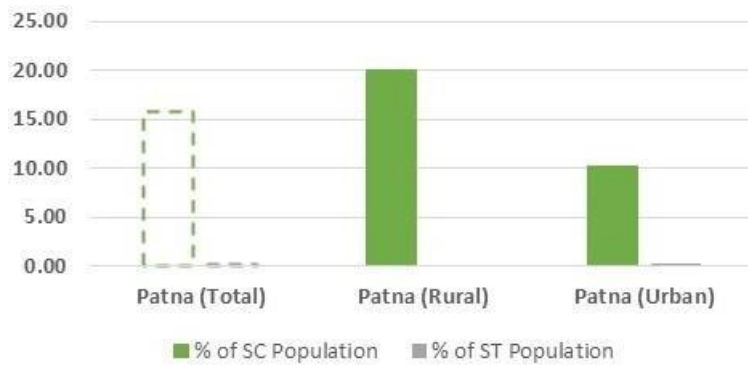


Figure 20: SC and ST Population in Study Area

4.7.4 Occupational Pattern

The proportion of working and non-working population in Patna District has been presented below (**Figure 21**). The proportion of non-working population in Patna District (67.77%) is more than that of working population (32.23%).

Amongst the working population, the proportion of main and marginal workers is represented in **Figure 22**. The proportion of main workers is higher than that of marginal working population.

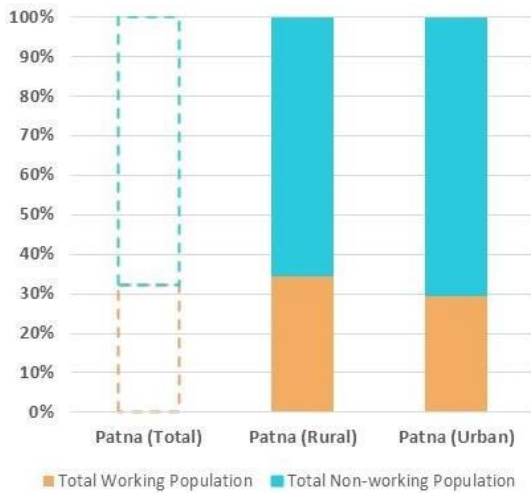


Figure 21: Working and Non-Working Population in the Study Area

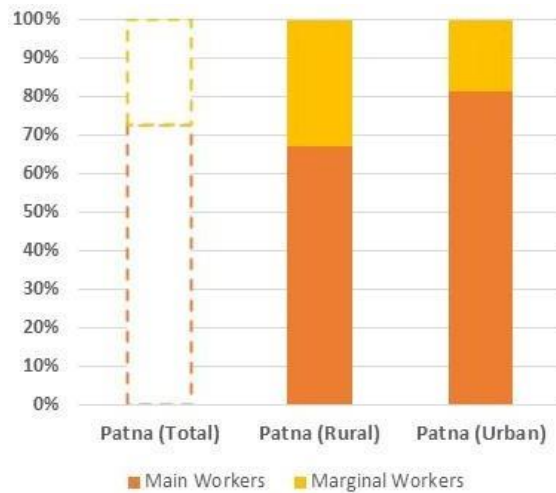


Figure 22: Main and Marginal Workers in the Study Area

The distribution of working population among main and marginal workers across key sectors has been presented in Figure 23 and

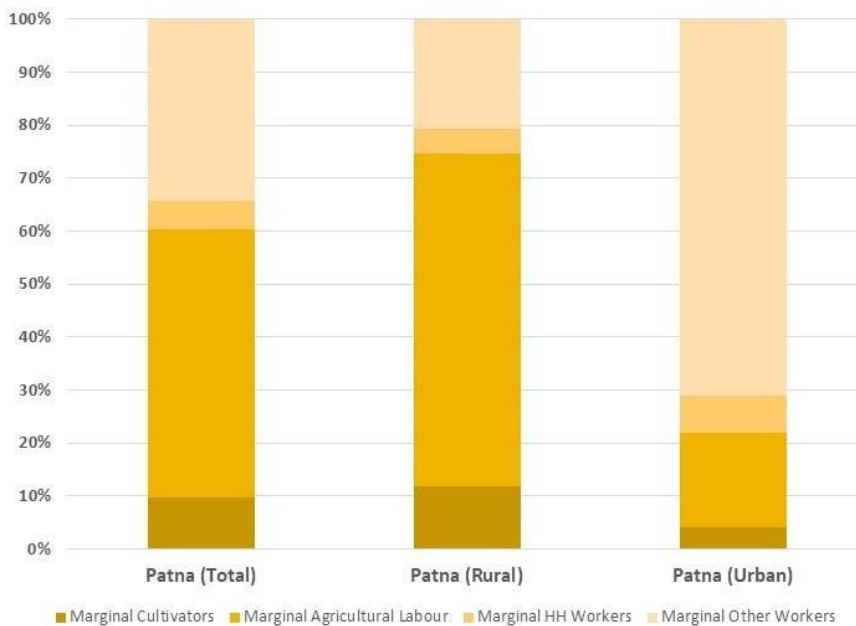


Figure 24. Amongst the main workers, the proportions of other workers (50.50%) dominate the work force in Patna (Urban) while agricultural labourers (29.15%) dominate in Patna (Rural). A similar pattern is observed in marginal workforce as well.

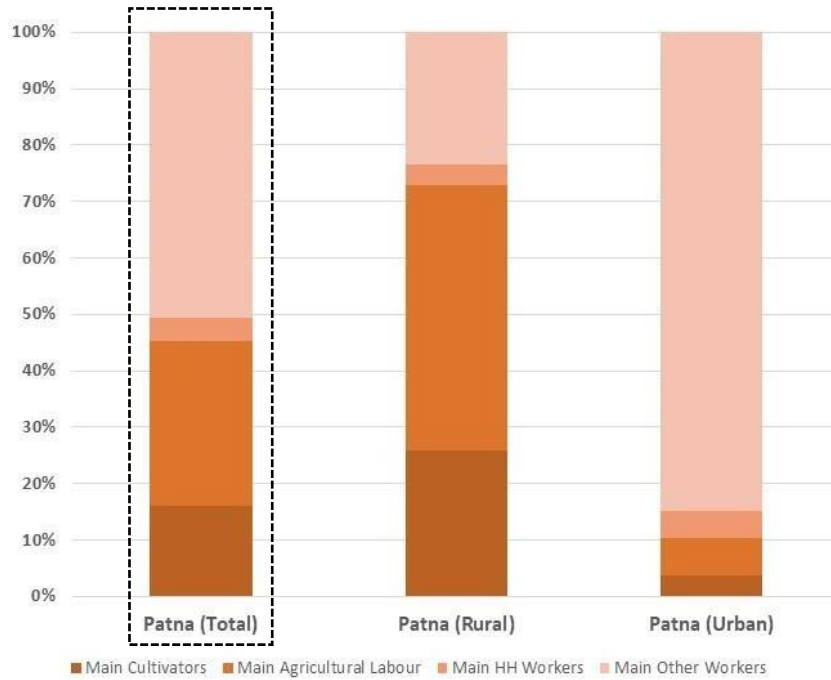


Figure 23: Distribution of Main Workers in the Study Area

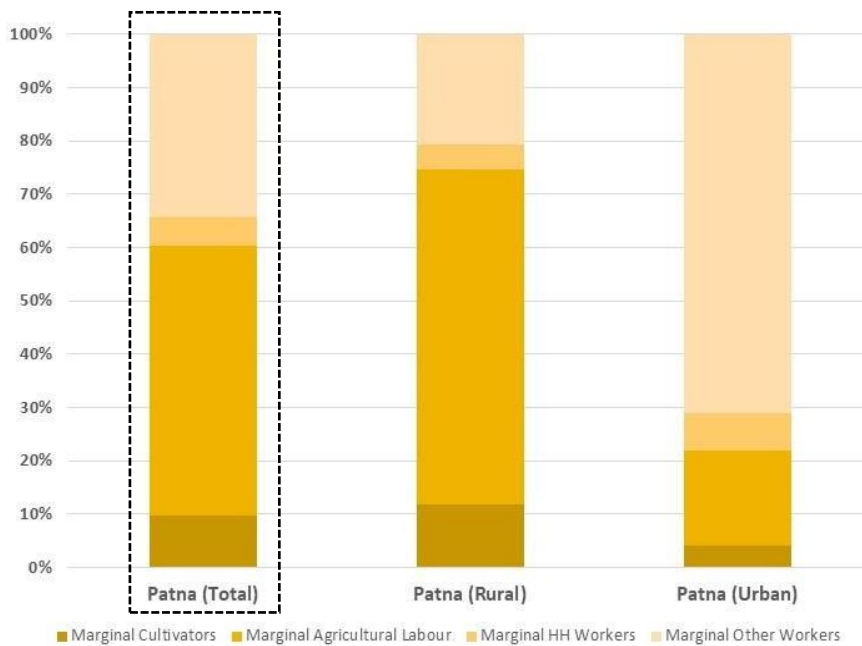


Figure 24: Distribution of Marginal Workers in the Study Area

4.7.5 Physical and Cultural Heritage

There are no ASI monuments in the study area. Small local religious places were present in each village. Through consultations with neighbouring communities, it was identified that no major cultural event is held in the nearby villages, higher community engagement is expected during religious festivals, such as Durga Puja and Chathh Puja.

4.8 Stakeholder Consultation

The primary objective of stakeholder consultation was to understand the acceptance and obtain impressions of the stakeholders about the project and discuss issues envisaged by the local community that may be encountered due to the project. The other objectives of the consultations included understanding of the existing local socio-economic status, social fabric, and local sensitive receptors.

4.8.1 Approach and Methodology

Decentralized consultations were carried around the project area in small informal groups. The consultations were carried out by a team comprising of the Consultant, representatives from the WABAG team and one representative from the BUIDCO team.

For the purpose of consultation, the stakeholders of the project were classified under Project Affected Parties and Other Interested Parties. Consultations were carried out with the project affected parties in the project area at four different locations in small informal groups comprising of 3 to 4 personnel. Consultations with the members of the other interested parties were carried out in-person. (Refer Figure 26).

Consultations were also carried out with the *Ward Parishad* (Mr. Balaram Singh Mandal) who was identified as a key figure in project related engagements. Discussions were recorded through Minutes of Meeting .

The locations of the consultations conducted within the Study area has been provided in Figure 25.

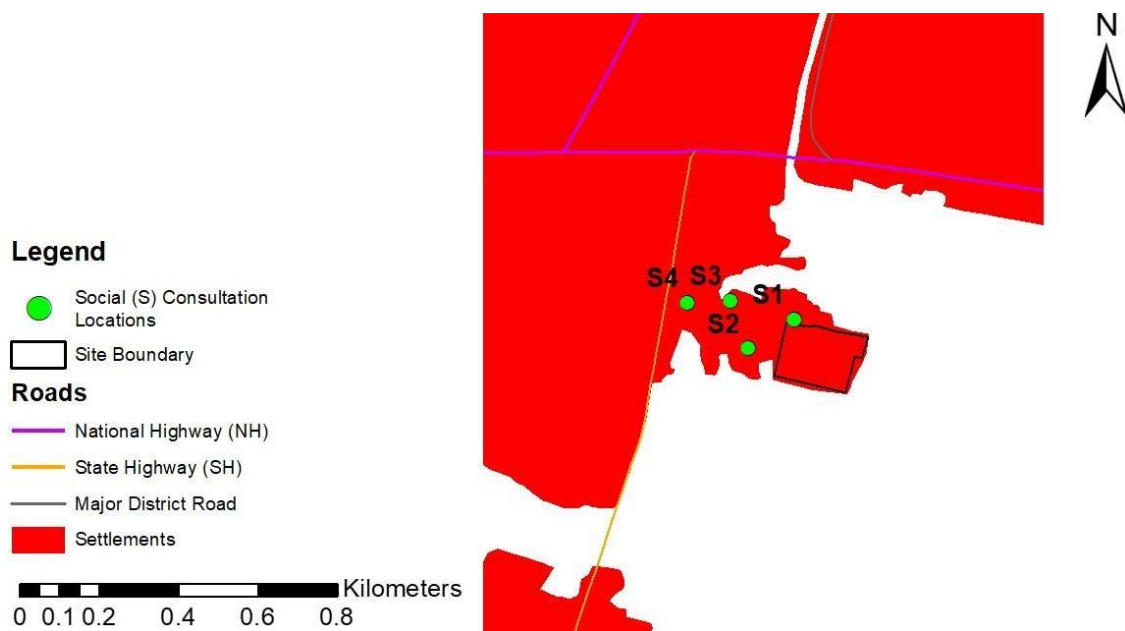


Figure 25: Social Consultation Locations

4.8.2 Summary of Consultation

The discussions topics of the Stakeholder Consultation were:

Aspects	Details
Project Information Disclosure	What is the project about?
	Who is in-charge of the project?
	How is project supervision being carried out?
	Role of WABAG in project implementation
	Layout Plan of STP (Printed)
	STP Model and process
	Contact details of Project Manager, Contractors, & Security Personnel for reporting of grievances (if any)
	Route used to access project location
Project Timeline Disclosure	Date of Commencement
	Construction Timeline with nature of activities
	Tentative date of completion of project
Anticipated Impacts and identified mitigation measure on the listed aspects	Community
	<u>Construction Phase:</u>
	• Dust
	• Noise
	• Solid Waste generated due to labour camp
	• Material storage
	• Labour camps
	• Barricading the project site
	• Security
	• Water Usage
	<u>Operation & Maintenance Phase:</u>
	• Air emission
	• Odour
	• Hazardous Wastes
	Shops or commercial establishments
	<u>Construction Phase:</u>
	• Dust
• Noise	
• Traffic volume	
Access to prominent places	Access to River Ganga (ghat) especially during festivals like Chhath Puja or any other prominent religious place within study area.
Benefits of the Project	Positive impacts and benefits of the project for overall city development and management of pollution in River Ganga.
Suggestions/ queries of Stakeholders	Suggestions from stakeholders on impact mitigation for identified E&S impacts.
	Response to queries of stakeholders on the above mentioned aspects

An excerpt of queries raised and their responses during the stakeholder consultation is provided in **Table 5** below. Refer **Figure 26** for the photographs of the consultation.

Table 5: Excerpt of Stakeholder Consultation

#	Topic covered	Queries / Concerns raised by stakeholders	Responses by Project Team
1.	Anticipated Impacts	The STP pond is open and not covered because of which there exists a problem of mosquito breeding and foul odour especially during monsoon.	As of now the Kankarbagh STP is being emptied and pre-construction work (site levelling) is being undertaken. As per the approved design of STP, it will be fully covered once operational. Periodic fumigation will be carried out through the project lifecycle and periodicity will be increased during the monsoon.
2.	Anticipated Impacts	Increase in noise and vehicular traffic in the locality.	The measures planned to be taken to minimize noise and regulate traffic were explained. Document procedures (EHS Manual - Construction and O&M phase) have been developed to ensure minimum noise generation. All work will be carried out as per the Manual. Acoustic hoods and rooms will be installed in the blower and biogas engine room to reduce ambient noise.
<p>Remarks: It was understood that the community had previously experienced similar issues (unresolved) resulting from operations of the Pahari STP which is adjacent to the proposed Kankarbagh STP. Thus, they desired to understand the difference in the management measures to be employed in this project by WABAG.</p>			
3.	Project Information Disclosure Benefits of the Project	Provide know-how of the STP and its benefits to the locality	The design and working of STP was explained. The network layout was explained. Installation of underground pipes network and connection to each household will be carried out thus solving any problems related to open drains, overflowing of nallas and waterlogging during monsoon. The process of treatment including ASP technology and working of the STP right from collection to discharge was explained. The various locations for discharge, namely Badshahi canal, and irrigation was mentioned.
4.	Project Information Disclosure	How will management of solid waste generated during the treatment process be carried out?	The final solid waste generated is process waste will be in a form of digested sludge. The sludge from the process shall be used for production of biogas and the final digested sludge shall be collected and disposed to municipal solid waste treatment facilities provided by the BUIDCO

#	Topic covered	Queries / Concerns raised by stakeholders	Responses by Project Team
<p>Remarks: The stakeholders consulted were partly aware of general STP operations. They were keen to understand further specific details of the project and its benefits to the community.</p>			
5.	Project Information Disclosure	Details of contact personnel in case of any query/ issue	The contact details of Project In-charge and security personnel were provided. In addition they were informed that the number will be displayed on a board near the main entrance of STP premises.
<p>Remarks: Although informed as part of the consultation process, this query with details was specifically asked by the women in the group.</p>			
6.	Project Timeline Disclosure	Revised estimated completion date of project due to current delays resulting from the Covid19 lockdown.	There is no encroachment and site is being barricaded to avoid external entry once construction picks up post monsoon.
<p>Remarks: This query was raised during in-person meeting with <i>Ward Parishad</i></p>			



Consultation at point S1



Consultation at point S2



Consultation at point S3



Consultation at point S4



In-Person consultation with Ward Parishad



Project Information displayed at entrance gate

Figure 26: Stakeholder Consultation conducted within Study Area

5 Analysis of Alternatives

5.1 Site Selection

The proposed Kankarbagh STP is located on land allotted and owned by Bihar Urban Infrastructure Development Corporation (BUIDCo). The site premises comprises of two STPs (Kankarbagh and Pahari), administrative building, staff quarters, laboratory, and project offices (temporary). Of these, the Kankarbagh STP shall be constructed over a land area of six hectares. Thus, aspects of land acquisition and resettlement are not triggered which also results in reduction of project costs.

The project site is also not in close proximity to any significant Environment & Social sensitive receptors such as forest and important bird areas. The project site is bordered by settlements on the west and by open agricultural lands to the north, east and south. Thus, the project is not exposed to large number of settlements. The location of the STP and the sewerage network are developed as part of the approved City Development Plan. The site is topographically flat and thus does not result impacts related to elevation and land-use change. Large scale public awareness and acceptance of the project was noted during consultations.

5.2 Technology and Operations

The Kankarbagh STP is an Activated sludge process (ASP) based technology and has been approved by the State Development Authority as part of the bidding process. The activated sludge process is a multi-chamber reactor unit that uses highly concentrated microorganisms to degrade organics and remove nutrients from wastewater, producing quality effluent. In this system, sewage is added as a continuous, treated to remove undesirable components, and then discharged. Equalization, aeration, and clarification can all be achieved.

To optimize the performance of the system, the activated sludge is a process with high concentration of microorganisms, basically bacteria, protozoa and fungi, which are present as loose clumped mass of fine particles that are kept in suspension by stirring, with the aim of removing organic matter from wastewater.

ASP systems have been successfully used to treat both municipal and industrial wastewater. They are uniquely suited for wastewater treatment applications characterized by low or intermittent flow conditions.

Further, the sludge generated from the primary and secondary treatment will also be used for biogas generation through an anaerobic digestion process. This biogas will further be used in a co-generation plant to produce heat and electrical energy which will be reused in plant operations thus reducing energy requirements.

The treated effluent from the plant will be stored in plant water sump and reused for plant water requirements. It is also envisaged that the treated effluent may also be provided to the nearby agricultural fields for irrigation purposes. This will result in reduction freshwater usage. However, BUIDCo has empaneled the consultants for preparing the DPR of "Reuse of treated Wastewater" for those STPs which are already commissioned or are in the process of commissioning.

6 Environment and Social Impact Identification and Assessment

6.1 Methodology of Impact Assessment

The impacts have been assessed for the Kankarbagh STP Project near Pahari Village, Kankarbagh. The environmental and social sensitive receptors present in the study area were identified. The presence and status of these receptors were validated during the field visit through visual inspection and stakeholder discussions. The activities during pre-construction, construction and operation and maintenance phases that could potentially impact the environmental and social sensitive receptors present in the study area are identified.

6.1.1 Impact Identification

For identification of E&S impacts, the following resources were referred:

- a) Applicable local, State, National environmental and social legal regulations
- b) World Bank Environmental & Social Framework (2017)
- c) World Bank Group's Environmental, Health & Safety Guidelines (WB-EHS) – General (2007), and Water and Sanitation (2007)

6.1.2 Impact Classification

The adverse impacts of project activities on environmental and social receptors in the study area have been classified based on the following attributes:

- Nature of impact – reversible/can mitigate or irreversible impact
- Duration of activity – long or short term
- Extent of impact – regional or local impact
- Order of impact – direct or indirect impact

Using the above attributes, the adverse impacts have been classified as 'low', 'moderate' or 'high' to enable prioritization of mitigation measures as shown below.

NATURE \ EXTENT	Short Term (Duration of activity ≤ 6 months)		Long Term (Duration of activity > 6 months)	
	Regional	Local	Regional	Local
Irreversible	High	Medium	Very High	High
Reversible	Medium	Low	High	Medium

The site context will determine likelihood of the impact, where this is found negligible, the impact is scaled down. The impact classification may be lowered or elevated basis the site context.

The assessment largely focusses on identifying **Direct Impacts** caused due to the project activities for planning preventive and mitigation measures. Addressing direct impacts would inherently break the chain of indirect impacts. Indirect impacts where critical have been identified.

6.1.3 Project Stages

The impacts on various sensitive receptors present in the study area have been grouped based on the stage of project.

- **Pre-construction and Construction Phase:** Activities related to planning of the STP; land preparation, civil work, and installation of various equipment.
- **Operation and Maintenance Phase:** Activities post operation of the STP such as treatment of sewage, material storage, waste management etc.

6.2 Positive Impacts

The Kankarbagh STP project is being developed under a Ganga conservation mission named "Namami Gange". It is estimated that at present the total wastewater generated in Patna is approximately 210 MLD. However, only 20% of the city area has a physical coverage of an underground sewer network. Further, the Kankarbagh Zone is one of the highly populated and core areas of the city with no dedicated sewage treatment mechanism. The sewage was presently being treated through other STP's in the nearby zones.

This project will thus enable lowering of treatment loads in the other connected STP's, ensure adequate treatment and eventually lower pollution loads in the River Ganga. Further, availability of a dedicated STP will ensure the channels are not flooded during monsoon thus preventing waterlogging and associated impacts.

The STP has also been designed in a way to promote and incorporate principles of resource efficiency and waste utilization. The sludge generated from the treatment process will be used to generate biogas which will be used for electricity and heating requirements in the STP operations. The treated sewage will also be reused for plant operations and may also be provided for irrigation of the surrounding agricultural fields. However, BUIDCo has empaneled the consultants for preparing the DPR of "Reuse of treated Wastewater" for those STPs which are already commissioned or are in the process of commissioning. The project would also generate employment opportunities for locals during construction and operation phases of the project.

6.3 Areas of No Significant Impact

1.1.1 Physical Cultural Resources

There are no places of cultural heritage or archaeological importance in the study area (buffer 3 km). Small local religious places were present in each village, that are not expected to be impacted by the project activities. Hence **no impacts on physical cultural resources** are anticipated from the project.

1.1.2 Scheduled/Tribal Areas

There are no Scheduled/Tribal Areas documented or notified in the study area. Hence, **there will be no impact on tribal areas due to the project.**

1.1.3 Protected Areas/ Forests

The study area does not comprise of any Reserved/Protected Forests, National parks, Wildlife sanctuaries and Ramsar sites. There are no Important Bird Areas (IBA) in the study area. As the project is being developed in a plot of an existing STP, minimal cutting of trees is envisaged. Hence **no impacts on protected areas/forests** are anticipated from the project.

6.3.1 Land Use Change

The proposed Kankarbagh STP is located on a site allotted and owned by BUIDCo. The site premises at present comprises of the existing Pahari STP and associated infrastructure. The Kankarbagh STP will be constructed within the same premises over a land area of six hectares. Thus, no change in land use is identified.

Further, no encroachers or squatters were identified in the designated land. Hence, aspects related to compensation, resettlement and rehabilitation are not triggered.

6.4 Project Activities

6.4.1 Construction Phase

The construction phase of the STP will include the following key activities:

- Site Preparation (clearance of existing vegetation, fencing to avoid intrusion)
- Earthwork (earth moving and filling, land grading, levelling, and compaction)
- Construction and use of haul roads
- Operation of heavy vehicles/ machinery/ equipment
- Use of diesel generator sets and diesel-powered vehicles
- Labour camps and site office/control room
- Storage of construction material
- Transportation of raw material and construction spoil
- Storage of scrap, solid waste, hazardous waste, and construction debris
- Maintenance of equipment/machinery

6.4.2 Operation and Maintenance Phase

The operation phase at STP will include the following key activities:

- Operation of sewage treatment plant and its components
- Operation and maintenance of chlorine dosing system
- Biogas and electricity generation
- Sludge management, treatment, and storage
- Operation and maintenance of the waste heat recovery system
- Operation of process air blowers
- Maintenance of the STP infrastructure
- Chemical and material storage
- Laboratory testing of raw and treated sewage
- Staff quarters and canteen facilities
- Overall maintenance of STP infrastructure
- Maintenance of vegetation (de-weeding, maintenance of greenbelt/buffer)

6.5 Impacts during Project Development / Planning

6.5.1 Viewscape Impacts

At present, the viewscape of the neighbouring community was limited to the small scale Pahari STP. However, construction of the Kankarbagh STP will result in emergence of various associated

infrastructure for STP operations. In addition, upgradation of the existing Pahari STP is also ongoing. Thus, it is expected that view of the neighbouring community will be obstructed due to the constructed components of the project, which otherwise was largely an open landscape.

During the construction phase, there will be an increase in the movement of vehicles, thus affecting the calm and serene view from the village.

There are no archaeologically important places in close vicinity of the project area.

Nature	Extent	Duration	Impact	Remarks
Irreversible	Local	Long term	Medium	<i>The STP is being constructed in a land which includes an existing STP. Further, there are no archaeologically important places in the study area. Hence, the viewscape impacts are lowered from 'High' to 'Medium'.</i>

6.6 Impacts During Pre-Construction & Construction Phase

The impacts during construction have been discussed in the subsequent sub-sections.

1.1.4 Alteration of Natural Drainage Pattern

The project site is located within the premise of the existing Pahari STP. The existing site area is largely a flat land with minimal variation in slope. The existing drainage channels are however not adequate for the expanded capacity and can potentially resulting in flooding.

Extraction of raw material required for construction such as soil from borrow pits and aggregates from quarries could disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding, water logging and water pollution. Extraction of rocks and sand from riverbeds can endanger bridges and cause continuous degradation of the river regime.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Long Term	Low	<i>The impact has been lowered from 'Medium' to 'Low' as site levelling activity has been completed and capacity of existing drains are under upgradation.</i>

6.6.1 Natural Resource Consumption

The various construction equipment typically consumes diesel fuel for operations. The transportation of raw material and hauling of construction spoil for disposal is also expected to consume petrol or diesel fuel. Labour camps set up during construction could be using kerosene or local fuel wood for domestic / cooking purposes. This is likely to increase consumption and burning of fossil fuels in the project area. Construction activities (foundation casting and admin building) consume water. Labour camps will consume water for domestic and sanitation purposes. It was reported that groundwater from the designated tap located on site is being used for construction purposes.

The ground water table in the project area is high and in the safe zone for development. The quantity of fuel consumed can be optimized through engineering controls. Use of raw materials for construction can be optimized with better choice of materials. Indiscriminate use of groundwater can be controlled through implementation of good management practices.

Nature	Extent	Duration	Impact
Reversible	Local	Short Term	Low

6.6.2 Loss of Flora and Fauna

The project site is located on the plot of an existing STP which has minimal vegetation. This was validated through review of historical imageries available for the location (free access). The site area and study area are also not located in any designated protected forest areas at state or local level. The impact of loss of flora (minimal extent) will be permanent but restricted to the project area.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Long Term	Low	<i>The impact has been lowered from 'Medium' to 'Low' based on the extent of vegetation on-site.</i>

6.6.3 Soil Erosion

The removal of vegetation during site clearance and levelling could loosen the soil, causing soil erosion. As the project is being developed on an existing STP land, there will not be any loss of fertile topsoil. Extraction of materials like soil from borrow pits and material aggregates/stones from quarries could alter the vegetation leading to accelerated soil erosion.

The impact of soil erosion will be experienced in the immediate vicinity of the project area which includes farmland and the open *Nallah*. The study area also receives good rainfall during the months from July to October. Hence impact from soil erosion during monsoon is likely to be experienced.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	Low	<i>Although the construction shall span across the rainy season, an embankment has been built around the project site. Thus, ensuring that soil is retained within the site area. Hence the impact has been retained as 'Low'.</i>

6.6.4 Air Pollution

The main sources of air pollution during construction will potentially be fugitive dust emissions and exhausts from transportation vehicles and construction equipment.

The soil in the site area is alluvium soil and is unlikely to contribute much to the particulate matter emissions. Thus, it is expected that fugitive dust emission generation from the various pre-construction activities of site clearance and levelling and various construction activities such as excavation and earthworks, haul roads, stockpiles of excavation spoil etc. will be minimal.

The transportation of raw materials to the site will lead to increase in fugitive dust emissions along the approach roads and emission of SO₂, NO_x, CO into the ambient air by movement of vehicles, thus causing increase in air pollution.

The use of diesel generator sets, and construction equipment will increase the concentration of pollutants (SPM, SO₂, NO_x, CO) in the project area and immediate vicinity due to burning of fuel. The

burning of fuel wood for cooking purposes in the labour camp will release air emissions, thus affecting the local ambient air quality.

Increase in air pollution levels could lead to various respiratory disorders in humans and animals. The impact of air pollution will be experienced in immediate vicinity of the project area. The nearest large settlement at Pahari village is about 0.5 km from the project location through which the existing approach road to site traverses will be affected the most. Apart from the Pahari village, smaller settlements located towards the west of the project site will also be affected due generation of pollution on-site.

The baseline for SO₂, PM_{2.5} and PM₁₀ were within NAAQS standard but exceeded the limits provided by the WHO guidelines.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	Medium	<i>Due to close proximity to Pahari village, and baseline values of PM_{2.5} and PM₁₀ being high with reference to the WHO guidelines prescribed in the IFC EHS guidelines, the impact is elevated from 'Low' to 'Medium'</i>

6.6.5 Noise Pollution

The operation of construction equipment and other construction activities such as movement of materials/vehicles will increase the noise levels in the vicinity during the construction phase. Typical noise levels due to standard construction equipment compiled from various Indian sources is provided below.

Equipment	Equipment Noise Level (dBA)	Equipment	Equipment Noise Level (dBA)
Crane	76	Pneumatic Tools	85
Jack Hammer	88	Truck	88
Concrete Mixer	85	Loader	85
Concrete Pump	82	Pile Driver	89
Concrete Vibrator	76	Rock Drill	98
Backhoe	80	Impact Wrench	85
Dozer	85	Generator	81

The impacts on ambient noise levels during construction will be directly experienced in the project area and immediate vicinity (not beyond 0.5 km). Thus, impacts related to increased noise levels maybe experienced in the Pahari village and the settlements in the immediate vicinity to the west of the project site.

The average ambient noise levels obtained for all ambient noise monitoring stations will not exceeded limits prescribed in the CPCB standards and EHS guidelines.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	Medium	<i>Due to close proximity to settlements, and baseline noise levels exceeding CPCB standards and EHS guidelines, the impact is elevated from 'Low' to 'Medium'</i>

6.6.6 Surface Water Pollution

The removal of vegetation during site clearance and levelling could loosen the soil, causing soil erosion. This loosened soil can cause siltation in the nearby *nallahs* specifically during the rainy season. Wastewater generated during construction could flow into the open *nallahs*. Wastewater from transit mixers, construction debris may be dumped along the open *nallahs*. These activities could impact the overall water quality in the *nallahs* and obstruct the water flow. The project area receives high rainfall and is prone to waterlogging due to the existing lower level than the surrounding area.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	Low	<i>The impact is retained as low as there are no major surface waterbodies present in project area.</i>

6.6.7 Soil Contamination

Spills of fuel, oil and grease from construction equipment and transport vehicles, chemicals such as paints, improperly managed wastewater generated from construction activities on unpaved areas etc. can contaminate soil. Absence of sanitation provisions for labour camps could lead to open defecation, thus causing soil contamination.

The waste generated during construction, such as scrap, debris, concrete waste, hazardous waste (waste oil from DG set and equipment, oil filters, oil soaked cotton), food waste from labour camp, if not stored in an environmentally safe manner can also cause soil pollution. The impact of soil contamination will be limited to the project area.

The ground water quality in the project site area exceeded acceptable limits for parameters such as TDS, alkalinity, hardness while also exceeding the permissible limits for magnesium and chloride prescribed in the IS 10500:2012 drinking water standards.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	Low	<i>As the baseline ground water quality not exceeds permissible limits on some key parameters, the impact is elevated from 'Low'</i>

6.6.8 Groundwater Pollution

The groundwater table in the project area is high. During excavation, there is a potential for groundwater contamination particularly if pits / cuts are left unfilled / uncovered for a long time. The activities causing soil pollution can leach into the ground and thus indirectly impact the ground water quality.

The impacts of ground water contamination will be experienced in the local area. The contamination could potentially spread to the region based on aquifer flows. The ground water quality in the project site area exceeded acceptable limits for parameters such as TDS, alkalinity, hardness while also exceeding the permissible limits for magnesium and chloride prescribed in the IS 10500:2012 drinking water standards.

Although the project area falls in the "safe" zone for ground water development, it is located in close proximity (approx. 1.08 km) to the boundary of Patna Sadar sub-district which is classified as a critical zone for ground water development.

Nature	Extent	Duration	Impact
Irreversible	Local	Short term	Medium

6.6.9 Occupational Health and Safety

The construction activities include site preparation, infrastructure and utilities installation, construction of structures. The construction workers and technicians would be exposed to various health and safety hazards that could cause injury or ill health.

The potential safety hazards include:

- Slips, trips and falls due to uneven surfaces, obstacles, trailing cables
- Fall during work at height
- Burns due to hot works
- Electrical shocks
- Collision with construction equipment and transportation vehicles
- Overturning of cranes
- Emergencies such as fire, structure collapse

The potential health hazards include:

- Manual handling and musculo-skeletal disorders due to typical construction activities such as lifting, lowering, pushing, pulling and carrying that can cause injury.
- Hand-arm vibration due to operation of hand-held or hand-guided power-tools and machines, such as pokers and compactors, sanders, grinders and disc cutters, hammer drills, chipping hammers, chainsaws, scrabbles and needle guns.
- Temporary or permanent hearing loss from exposure to high noise levels during operation of construction equipment.
- Heat stress and working during high temperatures.
- Dermatitis that can arise from contact with substances such as wet cement, asphalt, solvents used in paints, glues or other surface coatings etc.
- Exposure to fugitive dust emissions and exhausts from construction equipment that could cause respiratory disorders.
- Exposure to disease carrying vectors due to poor construction waste management practices.
- Exposure to operation of cranes which could overturn and installation of large structures that could collapse causing severe bodily injury.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	Medium	Workers will have direct exposure continuously during construction, hence impact classification elevated to 'Medium' from 'Low'

6.6.10 Community Health and Safety

During peak construction phase, a portion of the labour requirement will be met from nearby villages. A few migrant labour will also be engaged through labour contractors for whom labour camps will be

established. The migrant labours could have cultural differences with the resident population, resulting in potential conflicts on issues related to the environment, safety and privacy issues of the women in the surrounding villages, spread of various communicable diseases, nuisance caused by them due to improper sanitation facilities, etc.

For transportation of raw materials, the traffic from heavy vehicles is expected to increase along the state highway and village roads. This can lead to congestion on road networks around and within the site and deterioration of the road surfaces. This increase in traffic can be a nuisance to the villages in the project area, especially Pahari village.

All activities during construction causing air pollution, increasing noise levels and dust emissions have the potential to indirectly affect the health of the local community. Indiscriminate use of water for construction purposes could result in depletion of the resource for use by the neighboring community. The security personnel appointed for protection of the project area during construction could pose risks to the community due to misbehavior.

The impacts related to community, if not appropriately managed, could lead to agitation.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	Medium	The impacts related to community, if not appropriately managed, could lead to agitation. Hence impact classification elevated to 'Medium' from 'Low'

6.7 Impacts During Operation and Maintenance Phase

6.7.1 Natural Resource Consumption

Freshwater (soft water and borewell water) will be consumed for running of the treatment infrastructure such as chlorine leak absorption, scrubber system, hot water recirculation, plant cleaning, toilet, flushing, cooking, drinking, landscaping etc. This will result in consumption of water in large quantities.

Activities related to operations phase which include operations of the treatment system, air compressors, motor pumps, biogas system, laboratory testing, administrative processes, sludge handling system, heat recovery systems, general lighting etc. will use electricity for operations. Energy from the biogas plant will be used to heat process water. Fuel such as diesel will be consumed in DG sets for backup power.

The consumption of electricity, fuel, and water will continue through the life of the STP operations.

Leakages in the water supply lines, inefficient use of water by the individual components will result in depletion of the surface and ground water resources.

Similarly, inefficient use of electricity by the individual units of the STP could result in excess consumption of electricity thus indirectly depleting the natural resources used for generating the electricity. The use of inefficient common lighting systems and use of pumping systems to draw water from the bore wells will also result in consumption of electricity. Various equipment may be used for cleaning of STP area and stormwater drains that operate on diesel fuel.

The efficiencies in use of water and electricity can be improved through adoption of industry best practices.

Nature	Extent	Duration	Impact
Reversible	Local	Long term	Medium

6.7.2 Soil Contamination

Hazardous waste will be generated (used oil, oil rags, mineral oil) will be generated due to operation and maintenance of various equipment and machinery in the STP. Other hazardous wastes generated on-site could include spent media, filtration membranes, chemicals added in the treatment process, such as lime, polymer and coagulants and also spent caustic from chlorine leak absorption system. Spent media may include filter media (including sand, coal, or diatomaceous earth from filtration systems), granular activated carbon [GAC], etc.

Unscientific storage and disposal of hazardous waste (on unpaved areas, open to environmental factors) could lead to soil contamination. Similarly, spillages of chemicals and oil could also contaminate the soil.

Operation of the STP will also result in the generation of sludge. The sludge from the primary and secondary treatment shall be used for biogas generation. The spent sludge post treatment will include polymers, organic compounds, microorganisms etc. In addition, the sludge may also contain heavy metals (Cd, Zn, Cu and Ni), organic contaminants, and other pathogenic organisms. This sludge may be reused in the plant premises as compost or maybe sent to the city solid waste treatment facility. Sludge containing heavy metals in high concentration if reused can lead to contamination of the soil.

Various solids shall be generated from the preliminary treatment processes and also from the cleaning of drainage systems in the plant premises. These include grit, sand, gravel, food particles and other heavy solids. These wastes generated if not disposed properly will degrade and contaminate the land.

Leaks and overflows from the tanks containing untreated sewage and other hazardous chemicals can also cause contamination of soil. The contamination may extend to the neighbouring farmlands in case of breaches and may lead to adverse impacts to the agricultural crops.

The impact on soil quality from the various waste streams generated on site can be managed through adoption of good practices and will be limited to the project vicinity.

Nature	Extent	Duration	Impact
Reversible	Local	Long term	Medium

6.7.3 Air Pollution and Odours

Air emissions from sewage treatment and anaerobic digester operations may include hydrogen sulphide, methane, volatile organic compounds, and chlorine gas used for disinfection processes. Hydrogen Sulphide will be generated from biogas generation and improper handling of sludge from the primary and secondary treatment. This could impact the ambient air quality in the immediate vicinity.

The vehicular movement will be limited in the O&M phase, however the baseline levels of SO₂, PM_{2.5} and PM₁₀ were within NAAQS standard but exceeded the limits provided by the WHO guidelines.

The project is not expected to increase traffic volumes or change other existing conditions to such a degree as to increase air pollutants emissions. Therefore, no long term impacts to air quality are anticipated in terms of vehicular exhaust.

The other major contributing factor for ambient air pollution is odour. The major sources of odour include incomplete treatment of sewage and sludge and leakages from the anaerobic digestion process and chlorine gas. Odour generated from Hydrogen Sulphide gas is expected to be the most common source.

Exposure of receptors to hydrogen sulphide levels above 5 PPB can lead to nuisance to workers within the project site and communities in close vicinity of project.

Nature	Extent	Duration	Impact
Reversible	Local	Long term	Medium

6.7.4 Impacts due to Leakages and Overflows

The various wastewater streams resulting from the sewage treatment operations include filter backwash, softener reject, supernatant from sludge dewatering. These waste streams may also contain suspended solids and organics from the raw water, high levels of BOD, dissolved solids, high or low pH, heavy metals, etc.

Any malfunction of the STP will affect the quality of treated sewage that may be applied for various purposes such as landscaping, plant washing, provision for irrigation to nearby fields or discharge into the neighbouring freshwater bodies.

Leaks and overflows from the sewerage system can cause contamination of soil, groundwater, and surface water. Depending on the level of groundwater, leaks in gravity mains may also allow groundwater into the sewer system, increasing the volume of wastewater requiring treatment and potentially causing flooding and treatment bypass.

Overflows and treatment bypass can also occur in case of higher hydraulic loading greater than treatment capacities. This may occur due to high flows during heavy rains, power loss, equipment malfunction or blockages in the internal plumbing system.

The overflows and leakages could also potentially cause contamination of the neighbouring fields due to runoffs. This in turn could also potentially result in exposure of farmers and workers to pathogens, thus resulting in health impacts to the community.

The leakages and overflows if not managed scientifically could leach into the ground water, thus impacting ground water quality. In case of emergencies where operational difficulties may be experienced, the untreated /partially treated sewage would need to be bypassed directly into the freshwater bodies. This would produce adverse impacts on the water quality and aquatic flora and fauna during the period of release and for a short term afterwards.

The overall environmental impact for all the above mentioned aspects are reversible in nature and local that will continue throughout the lifecycle of the STP and can be mitigated by adopting industry best practices.

Nature	Extent	Duration	Impact
Reversible	Local	Long term	Medium

6.7.5 Occupational Health and Safety Impacts

The occupational health and safety impacts resulting from the O&M phase will primarily include accidents and injuries, exposure to hazardous chemicals and pathogens, occupational noise and exposure to natural and man-made emergencies.

- **Accidents and Injuries**

Accidents and injuries in the STP can be caused due to:

- Slips, trips, and falls due to wet floors and slippery walkways
- Falls into treatment tanks, clarifiers, trenches, confined spaces (manholes, pipelines, storage tank, digesters etc.
- Splashes of hazardous chemicals and liquids
- Exposure to poisonous gases
- Cuts, pricks, abrasions, and contusions from operation of sharp tools and rotating equipment
- Strains and sprains from handling of heavy equipment, material etc.
- Electrocutation from handling of energized circuits
- Burns from contact with high temperature liquids and equipment

Work at the STP may also involve entry into confined spaces, including manholes, sewers, pipelines, storage tanks, wet wells, digesters, and pump stations. Getting trapped at confined space may also result in asphyxiation resulting from increased carbon dioxide levels.

- **Exposure to Hazardous Chemicals and Pathogens**

Work in the Sewage Treatment Plant involves exposure to potentially hazardous chemicals, including strong acids and bases, chlorine, hydrogen sulphide, methane, and ammonia. The potential sources of exposure include the chemical storage yard, chlorine generator system, anaerobic digestors, sludge bed, clarifiers, and laboratory.

In addition, the water may also contain heavy metals. Untreated sewage may also result in exposure to various pathogen include viruses, bacteria, molds, fungi and other microorganisms. The process of sewage treatment can generate bioaerosols containing the above mentioned pathogens. These microorganisms can remain suspended in the air for long periods of time, retaining viability or infectivity. Workers may also be exposed to endotoxins, which are produced within a microorganism and released upon destruction of the cell and which can be carried by airborne dust particles.

The various routes of exposure include hand to mouth contact, skin contact (splashes), and inhalation of aerosols and poisonous gases etc. Pathogens may also enter the body through cuts and abrasions.

- **Occupational Noise**

Workers shall be directly prone to the exposure to excessive noise levels from operating machinery such as air compressors and pumping systems and motors. Increase in noise may also be experienced in the treatment systems where flow of water and bubbling exists.

- **Exposure to Operational, Natural and Man-made emergencies**

The various emergency situations that could occur on-site include:

a) Operational

- Fire and explosion in the STP premises
- Leakage of Hydrogen Sulphide/ Chlorine gas

- Explosion from biogas flaring and methane release
- Collapse of sheds or structure etc.

b) Natural calamities such as earthquakes, floods, and cyclones

c) Man-made

- Bomb threat or criminal attack
- Riots & Public violence

The various emergencies will have an impact to workers' health and could potentially impact the neighbouring community as well.

All workers, and visitors would be exposed to these hazards based on the various situations. These impacts can be managed and mitigated by adoption of industry best practices and employing cost effective mechanisms

Nature	Extent	Duration	Impact
Reversible	Local	Long term	Medium

6.7.6 Community Impacts

• **Reuse of treated wastewater**

One of the proposed applications of treated sewage includes use of the treated water for seasonal irrigation of adjacent agricultural lands. Sewage if not treated adequately shall result in the farmers or workers being exposed to pathogens thus impacting the health of community. The water may also attract pests and vectors which may potentially damage the crops.

• **Exposure to Odour**

The process of wastewater collection, conveying or treatment has the potential to generate and release odours to the surrounding area. Odours from wastewater treatment facilities can be a nuisance to the neighbouring community. Bioaerosols can also carry disease-causing microorganisms. Furthermore, releases of hazardous gases, such as chlorine, could adversely affect nearby residents. Exposure of receptors to levels of hydrogen sulphide above 5 PPB can also lead to odour nuisance within the project site and in the close vicinity of project.

• **Unavailability of natural resources**

Indiscriminate use of ground water for O&M of the STP could result in unavailability of the resource for domestic use by the neighbouring community.

Improper waste management by the STP could result in land contamination that could leach into the ground water and further deteriorate the quality of ground water thus rendering it unusable by the neighbouring community.

Ineffective treatment of sewage could result in the pollution of the freshwater bodies thus rendering them not-useable.

• **Other Impacts**

Other impacts may include:

- The security personnel appointed for protection of the plant could pose risks to the community due to misbehaviour.

- During operation phase, inflow of persons is expected. This will result in establishment of supporting facilities and attract labour for employment. New persons coming in could have cultural differences with the resident population, potential conflicts may arise on issues related to the environment, safety, and privacy issues of the women in the surrounding villages, spread of various communicable diseases, etc.
- Any kind of fire emergency or chlorine leakage that occurs in the STP could indirectly affect the health of the local community.

The overall impacts related to community, if not appropriately managed, could lead to agitation. However, it is expected that the impact will be restricted to immediate vicinity of the project area and can be addressed through implementation of mitigation measures and management of human resources.

Nature	Extent	Duration	Impact
Reversible	Local	Long term	Medium

6.8 Summary of E&S Impacts

1.1.5 Project Development/ Planning Impacts

Nature of Impact/ Activity	Impacted EHS Component	Impact Classification
1. Viewscape impacts due to proximity of settlements to the project area	Local community	Medium

1.1.6 Pre- Construction & Construction Phase Impacts

Nature of Impact	Impacted EHS Component	Impact Classification
1. Increase in fugitive dust emissions causing air pollution from site clearance, excavation, raw material transportation, storage of excavation spoil, use of fuel wood in labour camps	Ambient air quality, community health, worker health	Medium
2. Increase in concentrations of PM ₁₀ , PM _{2.5} , SO ₂ from burning of fuel in construction equipment, transportation vehicles and cooking in labour camps.		
3. Increase in ambient noise levels due to operation of construction equipment.	Worker health	Medium
4. Soil contamination due to improper management of construction waste, spills and leaks, absence of sanitation provisions in labour camp.	Soil quality, Ground water, Local community	Medium
5. Ground water pollution due to leaching of materials and waste into the soil	Ground water, Local community	Medium

Nature of Impact	Impacted EHS Component	Impact Classification
6. Exposure to physical, chemical hazards, exposure to noise, working with construction equipment, fugitive dust, emergencies at site	Construction workers	Medium
7. Exposure to migrant workers, air and noise pollution, project security personnel, obstruction to community activities and accidents caused in the nearby community due to construction activities	Local community	Medium
8. Alteration of natural drainage pattern due to site levelling	Landform, local community	Low
9. Resource consumption such as water, fuel, causing depletion	Local community	Low
10. Loss of flora due to site clearance impacting avian fauna habitat	Flora, avian fauna	Low
11. Soil erosion due to site clearance	community health	Low
12. Obstruction to flows in open <i>Nallahs</i> and deterioration of water quality due to soil erosion and dumping of construction waste	Surface water quality, local community	Low

6.8.1 Operation and Maintenance Phase

Nature of Impact	Impacted EHS Component	Impact Classification
1. Natural resource consumption causing depletion	Local community	Medium
2. Soil contamination due to leakages, spillages, and unscientific management of various types of waste	Soil quality Groundwater quality Local community	Medium
3. Air pollution through air emissions and odour generation from the operation of the treatment plant equipment and various treatment processes	Ambient air quality Local community	Medium
4. Leakages and overflows resulting contamination of soil, freshwater bodies, and groundwater	Surface water quality Groundwater quality Soil contamination Local community	Medium
5. Exposure to various occupational health and safety impacts including a. Physical hazards b. Biological hazards c. Chemical hazards d. Noise & vibration e. Odour Exposure to operational/natural/ manmade emergencies at project site	Local community STP workers and employees Visitors to the STP	Medium

Nature of Impact	Impacted EHS Component	Impact Classification
6. Community Impacts resulting from use of untreated wastewater, exposure to odour, resource depletion, influx of immigrant population, misbehaviour of security, and accidents and emergencies occurring in the STP	Local community	Medium

7 Environmental and Social Management Plan

7.1 Methodology of Developing ESMP

Based on the project activities during pre-construction, construction and O&M stages of the project, environmental, occupational health and safety, and community health and safety impacts have been identified in the previous Chapter.

For identification of management measures, the following resources were referred:

- World Bank Group (WBG) General EHS guidelines
- EHS Guidelines for Water and Sanitation (2007)

The hierarchy adopted for planning management measures is elimination, substitution, engineering control, administrative control, and personal protective equipment.

7.2 Institutional Arrangement for Implementation of ESMP

7.2.1 Implementation of ESMP

The overall responsibility of supervision and ensuring implementation of the ESMP will lie with WABAG during all phases of the project. The ESMP will be applicable to all Contractors and Sub- Contractors including labour contractors and their workers working in the project during all phases.

Contractor will submit the Monthly ESMP compliance report to BUIDCo and SPMG. Quarterly ESMP compliance report submitted by contractor will be shared with NMCG and World Bank. Periodic monitoring for the ESMP compliance will be ensured by E&S personnel of BUIDCo and SMCG..

7.2.2 Management System at WABAG

WABAG has a certified Integrated Management System (IMS) as per ISO 9001:2015, ISO 14001: 2015, and ISO 45001:2018 international standards. The management system has been developed at the corporate level and is extended to all projects in India. Processes, Procedures, Work Instructions, Record Formats and other documents complement the IMS. This management system and procedures are then replicated with necessary modifications for each project based on legal requirements, EHS impacts, resource availability and processes carried out in the project.

7.2.3 Institutional Arrangement

An Environmental, Health & Safety (EHS) Department will be constituted for the project. The environmental and occupational health and safety aspects of project construction and O&M will be managed by this department. The employee welfare and grievance mechanism will be managed by the Human Resources Department of the project. These departments will report to the Project/ Plant Manager of the STP.

The EHS Department should comprise of an EHS Manager and EHS Engineer(s).

The EHS Manager should have at least 10-12 years relevant past experience of similar infrastructure projects and EHS Engineers should have 2-4 years of relevant past experience in similar infrastructure projects. The Manager and Engineers should have background qualifications in Environmental

Science/ Environmental Engineering/ Environmental Planning/certification courses in Occupational Health & Safety.

The key responsibilities of the EHS Manager will be to:

- Review ESMP implementation status reports submitted by contractors during construction.
- Conduct periodic monitoring audits of the project during construction and O&M to check compliance to the ESMP.
- Investigate major accidents/ incidents, prepare report of findings, including recommendations to prevent recurrence and ensure implementation of approved course of action.
- Periodic reporting to Project/Plant Manager on status of implementation of ESMP.

The key responsibilities of the EHS Engineers would be to:

- Conduct regular monitoring of the project during construction and O&M to check compliance to the ESMP and report deviations to EHS Manager.
- Conduct training of Contractors or their personnel, where required, on implementation of the ESMP.
- Follow-up with Contractors to ensure legal compliance at all times.

7.3 ESMP for Proposed STP Plant at Kankarbagh

7.3.1 During Pre-Construction & Construction Phase

The ESMP for project development/ planning, pre-construction and construction phase impacts is presented in **Table 6**.

The legal requirements to be adhered during planning, pre-construction and construction phases of the project are provided in Section 3.1 of this report.

The environmental and social management plan ensures to suggest appropriate mitigation measure against the issues/ concerns identified during the environmental and social assessment study

7.3.2 During Operation & Maintenance Phase

The ESMP for O&M phase impacts is presented in **Table 7**.

The legal requirements to be adhered during operation and maintenance phase of the project are provided in Section 3.1 of this report.

The environmental and social management plan ensures to suggest appropriate mitigation measure against the issues/ concerns identified during the environmental and social assessment study.

Table 6: ESMP for Pre-Construction & Construction Phases

Nature of Impact	Impacted ESHS Component	Impact Classification	Management Mitigation Measures	Responsibility-Implementation/Monitoring& Supervision	Cost estimate (in INR)
1. Land for the project		Medium	a) Land allocated for construction of Kankarbagh STP and associated structures belong to BUIDCo (Govt. land). b) This land is free from any encroachment.		
2. Surface water pollution due to soil erosion, release/runoff of construction wastewater and dumping of debris	Surface water quality Local community	Medium	a) Arrangements for temporary storage of construction debris and excavation spoil will be made within the premises for its reuse. b) The waste concrete from transit mixers will be used for paving surfaces where required. c) Construction debris that is unusable at the site for any purpose and unsaleable will be disposed to designated areas permitted by the Municipal Corporation i.e transport nagar disposal area. (Letter is attached) d) It will be ensured that construction waste is not dumped along the riverside or near the open Nallahs. e) Protection of stockpiles will be made by plastic sheeting to ensure that they are suitably secured against the wind. f) Stockpiles will be done in high areas to avoid flow in storm water run-off channels and erosion.	<ul style="list-style-type: none"> Implementation- Contractor Monitoring & Supervision - BUIDCo/SMCG/NMCG 	Part of Contract

<p>3. Increase in fugitive dust emissions causing air pollution from site clearance, excavation, raw material transportation, storage of excavation spoil, use of fuel wood in labour camps</p>	<p>Air quality Community health Worker health</p>	<p>Medium</p>	<p>a) Area of clearance and excavations will be limited to area required immediately for construction.</p> <p>b) Water sprinkling will be done twice a day – however it may change based on the weather condition and the dust level.</p> <p>c) At the stocking yard, loading and unloading area will be temporarily fenced with green shade cloth to prevent air pollution in nearby areas. Height will be minimized from which fill materials are unloaded during site backfilling as far as possible. Wherever possible, this should be below the height of the barricading around the Project site boundary. If possible, such activities will be minimized during windy conditions.</p> <p>d) Semi-pucca haul roads will be tried to build by spreading and compacting aggregate/metal/waste concrete mix.</p> <p>e) Construction material will be stored in covered sheds.</p> <p>f) Periodic air quality monitoring i.e quarterly except monsoon season will be conducted and compared with baseline.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG/ NMCG 	<p>INR 3,00,000 (Lumpsum cost)</p>
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<p>4. Increase in concentrations of PM₁₀, PM_{2.5}, SO₂ and NO_x from burning of fuel in construction equipment and transportation vehicles and cooking in labour camps.</p>	<p>Air quality Community health Worker health</p>	<p>Medium</p>	<p>a) Fitness certificate of construction equipment will be checked before mobilization at site.</p> <p>b) PUC Certificate of all vehicles will be collected before mobilization at site.</p> <p>c) Periodic maintenance of construction equipment and transport vehicles will be ensured for optimum engine performance.</p> <p>d) Dumpers will be covered during transporting construction spoil.</p> <p>e) Exposed earthworks and surfaces will be covered when not under active work.</p> <p>f) D.G Sets will be installed with appropriate stack height for proper dispersion of gaseous complying with the BSPCB norms. It will be ensured that the oil used should be lead free and use of low sulphur diesel.</p> <p>g) Quarterly ambient Air Quality monitoring except monsoon season, at the active construction site will be carried out with the help of NABL approved laboratory.</p> <p>h) Wood burning will be restricted through physical inspection in cooking purpose at labour camp and construction site in winter season.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG/NMCG 	<p>INR 30,375/- (ESDDR-EMP cost)</p>
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<p>5. Increase in ambient noise levels due to operation of construction equipment and vehicles</p>	<p>Local community health Worker health</p>	<p>Medium</p>	<p>a) Periodic preventive maintenance of construction equipment for optimum engine performance will be practiced.</p> <p>b) D.G set including vehicle and construction machinery will be provided with acoustic enclosures and thickly padded to prevent vibration.</p> <p>c) Idling of engines will be limited when not in use to reduce its contribution to noise emissions.</p> <p>d) Signage's signaling no honking will be installed inside the site area</p> <p>e) Drivers and workers will be oriented on good noise management strategies in Tool Box Talk.</p> <p>f) Quarterly ambient noise monitoring will be conducted as per monitoring plan from NABL lab.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG/NM CG 	<p>INR: 5,88,570/- and also Refer ESDDR-EMP with cost estimation.</p>
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<p>7. Ground water pollution due to leaching of materials and waste into the soil</p>	<p>Ground water Local community</p>	<p>Medium</p>	<p>a) Waste materials will be ensured not to be thrown into excavated areas. b) Hazardous wastes will also be properly disposed as per CTE conditions to prevent any Ground Water Pollution.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG/NMCG 	<p>Part of contract</p>
<p>8. Exposure to physical, chemical hazards, exposure to noise, working with construction equipment, fugitive dust, emergencies at site</p>	<p>Construction workers</p>	<p>Medium</p>	<p>a) Good housekeeping in the construction area will be maintained through implementation of mitigation measures for air and noise pollution. b) Excavated areas will be barricaded properly. c) Work permit system will be implemented for work at height. d) Training/orientation of construction workers will be conducted on safe work practices in TBT. e) Any near miss/injuries at site will be properly recorded and investigated injuries. f) PPEs will be provided to construction workers</p> <ol style="list-style-type: none"> a. Safety shoes, hard hat/helmet, and hand gloves with grip facility to all workers b. Nose masks for those working in dusty area c. Earplugs for those working in high noise areas d. Nitrile rubber gloves to those engaged in painting activities e. Face shield for those engaged in welding 	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG /NMCG 	<p>INR 13,71,000/- Refer ESDDR-EMP with cost estimation</p>

<p>9. Exposure to migrant workers, air and noise pollution, project security personnel, obstruction to community activities and accidents caused in the nearby community due to construction activities</p>	<p>Local community</p>	<p>Medium</p>	<p>a) Barriers will be provided to prevent ingress of persons into the construction site and also to protect the public from exposure to hazards associated with the construction activities.</p> <p>b) Before entering into the site all the labour's will be screened for their age through identity card (Adhar card/voter id/driving licenses etc.), issued from competent authority will be checked and documented at site office level as per information shared by EHS officer.</p> <p>c) Health condition will also be checked before mobilizing the labour at site.</p> <p>d) Worker's centric GRM and a committee at project site as First tier of redressal of grievances is constituted to manage the workers grievances as per BUIDCo Grievance Redressal Mechanism.</p> <p>e) Orientation training on safety requirements, Code of Conduct, and other working conditions will be provided.</p> <p>f) Awareness will be created about local tradition and culture among outside migrant and encouraging respect for same.</p> <p>g) Awareness programme will be conducted about sexually transmitted diseases among the migrant workers, labourers .</p> <p>h) Hospital tie up is done with UDAYAN</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/N MCG 	<p>INR 306585/- and also Refer ESDDR-EMP with cost estimation</p>
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			<p>HOSPITAL, Boring road, Patna.</p> <ul style="list-style-type: none"> i) Labour camp will be provided with sanitation, drinking water, medical, food and space for recreation activities after work. j) Proper disposal of wastes generated from the camp and construction activity will be followed to maintain the general hygiene in the area. k) Security personnel from reputed security agencies will be employed. 		
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<p>10. Alteration of natural drainage pattern due to site levelling</p>	<p>Landform, local community</p>	<p>Medium</p>	<p>a) Stormwater drainage will be provided within and at the borders of the site to channelize the stormwater during monsoon season.</p> <p>b) Procurement of aggregates and soil will be ensured from authorized quarries and borrow areas. Royalty receipt of the same will be submitted to BUIDCo.</p> <p>c) Natural drainage pattern of the site and its immediate surrounding will be considered during site levelling.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG 	<p>Part of contract</p>
<p>11. Resource consumption such as water and fuel causing depletion</p>	<p>Local community</p>	<p>Low</p>	<p>a) Preventive maintenance of construction equipment will be conducted to ensure proper engine performance and optimum level of fuel consumption</p> <p>b) Running hours of the equipment and machinery will be optimized through proper planning of activities.</p> <p>c) Air nozzles on hose pipes will be used for water spraying during curing to prevent water loss. And any leaking pipelines will be plugged.</p> <p>d) Water taps will be ensured in closed position while not in use.</p> <p>e) Usage of water will be monitored and its usage for various activities will be optimized.</p> <p>f) Workers and all relevant personnel will be trained/oriented on the aspects of resource conservation and its importance.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG 	<p>Part of contract</p>

12. Loss of flora and fauna due to site clearance	Flora Avian fauna	Low	<ul style="list-style-type: none"> a) Top soil of the excavated area will be stored and used for green belt development. b) Care will be taken to avoid any disturbance to flora and fauna of the area. c) Construction areas does not have any significant flora and fauna. d) All the activities will be restricted to the premises only to avoid and reduce the impact on biodiversity. 	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG 	Part of contract
13. Soil erosion due to site clearance and extraction of construction raw materials	Community health	Low	<ul style="list-style-type: none"> a) Drainage lines or temporary bunds will be planned and constructed around construction areas and at the site boundary to prevent runoffs into the nearby agricultural lands. b) Area of clearance and excavations will be limited to the area required immediately for construction. c) Large trees will be preserved on site, as feasible. d) Procurement of aggregates and soil will be taken from authorized quarries and borrow areas. e) Compaction of the cleared areas will be done. 	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG 	Part of contract
14. Viewscape impacts due to proximity of settlements to the project area	Local community	Low	<ul style="list-style-type: none"> a) Feasibility will be checked for locating dump yards, storing construction materials and construction vehicle & equipment parking away from direct view of the settlements. b) Construction site is not much close to habitations but Ganga Path created near the site is the public attraction point in evening. 	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG 	Part of contract

Total Cost = INR 2596530/ -

Table 7: ESMP for O&M Phase

Nature of Impact	Impacted ESHS Component	Impact Classification	Management Mitigation Measures	Monitoring Guidance/ Documents	Cost estimate
1.Natural resource consumption causing depletion	Local community	Medium	<p>A. Measures for water efficiency</p> <p>a) Any leakage in pipelines will be monitored and plugged. Water taps and valves will be ensured to be in closed position while not in use.</p> <p>b) Reuse of treated sewage will be ensured for landscaping, plant cleaning, flushing etc. where to reduce freshwater consumption.</p> <p>c) Workers and all relevant personnel will be trained on the aspects of resource conservation.</p> <p>B. Measures for energy efficiency</p> <p>a) Preventive maintenance of all equipment and machinery including pumps, air compressors and motors will be conducted to ensure optimum level of energy consumption.</p> <p>b) Energy efficient lighting systems will be used.</p> <p>c) Monitoring of energy consumption across various equipment and treatment stage will be done through use of energy meters.</p> <p>d) Fuel efficient equipment will be used for cleaning of roads and storm water drains. e) Running hours of the equipment and machinery will be optimized through proper planning of activities.</p> <p>e) Optimum utilization of biogas will be ensured for co-generation of heat and electricity.</p> <p>f) Sufficient insulation will be ensured in hot water systems to prevent loss of heat.</p>	<ul style="list-style-type: none"> Implementation- Contractor Monitoring & Supervision - BUIDCo/SMCG/NMCG 	Part of contract

<p>2. Soil contamination and groundwater pollution due to spillages and unscientific management of various types of waste</p>	<p>Soil quality Groundwater quality</p>	<p>Medium</p>	<p>a) Disposal of all hazardous waste will be ensured as per CTO conditions through authorized TSDF. In case of contamination, scrape off and collect the soil contaminated by hazardous materials in a separate drum and dispose to authorized TSDF.</p> <p>b) Hazardous waste will be stored in secured rooms with secondary containment in compliance with the Hazardous Waste Management Rules.</p> <p>c) Waste oil will be stored separate container and dispose through authorized recyclers.</p> <p>d) Quantity of solids generated will be minimized by the water treatment process through optimizing coagulation processes.</p> <p>e) Where feasible, treated spent sludge will be reuse as manure for landscaping.</p> <p>f) Monitoring of soil (once in a year) and groundwater (twice in a year) will be conducted from NABL lab.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG/NMCG 	<p>Part of contract</p>
<p>3. Air pollution through air emissions and odour generation from the operation of the treatment plant equipment and various treatment processes</p>	<p>Ambient air quality Local community</p>	<p>Medium</p>	<p>a) Cover emission points (e.g., aeration basins, clarifiers, sludge thickeners, tanks, and channels), and vent emissions to control systems (e.g., compost beds, biofilters, chemical scrubbers, etc.) as needed to reduce odours and otherwise meet applicable national requirements.</p> <p>b) Where necessary, consider alternate aeration technologies or process configurations to reduce volatilization.</p> <p>c) Low Sulphur content diesel will be used in DG sets.</p>	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG/NMCG 	<p>Part of contract</p>

			<p>d) Ambient Air Monitoring will be conducted twice in a year from NABL lab.</p> <p>e) Tree plantation of at least two rows around the periphery of STP site and landscaping will be done to prevent spread of bad odour with large canopy/ broad leaves trees like Sesum, Neem, Bargad, Teak, Sal, etc.</p> <p>f) Accumulated sludge and solid waste will be cleared within 24 hours and spraying of suitable herbicides on accumulated sludge/solid waste will be made in practice to reduce odour if any. Sludge management plan will be prepared before start of O&M phase.</p>		
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<p>4. Leakages and overflows resulting contamination of soil, freshwater bodies, and groundwater</p>	<p>Surface water quality Groundwater quality Soil contamination Local community</p>	<p>Medium</p>	<p><u>Reject streams</u> a) Filter backwash will be recycled into the process if possible. b) Treatment and disposal of reject streams will be ensured in consistent with national and local requirements <u>Leakage and overflows</u> c) Routine inspection and maintenance program will be scheduled which includes: (i)Development of an inventory of system components (ii)Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris. (iii) Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. (iv) Monitoring of sewer flow to identify potential inflows and outflows Monitoring of sewer flow to identify potential inflows and outflows d) Repairs will be prioritized and conducted based on the nature and severity of the problem. e) Bypass of the treatment system will be minimized by using separate storm water and wastewater systems and providing capacity sufficient to treat peak flows. f) Sufficient hydraulic capacity will be ensured to accommodate peak flows and adequate slope in gravity mains to prevent buildup of</p>	<p>j) Implementation- Contractor k) Monitoring & Supervision - BUIDCo/SMCG/N MCG</p>	<p>Part of contract</p>
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			<p>solids and hydrogen sulfide generation.</p> <p>g) Pumps and motors will be equipped with a backup power supply to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions</p> <p>h) Faecal sludge and septage discharging at storage and treatment facilities will be facilitated so that untreated septage is not discharged to the environment.</p> <p>i) Pumps and motors will be equipped with a backup power supply to ensure uninterrupted operation during power outages, and conduct regular maintenance to minimize service interruptions</p>		
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<p>5. Exposure to various occupational health and safety impacts including</p> <ul style="list-style-type: none"> ○ Physical hazards ○ Biological hazards ○ Chemical hazards ○ Noise & vibration <p>Odor Exposure to operational/natural/manmade emergencies at project site</p>	<p>Local community STP workers and employees Visitors to the STP</p>	<p>Medium</p>	<p>A. Accidents and Injuries</p> <ul style="list-style-type: none"> a) Railing is proposed to be installed around all process tanks and pits. Use of a lifeline and personal flotation device (PFD) will be made mandatory when workers are inside the railing. Rescue buoys and throw bags will be ensured to be readily available. b) Confined spaces permit that is consistent with applicable national requirements and internationally accepted standards will be implemented. c) Valves to process tanks will be ensured to be locked to prevent accidental flooding during maintenance. d) Fire and explosion prevention measures will be implemented at site in accordance with internationally accepted standards. e) On job training for the workers shall be carried out. f) Work permit system shall be followed. g) PPEs to be provided and use of PPEs shall be encouraged. 	<ul style="list-style-type: none"> • Implementation- Contractor • Monitoring & Supervision - BUIDCo/SMCG/NMCG 	<p>Part of Contract</p>
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			<p>B. Hazardous chemicals</p> <ul style="list-style-type: none"> a) Orientation of operators will be conducted involved in work with chlorine regarding safe handling practices and emergency response procedures i.e run towards safety equipment installed at site for this purpose (safety shower, eye wash station) and call emergency number. b) Appropriate personal protective equipment (including, for example, self-contained breathing apparatus) will be provided and training on its proper use and maintenance to be ensured. c) Escape plans for areas where there might be a chlorine emission will be prepared. d) Safety showers and eye wash stations will be installed near the chlorine station and other areas where hazardous chemicals are stored or used. e) Wastes will be limited entering the sewer system to those that can be effectively treated in the wastewater treatment facility and reduce the amount of airstrippable hazardous compounds entering the system by controlling industrial discharges (e.g., by permit or similar system). f) Analysis of raw wastewater will be conducted to identify hazardous constituents. g) Enclosed processing areas and equipment will be ventilated, such as pump stations, prior to maintenance. h) Gas detection equipment will be ensured at site while working in a wastewater facility. 		
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| | | | <ul style="list-style-type: none"> i) Air quality monitoring will be conducted as per monitoring plan in work areas for hazardous conditions (e.g. explosive atmosphere, oxygen deficiency). j) Engineering controls will be installed to limit worker exposure, for example collection and treatment of off-gases from air stripping. k) Personnel will be rotated among the various treatment plant operations to reduce inhalation of air-stripped chemicals, aerosols, and other potentially hazardous materials. <p>C. <u>Chlorine system safety</u></p> <ul style="list-style-type: none"> a) Alarm and safety systems will be installed, including automatic shutoff valves, that are automatically activated when a chlorine release is detected. b) Containment and scrubber systems will be installed to capture and neutralize chlorine leak if occur. c) Storage of chlorine will be ensured away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures. d) Sodium hypochlorite will be stored in cool, dry, and dark conditions for no more than one month, and use equipment constructed of corrosion-resistant materials. e) Ammonia storage and feed areas will be isolated from chlorine and hypochlorite storage and feed areas to avoid any incident. f) Amount of chlorination chemicals storage will be minimized on site while maintaining a sufficient inventory to cover intermittent disruptions in supply. | | |
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			<p>g) A prevention program will be developed and implemented that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures.</p> <p>h) Emergency response plan will be developed and implemented as a part of O&M manual.</p> <p>D. <u>Pathogens</u></p> <p>a) On job training program for workers shall be conducted on safe handling, and personal hygiene practices to minimize exposure to pathogens and vectors with Use vacuum trucks or tugs for removal of fecal sludge instead of manual methods.</p> <p>b) Required personal protective clothing and equipment to prevent contact with wastewater will be provided (e.g., rubber gloves, aprons, boots, etc.).</p> <p>c) Areas will be demarcated for workers to shower and change clothes before leaving work and orient them on washing of these work clothes.</p> <p>d) Workers at wastewater facilities will be trained on regular hand washing.</p> <p>e) Worker immunization (e.g. for Hepatitis B and tetanus) and health monitoring program will also be developed, including regular physical examinations.</p>		
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			<p>f) Aerosol formation and distribution will be reduced by, adopting following measures, for example by :</p> <ul style="list-style-type: none"> ○ Planting trees around the aeration basin to shield the area from wind and to capture the droplets and particles ○ Using diffused aeration rather than mechanical aeration and using finer bubbles for aeration ○ Reducing aeration rate, if possible ○ Use of floating covers on the mixed liquor of the aeration basin ○ Suppression of droplets just above the surface, (e.g., by installing a screen or mesh above the basin) ○ Collection of droplets (e.g., by sedimentation, scrubber, electrostatic precipitator, or fabric filter) ○ Use of submerged effluent collector (such as pipes with orifices) rather than weirs <p>g) Good housekeeping will be maintained in sewage processing and storage areas.</p> <p>h) Individuals with asthma, diabetes, or suppressed immune systems will be avoided to work at wastewater treatment facilities, especially composting facilities, facility because of their greater risk of infection.</p> <p>i) Use of drip irrigation with treated wastewater will be considered, which minimizes worker exposure and the amount of water needed. Use of spray irrigation of treated wastewater will be avoided, if possible.</p>		
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			<p>j) Personal protective equipment will be provided to all field workers, such as rubber gloves and waterproof shoes.</p> <p>E. <u>Operational noise</u></p> <p>k) Adequate PPE (ear-plugs and earmuffs) will be provided to personnel.</p> <p>l) Periodic maintenance of the high noise generating equipment will be conducted.</p> <p>m) If required, noise insulating materials will be used where noise level will be observed high.</p> <p><u>Other precautions</u></p> <p>n) Access to safe drinking water and sanitation will be provided (including hand washing) facilities</p> <p>o) Health monitoring of workers will be conducted, including regular physical examination.</p> <p>p) All electric switches (including unit specific on-off switches installed at respective units) and panels will have adequate protection from rain water to prevent short circuiting.</p>		
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6. Community Impacts	Local community	Medium	<p>a) Grievance register will be maintained at site for record of grievances if any to nearby community.</p> <p>b) Healthy relationship will be maintained with nearby community through CSR activities.</p>	<ul style="list-style-type: none"> • Implementation by contractor • Monitoring by BUIDCo/SMCG/NMCG 	Part of Contract
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7.4 Environmental & Social Monitoring Plan

7.4.1 ESMP Monitoring

The ESMP provides prevention and mitigation measures to be undertaken to reduce the environmental and social impacts due to project activities. Monitoring parameters and mechanism of monitoring are also provided.

During construction, quarterly monitoring of implementation of the ESMP should be conducted. During operation and maintenance phase of the project, implementation of the ESMP should be monitored on a half yearly basis.

7.4.2 Environmental Quality Monitoring

To ascertain effectiveness of implementation of mitigation measures recommended in the ESMP and to comply with legal requirements, environmental quality monitoring would need to be conducted. The ambient air quality, ambient noise and ground water quality will need to be monitored. The monitoring should be conducted at the locations where baseline environmental quality was monitored and analyzed to note the change.

Apart from Environmental monitoring others aspects required to be monitored as the conditions of CTE NOC and submission of compliance report to Bihar State Pollution Control Board, accidents/fatalities/near miss and its reporting, fire extinguisher inspection etc. Refer the table below for monitoring plan. Refer the table below for monitoring plan.

Environmental Component	Stage	Parameters	Locations	Total No. of Samples	Frequency	Standards /Methods	Implementation Agency
Environmental Monitoring Plan							
Air quality	Construction	PM10 µg /m ³ , PM2.5 µg/m ³ , SO ₂ , NO _x , CO	STP	6 Samples	Once in every season (except monsoon) for 2 yrs	National Ambient Air Quality Standards, CPCB And Stack emissions concentrations from Biogas power plant (NO _x , CO, PM	Contractor through approved monitoring agency/Lab (NABL/ MoEF&CC accredit Laboratory) Stack emission will be monitored by contractor and record will be kept.
	Operation	Stack emissions concentrations from Biogas power plant (NO _x , CO, PM)	STP	10 Samples	Twice in every year (pre & post monsoon) for first 5 years		
Noise	Construction	Leq dB (A)	STP	6 Samples	Once in every season (except monsoon) for 2 yrs	National	Contractor through approved monitoring agency/Lab (NABL/ MOEF&CC

CONTRACTOR'S ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (C-ESA)

Environmental Component	Stage	Parameters	Locations	Total No. of Samples	Frequency	Standards /Methods	Implementation Agency
Environmental Monitoring Plan							
	Operation	(Day and Night) Average and Peak values	STP	10 Samples	Twice in every year (pre & post monsoon) for first 5 years	Ambient Air Quality Standards with respect to Noise Standards, CPCB	accredit Laboratory)
Water Quality (Surface and Groundwater)	Construction	Ground Water Parameter as per IS:10500 (2012) and surface water parameters (Surface Water Quality of the nearest drains (outfall)	Ground Water-STP & Labour camp	12 Samples	Once in every season (except monsoon) for 2 yrs	As per CPCB/NGT Standards for treated effluent discharge and IS:10500 (2012) for ground water	Contractor through approved monitoring agency/Lab (NABL/MoEF&CC accredit Laboratory)
	Operation	asper CPCB guideline for discharge of treated effluents in Inland water bodies	Ground Water of STP site and inlet & outlet point	70 Samples	Monthly for inlet & outlet and Twice for groundwater in a year (Pre and post monsoon) for first 5 years		
Soil	Construction	Physical Parameter: Texture, Grain Size, Gravel, Sand, Silt, Clay; Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio	STP site	2 Samples	Once in every year (Except monsoon) for 2 yrs	Soil test method by Ministry of Agriculture	Contractor through approved monitoring agency/Lab (NABL and MoEF&CC accredit Laboratory)
	Operation		STP site	5 Samples	Once in a year (except monsoon) for first 5 years		
Other Monitoring aspects (construction phase)							
Health & Safety Monitoring	Minor accidents/near miss/fatalities				Record in accident register and reporting will be in ESMP compliance report	Contractor -EHS officer	
Fire Extinguisher	Validity period				Inventory to be maintained and reporting to be ensured.	Contractor -EHS officer	
Monitoring points of Consent to Establish (CTE) NOC received from Bihar State Pollution Control Board							
Specific Conditions of CTE NOC							

CONTRACTOR'S ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (C-ESA)

Environmental Component	Stage	Parameters	Locations	Total No. of Samples	Frequency	Standards /Methods	Implementation Agency
Environmental Monitoring Plan							
Diesel generating sets (DG Sets), if any; as source of backup power should be provided with an integral acoustic enclosure and the maximum permissible sound pressure Level for new D.G. set shall be 75 dB(A) at 1 meter from the enclosure surface. The height of exhaust of DG sets should be as: Exhaust Stack Height formula: - (Ht of Building in meter+0.2VKVA)m; it should be installed on pucca base with anti-vibration pads;							Contractor (DG set is not installed at site)
That, they shall ensure all possible measures to be implemented to control noise pollution and the ambient noise levels should conform to the standards prescribed under the Noise Pollution (Regulation and Control) Rules, 2000, as amended to date viz. 75 dB(A) during day time and 70 dB (A) during night time;							Contractor (Ambient noise monitoring is conducted on quarterly basis)
That, they shall comply with the provisions (whichever applicable) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. The used oil from DG sets as hazardous waste will be stored in HDPE drums in isolated covered facility. This used oil will be sold to authorized recyclers and record shall be maintained. Necessary care will be taken so that spills/leaks of used oil from storage are avoided;							Contractor (DG set is not installed at site)
That, they shall comply with the provisions (whichever applicable) of the E-Waste (Management) Rules, 2016. The e-waste generated shall be disposed off by handing over to the authorised collection centre and a record shall be maintained;							Contractor (Noted)
That, they shall comply with the provisions (whichever applicable) of the Plastic Waste Management Rules, 2016. They will make effort to discourage the use of plastics so that minimum generation of plastics wastes to be taken place;							Contractor (Noted)
That, in case of construction activities, they shall comply with the provisions (whichever applicable) of the Construction and Demolition Waste Management Rules, 2016;							Contractor (Leftover wastes are disposed in Patliputra PMC disposal site on verbal direction)
That, the surface having unpaved and loose soil, if any, shall be adequately sprinkled with water to suppress dust;							Contractor (Sprinkler is available at site and moved twice in a day)
That, maximum efforts will be made to retain existing tree cover as well as new sapling shall be planted during coming season; and							Contractor (Trees are saved in layout at STP site)
That, the project proponent shall submit half yearly compliance report of CTE condition.							Contractor through concerned EE.
General Conditions of CTE NOC							
That, they shall provide adequate fire safety measures and equipment as required under the Rules and obtain necessary permission/NOC from competent authority as required;							Contractor (Complied)
That, they shall obtain all mandatory clearance/ permission from all relevant agencies;							Contractor (complied)
That, the Environmental Statement as prescribed in the E (P) Rules, 1986 [see rule 14] for each financial year ending the 31a March, shall be submitted by the month of September every year;							Contractor through concerned EE.(Will be submitted in EMP compliance report)
That, maximize recycling of water and utilization of treated sewage water in irrigation/rain water in harvesting							Contractor (Applicable in operational phase)

CONTRACTOR'S ENVIRONMENTAL AND SOCIAL ASSESSMENT REPORT (C-ESA)

Environmental Component	Stage	Parameters	Locations	Total No. of Samples	Frequency	Standards /Methods	Implementation Agency
Environmental Monitoring Plan							
That, they shall provide electromagnetic flow meter at the inlet and outlet of the STP and any pipeline to be used for re-using the treated wastewater in irrigation purposes as well as back into the system for flushing/horticulture purpose/green belt development etc. and shall maintain a record of readings of each such meter on daily basis;							Contractor (Operational phase)
That, adequate number of ground water monitoring stations by providing piezometers around the project area shall be set up. The ground water quality shall be monitored for parameters like pH, BOD, COD, Ammonical Nitrogen, Chloride and Total Dissolved Solids. Analysis report shall be submitted to the Board on monthly basis;							Contractor (Operational phase)
That, they shall comply with the applicable provisions/directions of the State Govt./BSPCB including the directions that no person shall manufacture, Import, store, sell or use any kind of plastic carry bags;							Contractor (Noted)
That, in compliance of direction of the Hon'ble Supreme Court and vide Board's HQ ref. no.2638, dated 09.07.2019, they shall make provisions for display of data outside main unit gate about quantity and quality of water discharge and air emission along with solid waste generated within the unit premises							Contractor (Noted)
That, not withstand any thing stated above, provisions of the environmental laws including policies and guidelines made there under; and he applicant unit shall abide by all the							Contractor (Noted)

7.4.3 Environmental and Social Budget

The cost of environmental budget for the various environmental management measures proposed in the ESMP and the cost of the Environmental Monitoring is given in **Table -6 (ESMP for preconstruction and construction phase), 7 (ESMP for O&M phase) and 8 (Environmental Monitoring cost)**. There are several other environmental issues that have been addressed as part of good engineering practices, the costs for which have been accounted in the Engineering Cost. Various environmental aspects covered/will be covered under engineering costs are listed below:

- ✓ Site Management.
- ✓ Housekeeping.
- ✓ Noise monitoring of DG sets if any used during construction phase.
- ✓ Proper drainage arrangements to prevent water stagnation/ flooding in site.
- ✓ Appropriate siting, and enclosing within building to reduce noise and odors nuisance to surrounding area.
- ✓ Ensuring storage of excavated soil material on the higher lying areas.
- ✓ Excavation, cutting and filling operations.
- ✓ Safety hazards to workers.
- ✓ Solid Waste Management.

Table 8: Environmental Monitoring Cost

Item	Location	Season	Year	Total no. of samples	Unit cost (INR)	Total cost (INR)
Environmental Monitoring during Construction Stage						
Air Quality Monitoring (STP)	1	3	2	6	7000	42000
Noise/Vibration (STP)	1	3	2	6	2500	15000
Water Sample (Ground Water-STP and Labour camp)	2	3	2	12	7000	84000
Soil (STP)	1	1	2	2	5000	10000
Travel and Transportation of Monitoring team (Lump sum cost)						200000
Sub-Total:						351000
Environmental Monitoring during Operation Stage						
Air Quality Monitoring (STP site)	1	2	5	10	7000	70000
Stack emissions concentrations from Biogas power plant (NOx, CO, PM)	1					100000
Noise/Vibration (STP site)	1	2	5	10	2500	25000
Water Sample (STP sites-groundwater, inlet, outlet)	3	Monthly for inlet & outlet Twice for groundwater	5	60+10=70	7000	490000
Soil	1	1	5	5	5000	25000
Travel and Transportation of Monitoring team (Lump sum Amount)						300000
Sub-Total:						1010000
Total for Environmental Monitoring						13,61,000

The total cost for implementing measures outlined in Environmental Management Plan and Environmental Monitoring Programme during construction and operation phase in ESMP – Rs.2596530/-and ESMP Monitoring Rs.1361000/- and unidentified impacts Rs.1000000/-.

Hence total cost of ESMP is 2596530 + 1361000 + 10,00,000 = **4957530/- (Forty Nine Lacs Fifty Seven Thousand Five Hundred Thirty only).**

7.5 Stakeholder Engagement and Information Disclosure

7.5.1 Context of Stakeholder Engagement

As presented in World Bank's ESS 10, stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements spanning the entire life of a project:

- Stakeholder Analysis and Planning,
- Disclosure and Dissemination of Information,
- Consultation and Participation,
- Grievance Mechanism, and
- Ongoing Reporting to Affected Communities.

The World Bank defines stakeholder as a 'person, group, or organization that has a direct or indirect stake in a project/organization because it can affect or be affected by the Project/organization's actions, objectives, and policies.'

Stakeholders of the STP will include persons or groups that will have an interest in the Company's operations or have an ongoing relationship with the company and have the ability to influence the company operations. As provided in the guidance notes associated with ESS 10, engagement with suppliers, contractors, employees, or customers are not considered in this plan as these groups are parties to the core business function and subject to national regulations and/or established corporate policies and procedures.

This section puts in place a framework that will guide the stakeholder identification, analysis, and engagement process for the Kankarbagh STP.

7.5.2 Stakeholder Identification and Analysis

A. Stakeholders of WABAG

Considering the nature, activities and facilities, and potential adverse impacts of the STP, the following key stakeholders have been identified.

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
1. Neighbouring Communities	<ul style="list-style-type: none"> • Pahari Village • Neighbouring residents of the STP 	Other neighbouring communities within study area

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
	<ul style="list-style-type: none"> • Owners of agricultural land neighbouring the project site • Shop owners neighbouring the facility 	
2. Community Representatives	<ul style="list-style-type: none"> • Ward Parishad • Pahari Village Heads 	--
3. Industrial Establishments	<ul style="list-style-type: none"> • None present in project influence area 	--
4. Regulators	<ul style="list-style-type: none"> • BUIDCo • Patna Municipal Corporation • Other Regulators (State Pollution Control Board, Factories Department, Labour Department) 	--
5. Institutional Stakeholders	<ul style="list-style-type: none"> • Equity Investors • Lenders 	--
6. Other Groups	--	<ul style="list-style-type: none"> • Political Parties • Civil society organizations • NGOs • Media organizations

B. Stakeholder Analysis

Stakeholder Analysis involves a more in-depth look at the interests of the stakeholders, how they will be affected and what influence they have on a project.

The influence and priority have both been primarily rated as:

- **High Influence:** This implies a high degree of influence of the stakeholder on the project/ organization in terms of participation and decision making or high priority to engage with the stakeholder.
- **Medium Influence:** This implies a moderate level of influence and participation of the stakeholder in the project/ organization as well as a priority level to engage the stakeholder which is neither highly critical nor are insignificant in terms of influence.
- **Low Influence:** This implies a low degree of influence of the stakeholder on the project/ organization in terms of participation and decision making or low priority to engage that stakeholder.

The following table provides an analysis of the stakeholders for the Company specific to the Project.

Relevant stakeholders	Impact/ Influence of the Project on this stakeholder group	Impact/ Influence of the Stakeholder Group on the Project	Expectations, Opinions, Key Concerns of Stakeholders	Rating of Stakeholder Influence
Neighbouring Communities				
Neighbouring residents/	<ul style="list-style-type: none"> • Inconvenience during construction due to 	<ul style="list-style-type: none"> • Agitation in case of increased nuisance 	<ul style="list-style-type: none"> • Contribution to infrastructural development of the area 	High Influence

Relevant stakeholders	Impact/ Influence of the Project on this stakeholder group	Impact/ Influence of the Stakeholder Group on the Project	Expectations, Opinions, Key Concerns of Stakeholders	Rating of Stakeholder Influence
commercial shops near STP	<p>noise, fugitive dust and other forms of pollution.</p> <ul style="list-style-type: none"> • Inconvenience during operation & maintenance due to noise, emissions from the facility activities, odour, and other forms of pollution. • Increase in vehicular traffic and viewscape impacts • Accidental release of chlorine gas and toxic fumes endangering health. • Exposure to emissions from fire emergency at the facility that may impact the life and property. • Access to income generation opportunities • Harassment by security personnel posted by the STP 	<p>created from STP activities</p> <ul style="list-style-type: none"> • Public Interest Litigations. • Show Cause Notice from State Pollution Control Board • Compensation claims. • Complaints to Ward Office/ District Administration that can lead to stoppage of activities. 	<ul style="list-style-type: none"> • Economic and employment opportunities • Company adopts management systems on environment, health & safety to prevent adverse impacts on the community. • Company establishes a community grievance redress mechanism. • Company informs the community about high risk operations and actions to be taken in emergency situations. 	
Farmers owning land neighbouring the STP	<ul style="list-style-type: none"> • Soil contamination resulting from accidental discharge of untreated wastewater. • Impact on health of farmers and on produce due to release of pathogens/vectors from untreated wastewater • Source of treated water for irrigation of the agricultural lands • Unavailability of groundwater for pursuing livelihood like farming due to groundwater depletion caused by excessive consumption by the STP • Accidental release of chlorine gas and toxic 	<ul style="list-style-type: none"> • Public Interest Litigations. • Agitation in case of increased nuisance created from STP activities • Complaints to Ward office/ District Administration that can lead to stoppage of activities. • Compensation claims. 	<ul style="list-style-type: none"> • Company uses natural resources in a responsible manner. • Company ensures adequate treatment of sewage prior to discharge • Company adopts management systems on environment, health & safety to prevent adverse impacts on the community. • Company establishes a community grievance redress mechanism. • Company informs the community about high risk operations and actions to be taken in emergency situations. 	High Influence

Relevant stakeholders	Impact/ Influence of the Project on this stakeholder group	Impact/ Influence of the Stakeholder Group on the Project	Expectations, Opinions, Key Concerns of Stakeholders	Rating of Stakeholder Influence
	<p>fumes endangering health.</p> <ul style="list-style-type: none"> Exposure to emissions from fire emergency at the facility that may impact the life and property. 			
Other neighbouring communities within study area	<ul style="list-style-type: none"> Increase in vehicular traffic during construction and O&M phases. Unavailability of groundwater for community use due to groundwater depletion caused by excessive consumption by the STP. Degraded quality of ground water due to land contamination from improper disposal of waste causing leaching of contaminants into the ground water aquifer. Contamination of waterbodies used for recreation or drinking or other purposes due to inefficient treatment of sewage and bypass in case of emergencies. Harassment by security personnel posted by the STP 	<ul style="list-style-type: none"> Public Interest Litigations. Agitation in case of increased nuisance created from STP activities Show Cause Notice/ Closure Notice from State Pollution Control Board Complaints to Ward Office/ District Administration that can lead to stoppage of activities. 	<ul style="list-style-type: none"> Company adopts management systems on environment, health & safety to prevent adverse impacts on the community. Company establishes a community grievance redress mechanism. 	Medium Influence
Community Representatives				
<p>Ward Parishad</p> <p>Pahari Village Heads</p>	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Issue permits and approvals as applicable to the STP operations Complaints to regulatory authorities that can lead to penalties or stoppage of activities 	<ul style="list-style-type: none"> All applicable permits and approvals are obtained timely and periodically as applicable Concerns of villagers are addressed timely and appropriately 	High influence
Regulators				

Relevant stakeholders	Impact/ Influence of the Project on this stakeholder group	Impact/ Influence of the Stakeholder Group on the Project	Expectations, Opinions, Key Concerns of Stakeholders	Rating of Stakeholder Influence
BUIDCo	<ul style="list-style-type: none"> Fulfilling the institutions objective of improving the urban infrastructure 	<ul style="list-style-type: none"> Approve the project components. Issue directives to stop work based on complaints form stakeholders. 	<ul style="list-style-type: none"> The project is developed and operated in alignment with the institutions requirements. Complaints from stakeholders are addressed timely and appropriately. 	High Influence
Patna Municipal Corporation	<ul style="list-style-type: none"> Improving quality of life in the City. 	<ul style="list-style-type: none"> Issue permits and approvals as applicable to the project. Issue directives to stop work based on complaints from Ward Parishad. 	<ul style="list-style-type: none"> All applicable permits and approvals are obtained timely and periodically as applicable. Complaints of Ward Parishad are addressed timely and appropriately. 	Medium Influence
Applicable regulators (State Pollution Control Board, Factories Department, Labour Department)	<ul style="list-style-type: none"> Assistance in treatment of sewage and reduction pollution of the river systems 	<ul style="list-style-type: none"> Issue permits and approvals as applicable to the project. Levy penalties if STP Plant found non-compliant. 	<ul style="list-style-type: none"> All applicable permits and approvals are obtained timely and periodically as applicable. Conditions of the permits are implemented. 	High Influence
Institutional Stakeholders				
Equity Investors/ Lenders	<ul style="list-style-type: none"> Opportunity to grow financial resources Credit risk to equity investors and lenders due to stoppage of STP operations due to action from regulatory bodies or major accidents 	<ul style="list-style-type: none"> Provide financial and technical resources contributing to business growth 	<ul style="list-style-type: none"> STP operations is managed in alignment with environmental and social safeguards among other requirements Major incidents are communicated at the earliest 	Medium influence
Other Groups				
Civil society organizations NGOs	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> File PILs. Collective bargaining through public support. 	<ul style="list-style-type: none"> Project operates within the regulatory framework. Have a robust grievance redress mechanism. 	Medium influence
Political Parties	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Collective bargaining through public support. 	<ul style="list-style-type: none"> The Company operates within the regulatory framework. Have a robust grievance redress mechanism. 	Low influence

Relevant stakeholders	Impact/ Influence of the Project on this stakeholder group	Impact/ Influence of the Stakeholder Group on the Project	Expectations, Opinions, Key Concerns of Stakeholders	Rating of Stakeholder Influence
Media	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Publish adverse reports about the company. 	<ul style="list-style-type: none"> Project operates within the regulatory framework. Have a robust grievance redress mechanism. 	Low influence

7.5.3 Stakeholder Engagement Plan

A Stakeholder Engagement Plan for Kankarbagh STP project, that lists the stakeholders identified above, stage at which the engagement needs to be undertaken, purpose of engagement, mode of engagement, minimum information to be disclosed to the respective stakeholder, and responsible person for stakeholder engagement is presented below. The methods of communication can be either verbal or written, on the basis of the purpose of communication and the target stakeholder group.

Relevant Stakeholders	Stage of Engagement	Purpose of Consultation	Mode of engagement	Minimum Information to Disclose
Neighbouring Communities				
<p>Nearby community</p> <p>Farmers owning land neighbouring the STP</p> <p>Other neighbouring population in the vicinity</p>	Construction and Operations Phase	<ul style="list-style-type: none"> To maintain 'social license to operate' Alleviate community (or individual) grievances 	<ul style="list-style-type: none"> Consultations through one-to-one meetings/ group discussions Through written communication to Ward Parishad Response to queries raised (if any) 	<ul style="list-style-type: none"> Facility description and benefits Provide information about STP activities concerning the community in a proactive and timely manner in a language understood by community Offsite Emergency Preparedness and Response Plan Grievance redress contact details
Civil Society Organizations				
<p>Ward Parishad</p> <p>Pahari Village Heads</p>	Construction and Operations Phase	<ul style="list-style-type: none"> To maintain 'social license to operate' Alleviate community (or individual) grievances 	<ul style="list-style-type: none"> Through written communication 	<ul style="list-style-type: none"> Facility description and benefits Grievance redress contact details
Regulators				
<p>BUIDCo</p> <p>Patna Municipal Corporation</p> <p>Regulatory bodies issuing various</p>	Construction and Operations Phase	<ul style="list-style-type: none"> Various approvals, permissions and licenses related to setting up of the project Land NOC 	<ul style="list-style-type: none"> In-person meetings Official communications as required by the law and the permits issued. 	<ul style="list-style-type: none"> Information required by the law and under the permits issued

Relevant Stakeholders	Stage of Engagement	Purpose of Consultation	Mode of engagement	Minimum Information to Disclose
environmental, labour and factory safety related approvals		<ul style="list-style-type: none"> Submission of compliance related returns 	<ul style="list-style-type: none"> Response to queries raised, notices/ letters received 	
Institutional Stakeholders				
Equity Investors/ Lenders	Project Lifecycle	<ul style="list-style-type: none"> Inform investors about the growth and direction of the Company 	<ul style="list-style-type: none"> Investment/ Loan Agreement Official communication on overall E&S performance Response to queries raised 	<ul style="list-style-type: none"> All major incidents that may occur in the facility that may lead to disruption of business or create a negative impact on the facility or the group Information requirement stated in Loan/ Investment Agreement Reporting on E&S Key Performance Indicators
Other Groups				
Civil Society Organizations NGOs	Project Lifecycle	<ul style="list-style-type: none"> Discussion on specific issues of concern to environment and social issues Building and maintaining WABAG reputation 	<ul style="list-style-type: none"> Partnerships Response to queries raised (if any) 	None in specific
Political Parties	Project Lifecycle	<ul style="list-style-type: none"> Uninterrupted operations of the STP 	<ul style="list-style-type: none"> One-to-One meetings Receipt of verbal grievances 	None
Media	Project Lifecycle	<ul style="list-style-type: none"> Building and maintaining WABAG reputation 	<ul style="list-style-type: none"> Response to queries raised (if any) 	None in specific

7.5.4 Implementation of Stakeholder Engagement Plan

All communication with stakeholders (especially in-person meetings and group discussions) will 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:

- | | |
|--|--|
| <ul style="list-style-type: none"> Stakeholder group Location Date of communication Purpose of communication | <ul style="list-style-type: none"> Mode of communication Stakeholder response Further action Reference document (if any) |
|--|--|

7.6 Community Grievance Redress Mechanism

A project level Community Grievance Redressal Mechanism (GRM) should be established at project site to provide the affected communities a credible and effective channel of communication and allow them to communicate their grievances/concerns which they believe to be caused by the project activities.

This GRM should not hinder the legal process of grievance resolution route that the aggrieved may wish to adopt.

7.6.1 Institutional Arrangement for Grievance Redressal

A Grievance Redress Committee (GRC) should be established at the Project level. The Committee should comprise of Project Head, E&S Officer from BUIDCo and a third party representative appointed through mutual consent between BUIDCo and the project. The third-party representative appointed should either be a reputed member of the community or from a non-governmental organization (NGO).

The GRC should meet on a monthly basis to review the grievances received during the period and to take a stock of actions undertaken for grievances received in the previous month.

The Project Head should designate a Community Liaison Officer from its team for attending to community grievances and engaging with them on a regular basis.

7.6.2 Receipt & Recording of Grievance

The aggrieved members can communicate their grievances related to the Project to the Community Liaison Officer through the formal and informal avenues listed below. The officer will facilitate the aggrieved in communicating their grievance.

- Oral complaints communicated through remote-access methods such as phone calls or face to face to the Officer during group or individual meetings.
- Written complaints communicated through remote-access methods such as email or face-to-face, wherein individuals or a group submit their grievances to the officer.

All grievances received through oral or written format will be recorded. The following details will be recorded for each grievance:

- Date of receipt of grievance
- Name of aggrieved or anonymous
- Mode of communication – oral or written
- Name of person to whom the grievance was communicated
- Details of Grievance (as communicated by the aggrieved)

The Community Liaison Officer will provide a confirmation of receipt of grievance to the aggrieved within 48 hours of receiving the oral or written question or concern and inform them that they will receive a response in writing within 30 business days.

The Project should provide an option to submit anonymous complaints. However, no personal response can be provided for such grievances. Also, if insufficient information is provided and further investigation cannot proceed, such grievances can be closed without the possibility of resolution.

7.6.3 Review and Investigation of Grievances

All grievances received should be placed before the GRC during their monthly meeting. Each grievance should be reviewed whether it is in the scope of the project for resolution. Where the grievance is not within the scope of the Project, the Community Liaison Officer should explain to the complainant the reason and accordingly close the grievance. The same should be recorded.

Where the grievances that are found to be within the scope of the Project, the details should be reviewed. Relevant project documents and records should be reviewed. There may be a need for discussion with the aggrieved community members/ complainant for better understanding of the nature of the grievance and to discuss resolution options. Site visits and meetings with complainants should be conducted by the GRC for redressing grievances resulting from a physical incident. Proceedings of the site visit should be documented.

The Project should take full responsibility for investigating the details of grievances coming through its grievance mechanism, at no cost to the communities.

7.6.4 Grievance Resolution

Once the grievance is well understood, resolution options should be developed taking into consideration community preferences, project policy, past experience, current issues, and potential outcomes. The GRC should plan measures to resolve the grievance and set a timeline for implementation of the measures. The plans/ actions should be documented and monitored.

Where details of complainant are available, a formal response on the actions planned with implementation timeline for resolving the grievance should be communicated to the complainant within 30 days of receipt of the grievance. Where grievance review and resolution are delayed, the complainant should be provided regular updates on the progress.

The solutions for grievance resolution could include:

- altering or halting harmful activities or restricting their timing and scope
- providing monetary compensation
- providing an apology
- replacing lost property
- revising community engagement strategy
- renegotiating existing commitments or policy

7.6.5 Grievance Closure

The following actions should be undertaken for grievance closure:

- Grievance should be duly addressed through the actions / measures that are arrived at as described in this Section and closed by the GRC and where relevant and feasible, signed off by the complainant.
- The closure date of the grievance should be recorded and communicated to the aggrieved/complainant with acknowledgement received from the complainant (in any written format). This may be in form of minutes of meeting with an aggrieved person/ group signed off by its designated head or a written signature/thumb-print of an individual/written email etc.

7.6.6 Redressal of Anonymous Grievance

The procedure for redressing anonymous grievances should be as follows:

- An anonymous grievance will be received in writing in most circumstances. The grievance will be recorded and checked whether it is in the scope of the Project for resolution.
- The grievances found to be within the scope of the Project for resolution, will be resolved as per the procedure presented in Section 7.6.3 and 7.6.4 (barring the procedure on communicating to the complainant).
- The closure date of the grievance will be recorded.

7.6.7 Publicizing the C-GRM

The GRM should be publicized giving due consideration to the cultural characteristics and accessibility factors. The neighbouring community, community representatives, civil society organizations, female groups, vulnerable groups should be informed about the presence of the grievance redress mechanism, its objectives and its functions. the following features of the GRM should be communicated:

- Presence of a Community Liaison Officer and GRC for redressal of grievances.
- All complaints and constructive feedback will be taken seriously, whether submitted from a named source or anonymously.
- There will be no cost or fee associated with submitting a question or concern through the GRM.
- Interested and affected parties may submit queries or concerns without fear of retribution.
- The GRM does not impede or replace the grievance resolution process offered by the legal system of the country.

Contact details of the Community Liaison Officer should be communicated to the neighbouring community, community representatives, civil society organizations (if any). Contact details of the GRC members should also be made available as escalation contact. The contact details should be communicated through a display at the project site gate in a manner that it is easily visible.

7.7 Conclusion

The scope of this report is limited to the Kankarbagh STP project. Environment & Social analysis of the " Proposed Kankarbagh STP project " concludes that the Projects falls under Medium Risk Category and has overall positive benefits on the life and environment of the people. There has been no reported land acquisition caused under this project. As per environmental and social management framework guidelines of NGRBA (ESMF for Ganga-2), Environmental and Social Assessment, with a Generic Safeguard Management Plan was conducted for addressing possible issues & concerns arising from proposed project. Impacts of activities identified during the assessment fell under two separate categories of Construction and Operation. Although no such adverse or permanently negative environmental or social impacts were identified. There were certain temporary impacts, for which appropriate mitigation plans have been suggested. The environmental management plan suggests appropriate mitigation measure against the issues & concerns identified during the environmental and social analysis study. All the social and environmental issues were appropriately studied and have been substantiated using appropriate evidences, to ascertain the magnitude of their impacts. Even the issues of public grievances and public notice have been taken care in the report to confirm transparency during the project implementation. A well defined institutional mechanism is already in place to monitor and evaluate the progress of the project during construction, implementation and operation phases and to handle the project related grievances if any arise in due course of project life cycle.

ANNEXURE

Annexure :1 –CTE NOC


BIHAR STATE POLLUTION CONTROL BOARD

 PARIVESH BHAWAN, PLOT NO. NS-B/2, PALIPUTRA INDUSTRIAL AREA,
 PATLIPUTRA, Patna – 800 010

Ref. No.-

Patna, Dated-

'CONSENT-TO-ESTABLISH' (NOC)
UNDER SECTIONS 25/26 OF THE WATER (PREVENATION AND CONTROL OF POLLUTION) ACT, 1974 AND 21 OF THE AIR (PREVENTION AND CONTROL OF POLLUTION) ACT, 1981
REFERENCE

- i. Name and address of the Proponent: BUIDCO, DK Sewage Project Pvt. Ltd., Pahari, Patna Sadar, Patna; and
- ii. Application No. 6521675, dated 02.09.2022 of the proponent to establish a Sewage Treatment Plant (STP) at Mauza-Pahari-14, Plot No./Khesra No.-1252,1249,1248,1246, Khata No.-1252, 1249, 1248, 1246, Campus Ganga Pollution Board, Pahari, Patna Sadar, Patna, Dist-Patna for capacity: 50,000 m³/day (50.0 MLD).

AFTER CONSIDERING

- (i) The facts stated in their application;
- (ii) Bihar State Pollution Control Board's Notification No. 26 dated 08.11.2003 and as amended;
- (iii) Provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981; and
- (iv) Previous CTE dated 14.06.2021 and other document submitted online by the applicant.

NOC IN FAVOUR OF THE PROPONENT AT THE SAID SITE IS HEREBY ACCORDED SUBJECT TO THE FOLLOWING CONDITIONS
Specific Conditions

1. That, Consent-to-Operate for the Sewage Treatment Plant (STP) shall be obtained from the Bihar State Pollution Control Board as required under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981;
2. That, they shall comply with provisions (whichever applicable) of The Water Act, 1974, The Air Act, 1981, The Environment (Protection) Act, 1986, Rules and notifications issued there under;
3. That, they shall maintain maximum possible distance from the river and ideally it should be more than 500m from the river;
4. That, they shall obtain prior permission for installation of bore well (if any required) and abstraction of groundwater from Central Groundwater Authority (CGWA)/Competent Authority, , if required groundwater abstraction is ≥ 10 KLD;
5. That, they shall have to provide suitable and separate drainage system for sewer/other wastewater and storm water. No sewage or untreated effluent water would be discharged through storm water drains. A coloured drainage map shall be submitted to the Board;
6. That, they shall adopt rain water harvesting as provisions made by the local bye-law. If local bye-law provision is not available, adequate provision for storage and recharge should be followed as per CPCB guideline. Ensure proper management of storm water to optimum use and allow it to be by-passed during times of heavy rain to avoid any flooding problem inside the campus. Submit an action plan of well-designed rainwater harvesting system with storm water management;
7. That, the sewage shall be treated in Sewage Treatment Plant (STP) and after treatment; the water will be recycled for irrigation purposes, flushing of toilets, floor washing/cleaning, gardening/horticulture etc, with remainder if any, to be discharged into the public sewer system. They shall submit an action plan for use of treated sewage water in irrigation purposes and any other bulk use/in-house use;

5. That, they shall provide electromagnetic flow meter at the inlet and outlet of the STP and any pipeline to be used for re-using the treated wastewater in irrigation purposes as well as back into the system for flushing/horticulture purpose/green belt development etc. and shall maintain a record of readings of each such meter on daily basis;
6. That, adequate number of ground water monitoring stations by providing piezometers around the project area shall be set up. The ground water quality shall be monitored for parameters like pH, BOD, COD, Ammonical Nitrogen, Chloride and Total dissolved Solids. Analysis report shall be submitted to the Board on monthly basis;
7. That, they shall comply with the applicable provisions/directions of the State Govt./BSPCB including the directions that no person shall manufacture, import, store, sell or use any kind of plastic carry bags;
8. That, no further expansion or modernization in the STP shall be carried out without prior approval of the Board. In case of any deviation or alteration in the project, a fresh reference shall be made to this Board for the adequacy of conditions imposed, if any;
9. That, in compliance of direction of the Hon'ble Supreme Court and vide Board's HQ ref. no.-2638, dated 09.07.2019, they shall make provisions for display of data outside main unit gate about quantity and quality of water discharge and air emission along with solid waste generated within the unit premises;
10. That, not withstanding any thing stated above, the applicant unit shall abide by all the provisions of the environmental laws including policies and guidelines made there under; and
11. This NOC is subject to the condition that the information/paper's submitted by the proponent is found to be false or misleading at any stage, the NOC shall be revoked at proponent's risk and cost.
- 12.

NOTE:-

1. Bihar State Pollution Control Board reserves the option to revise or add other conditions, if necessary, for protection of Environment in general and for Pollution Control in particular;
2. The present NOC should not be construed as an assurance for the grant of 'Consent-to-Operate' the proposed STP but shall be subject to compliance of all the conditions indicated above; and
3. The NOC, granted, shall be valid for a period of one year from the date of issue.

Sd/-
(S. Chandrasekar)
Member Secretary

Memo No.:-

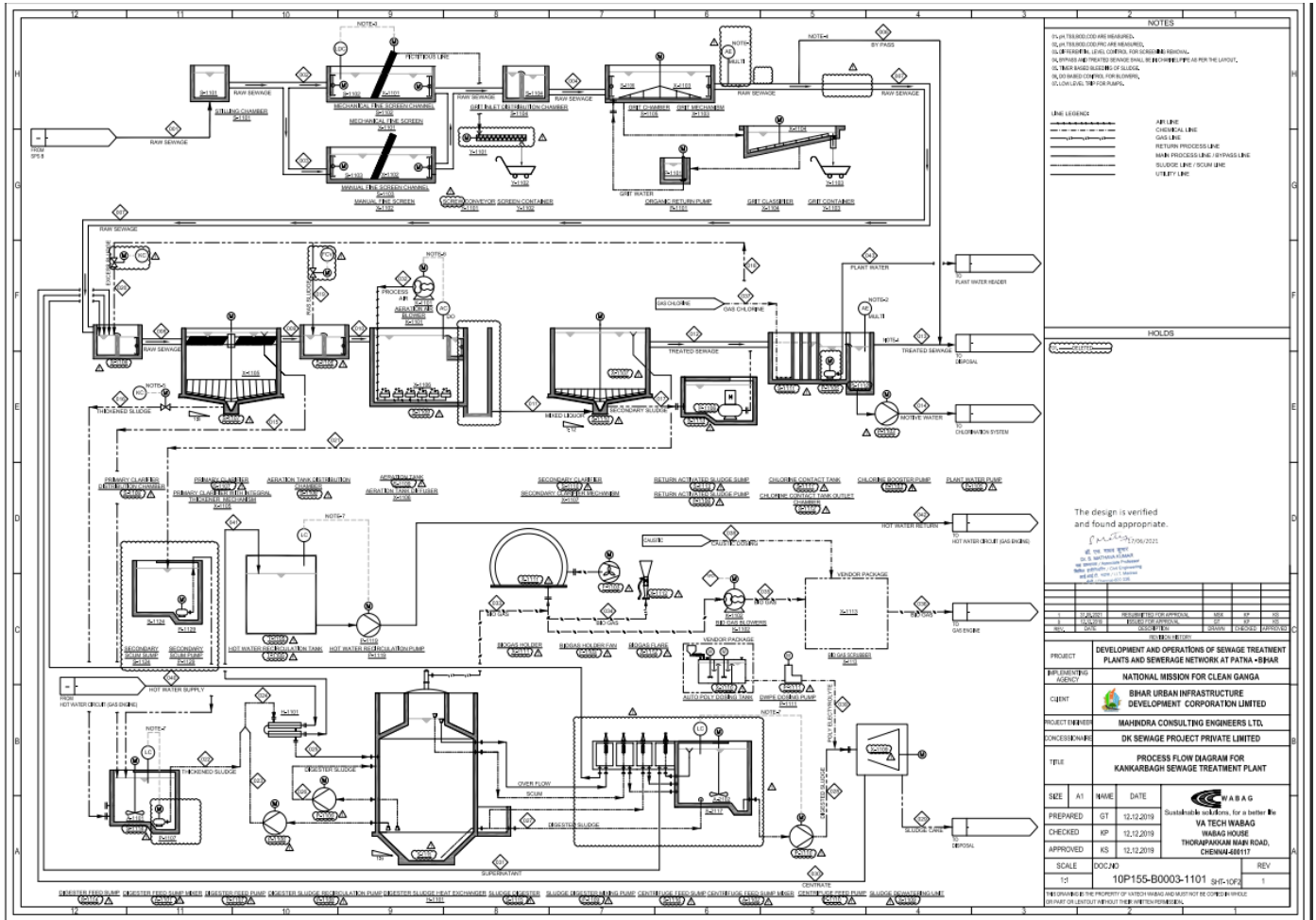
3169.

Copy forwarded to: BUIDCO, DK Sewage Project Pvt. Ltd., Pahari, Patna Sadar, Patna for favour of information and necessary action.

Patna, Dated:- 12.10.22


(S. Chandrasekar)
Member Secretary
31

Annexure: 2-Process Flow Diagram and Process Design Calculation



NOTES

PLUM SYMBOLS ARE MARKED. ALL DIMENSIONS ARE IN METERS. ALL LEVELS ARE IN Meters Above Mean Sea Level (M.A.M.S.L.). ALL DIMENSIONS ARE IN METERS. ALL LEVELS ARE IN Meters Above Mean Sea Level (M.A.M.S.L.). ALL DIMENSIONS ARE IN METERS. ALL LEVELS ARE IN Meters Above Mean Sea Level (M.A.M.S.L.).

LINE LEGEND

- AIR LINE
- CHEMICAL LINE
- GAS LINE
- RETURN PROCESS LINE
- RAW PROCESS LINE (RAW LINE)
- SLUDGE LINE (FROM LINE)
- UTILITY LINE

The design is verified and found appropriate.

DATE: 12/12/2019

PROJECT: DEVELOPMENT AND OPERATIONS OF SEWAGE TREATMENT PLANTS AND SEWERAGE NETWORK AT PATNA - BHAR

CLIENT: BHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

PROJECT ENGINEER: MAHINDRA CONSULTING ENGINEERS LTD.

CONTRACTOR: DK SEWAGE PROJECT PRIVATE LIMITED

TITLE: PROCESS FLOW DIAGRAM FOR KANKARBAGH SEWAGE TREATMENT PLANT

DATE	BY	FOR	REVISION
12/12/2019	MAHINDRA CONSULTING ENGINEERS LTD.	DK SEWAGE PROJECT PRIVATE LIMITED	1


STREAM NUMBER	UNITS	1	2	3	4	5	6	7	8	9	10	11	12	13
DESCRIPTION		RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE
STREAM		10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
AVERAGE		10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
PEAK		15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
OPERATING PRESSURE	MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
DESIGN PRESSURE	MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
OPERATING TEMPERATURE	°C	25	25	25	25	25	25	25	25	25	25	25	25	25
DENSITY	kg/m³	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
SLUDGE CONCENTRATION	%	-	-	-	-	-	-	-	-	-	-	-	-	-
RF		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

STREAM NUMBER	UNITS	14	15	16	17	18	19	20	21	22	23	24	25	26
DESCRIPTION		RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE
STREAM		10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
AVERAGE		10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
PEAK		15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
OPERATING PRESSURE	MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
DESIGN PRESSURE	MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
OPERATING TEMPERATURE	°C	25	25	25	25	25	25	25	25	25	25	25	25	25
DENSITY	kg/m³	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
SLUDGE CONCENTRATION	%	-	-	-	-	-	-	-	-	-	-	-	-	-
RF		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

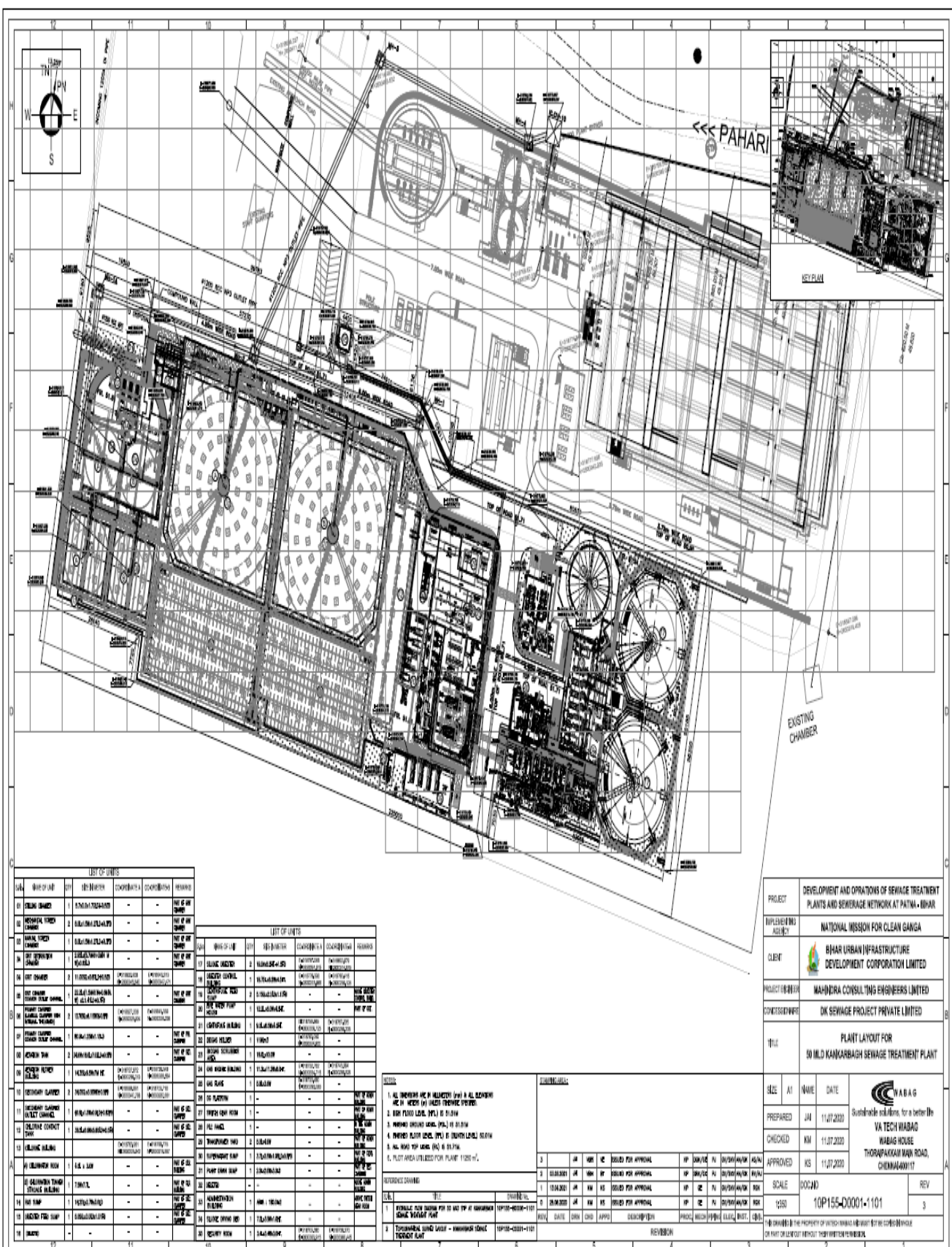
STREAM NUMBER	UNITS	27	28	29	30	31	32	33	34	35
DESCRIPTION		RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE	RAW SEWAGE
STREAM		10000	10000	10000	10000	10000	10000	10000	10000	10000
AVERAGE		10000	10000	10000	10000	10000	10000	10000	10000	10000
PEAK		15000	15000	15000	15000	15000	15000	15000	15000	15000
OPERATING PRESSURE	MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
DESIGN PRESSURE	MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
OPERATING TEMPERATURE	°C	25	25	25	25	25	25	25	25	25
DENSITY	kg/m³	1000	1000	1000	1000	1000	1000	1000	1000	1000
SLUDGE CONCENTRATION	%	-	-	-	-	-	-	-	-	-
RF		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

STREAM NUMBER	UNITS	37	38	39
DESCRIPTION		RAW SEWAGE	RAW SEWAGE	RAW SEWAGE
STREAM		10000	10000	10000
AVERAGE		10000	10000	10000
PEAK		15000	15000	15000
OPERATING PRESSURE	MPa	0.1	0.1	0.1
DESIGN PRESSURE	MPa	0.1	0.1	0.1
OPERATING TEMPERATURE	°C	25	25	25
DENSITY	kg/m³	1000	1000	1000
SLUDGE CONCENTRATION	%	-	-	-
RF		0.000	0.000	0.000

Process Design Calculation

BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED		sustainable solutions. for a better life. 					REVISION
		PROCESS DESIGN CALCULATION KANKARBAGH SEWAGE TREATMENT PLANT					
DEVELOPMENT AND OPERATIONS OF SEWAGE TREATMENT PLANTS AND SEWERAGE NETWORK AT PATNA - BIHAR		Location	Project No	Doc. Code	Serial No	Rev	Page No
		KANKARBAGH	10P155	B0001	1101	2	9 / 56
1							
2							
3	5.3 TREATED SEWAGE PARAMETERS						
4	Reference: Schedule 10 : KPI						
5	pH		=	6.5 - 9.0			
6	TOTAL SUSPENDED SOLIDS, TSS		<	50	mg/L		1
7	BIOLOGICAL OXYGEN DEMAND, BOD		<	20	mg/L		1
8	FECAL COLIFORMS		<	1000	MPN/100 mL		1
9	COD (EXPECTED)	NOTE-1	<=	100	mg/L		1
10	RESIDUAL CHLORINE (MAXIMUM)	NOTE-1	>=	1	mg/L		1
11							
12	5.4 DEWATERED SLUDGE CHARACTERISTICS						
13	Reference: Schedule 10 : KPI						
14							
15	SLUDGE CONSISTENCY		>=	20%			
16	FECAL COLIFORMS		<=	2000000	MPN/g		
17							
18	5.5 SITE INFORMATION						
19	AMBIENT TEMPERATURE	NOTE-2	MIN	=	15	deg C	1
20		NOTE-2	MAX	=	45	deg C	1
21		NOTE-2	AVE	=	25	deg C	1
22	RELATIVE HUMIDITY	NOTE-2	MIN	=	58	%	1
23		NOTE-2	MAX	=	85	%	1
24							
25	NATURAL GROUND LEVEL (NGL) AT SITE	NOTE 2	=	49.51	m		1
26	HIGH FLOOD LEVEL (HFL) AT SITE	NOTE 3	=	51.51	m		1
27	FINISHED GROUND LEVEL (FGL) AT SITE	NOTE 2	=	51.51	m		2
28	DETERMINATION OF ATMOSPHERIC PRESSURE						
29							
30	$P_{atm,H} = P_{atm,0} \times \exp\left(\frac{-gM(H-0)}{RT}\right)$						
31							
32							
33	WHERE						
34	$P_{atm,0}$	=	ATMOSPHERIC PRESSURE AT ZERO ALTITUDE	=	101325	N/m ²	
35	g	=	ACCELERATION DUE TO GRAVITY	=	9.81	m/s ²	
36	M	=	MOLAR MASS OF AIR	=	28.97	kg/kg mole	
37	H	=	SITE ELEVATION	=	51.51	m	
38	R	=	UNIVERSAL GAS CONSTANT	=	8314.00	N.m/kgmole K	
39	T	=	SITE TEMPERATURE				
40							
41	ATMOSPHERIC PRESSURE PREVAILING AT SITE			=	100707.8	N/m ²	
42	(AT MINIMUM TEMPERATURE)						
43							
44	ATMOSPHERIC PRESSURE PREVAILING AT SITE			=	100728.4	N/m ²	
45	(AT AVERAGE TEMPERATURE)						
46							
47	ATMOSPHERIC PRESSURE PREVAILING AT SITE			=	100755.8	N/m ²	
48	(AT MAXIMUM TEMPERATURE)						
49							
50							
51	NOTES:						
52	1 THE VALUES SHOWN ARE THEORETICAL AND ARE NOT FOR GUARANTEE PURPOSE						
53	2 AS PER THE CLIMATE DATA OF SCHEDULE 17 OF SECTION 4A						
54	3 AS PER HFL BASED ON PAHARI STP						
55							

Annexure:3 - Plant Layout for Kankarbagh



LIST OF UNITS				
NO.	NAME OF UNIT	QTY	CONSTRUCTION	REMARKS
01	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
02	RAW WATER TANK	2	CONCRETE	NOT IN SCHEMATIC
03	RAW WATER TANK	3	CONCRETE	NOT IN SCHEMATIC
04	RAW WATER TANK	4	CONCRETE	NOT IN SCHEMATIC
05	RAW WATER TANK	5	CONCRETE	NOT IN SCHEMATIC
06	RAW WATER TANK	6	CONCRETE	NOT IN SCHEMATIC
07	RAW WATER TANK	7	CONCRETE	NOT IN SCHEMATIC
08	RAW WATER TANK	8	CONCRETE	NOT IN SCHEMATIC
09	RAW WATER TANK	9	CONCRETE	NOT IN SCHEMATIC
10	RAW WATER TANK	10	CONCRETE	NOT IN SCHEMATIC
11	RAW WATER TANK	11	CONCRETE	NOT IN SCHEMATIC
12	RAW WATER TANK	12	CONCRETE	NOT IN SCHEMATIC
13	RAW WATER TANK	13	CONCRETE	NOT IN SCHEMATIC
14	RAW WATER TANK	14	CONCRETE	NOT IN SCHEMATIC
15	RAW WATER TANK	15	CONCRETE	NOT IN SCHEMATIC
16	RAW WATER TANK	16	CONCRETE	NOT IN SCHEMATIC
17	RAW WATER TANK	17	CONCRETE	NOT IN SCHEMATIC
18	RAW WATER TANK	18	CONCRETE	NOT IN SCHEMATIC
19	RAW WATER TANK	19	CONCRETE	NOT IN SCHEMATIC
20	RAW WATER TANK	20	CONCRETE	NOT IN SCHEMATIC
21	RAW WATER TANK	21	CONCRETE	NOT IN SCHEMATIC
22	RAW WATER TANK	22	CONCRETE	NOT IN SCHEMATIC
23	RAW WATER TANK	23	CONCRETE	NOT IN SCHEMATIC
24	RAW WATER TANK	24	CONCRETE	NOT IN SCHEMATIC
25	RAW WATER TANK	25	CONCRETE	NOT IN SCHEMATIC
26	RAW WATER TANK	26	CONCRETE	NOT IN SCHEMATIC
27	RAW WATER TANK	27	CONCRETE	NOT IN SCHEMATIC
28	RAW WATER TANK	28	CONCRETE	NOT IN SCHEMATIC
29	RAW WATER TANK	29	CONCRETE	NOT IN SCHEMATIC
30	RAW WATER TANK	30	CONCRETE	NOT IN SCHEMATIC
31	RAW WATER TANK	31	CONCRETE	NOT IN SCHEMATIC
32	RAW WATER TANK	32	CONCRETE	NOT IN SCHEMATIC
33	RAW WATER TANK	33	CONCRETE	NOT IN SCHEMATIC
34	RAW WATER TANK	34	CONCRETE	NOT IN SCHEMATIC
35	RAW WATER TANK	35	CONCRETE	NOT IN SCHEMATIC
36	RAW WATER TANK	36	CONCRETE	NOT IN SCHEMATIC
37	RAW WATER TANK	37	CONCRETE	NOT IN SCHEMATIC
38	RAW WATER TANK	38	CONCRETE	NOT IN SCHEMATIC
39	RAW WATER TANK	39	CONCRETE	NOT IN SCHEMATIC
40	RAW WATER TANK	40	CONCRETE	NOT IN SCHEMATIC
41	RAW WATER TANK	41	CONCRETE	NOT IN SCHEMATIC
42	RAW WATER TANK	42	CONCRETE	NOT IN SCHEMATIC
43	RAW WATER TANK	43	CONCRETE	NOT IN SCHEMATIC
44	RAW WATER TANK	44	CONCRETE	NOT IN SCHEMATIC
45	RAW WATER TANK	45	CONCRETE	NOT IN SCHEMATIC
46	RAW WATER TANK	46	CONCRETE	NOT IN SCHEMATIC
47	RAW WATER TANK	47	CONCRETE	NOT IN SCHEMATIC
48	RAW WATER TANK	48	CONCRETE	NOT IN SCHEMATIC
49	RAW WATER TANK	49	CONCRETE	NOT IN SCHEMATIC
50	RAW WATER TANK	50	CONCRETE	NOT IN SCHEMATIC

LIST OF UNITS				
NO.	NAME OF UNIT	QTY	CONSTRUCTION	REMARKS
17	RAW WATER TANK	2	CONCRETE	NOT IN SCHEMATIC
18	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
19	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
20	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
21	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
22	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
23	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
24	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
25	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
26	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
27	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
28	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
29	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
30	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
31	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
32	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
33	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
34	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
35	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
36	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
37	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
38	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
39	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
40	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
41	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
42	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
43	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
44	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
45	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
46	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
47	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
48	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
49	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC
50	RAW WATER TANK	1	CONCRETE	NOT IN SCHEMATIC

NOTES:

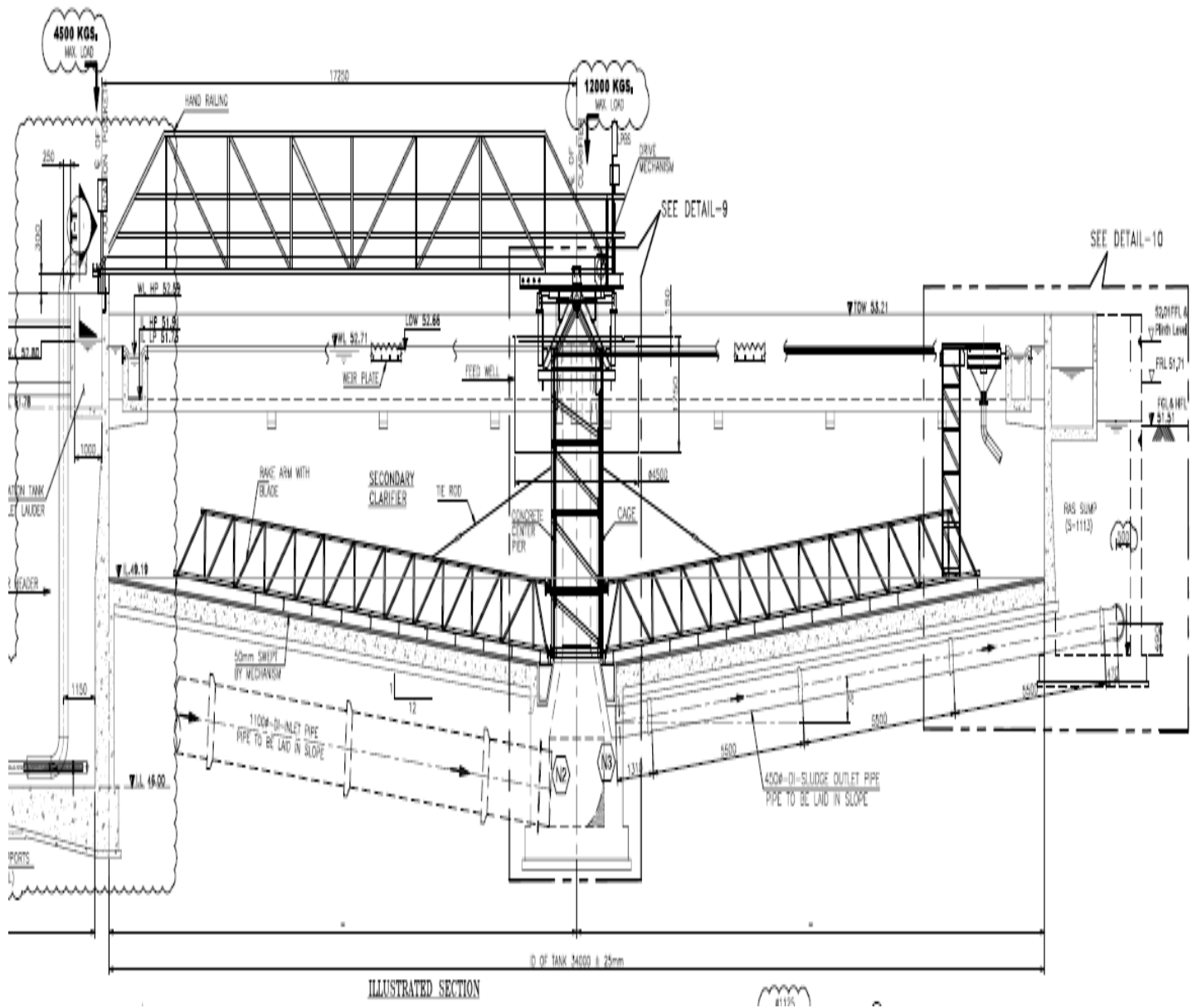
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. ALL FLOOR LEVELS (F.F.L.) IS 0.00 M.
3. FINISHED FLOOR LEVEL (F.F.L.) IS 0.15 M.
4. FINISHED FLOOR LEVEL (F.F.L.) IS 0.15 M.
5. ALL ROAD TOP LEVEL (R.T.L.) IS 0.15 M.
6. PLOT AREA UTILIZED FOR PLANT: 1.00 M².

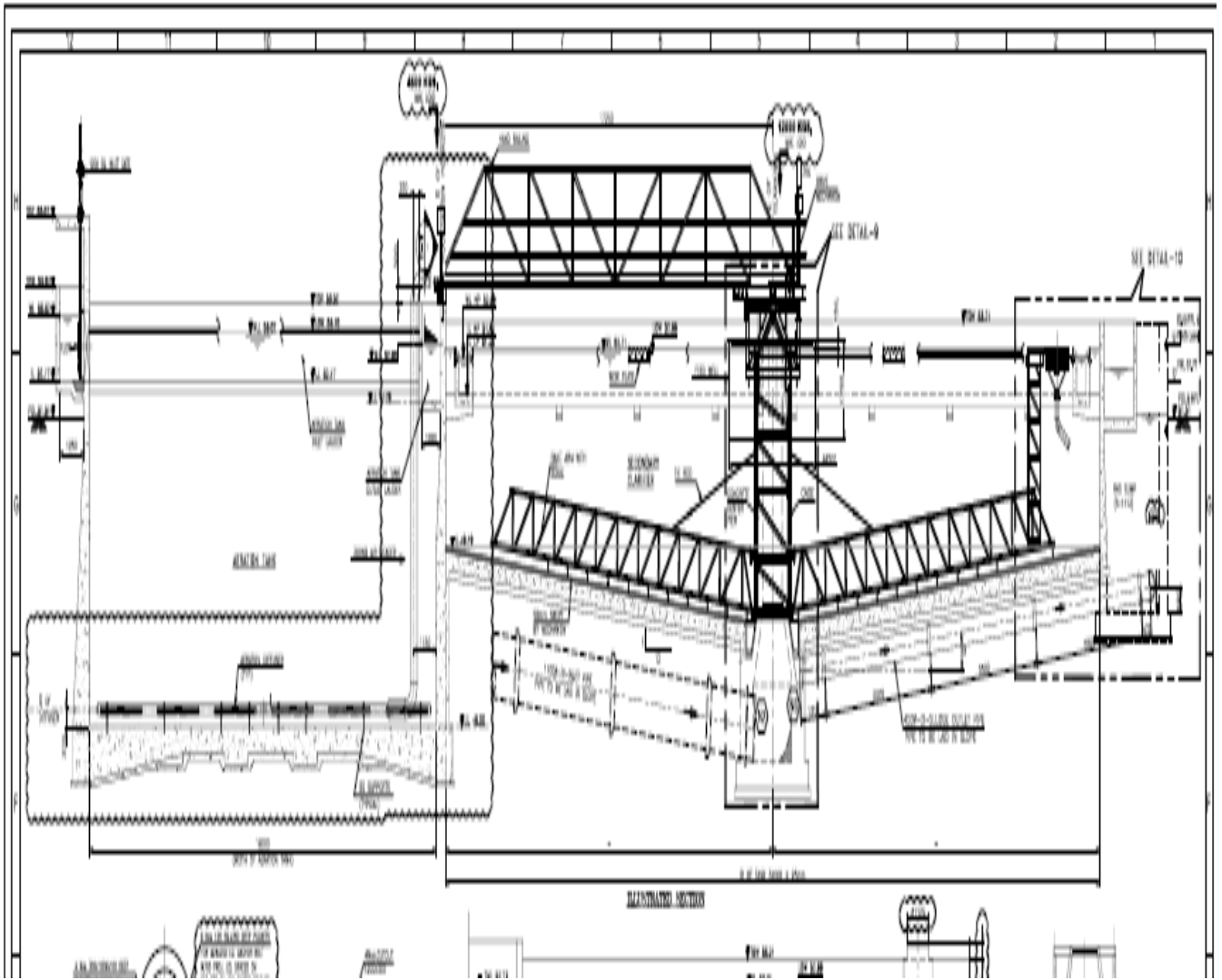
REFERENCES DRAWING:

NO.	DATE	BY	CHKD	APPD	DESCRIPTION	PROJECT	SCALE	REV
1	10/10/2020	JA	NM	KS	ISSUED FOR APPROVAL	10P155-0001-1101	1:250	3
2	10/10/2020	JA	NM	KS	ISSUED FOR APPROVAL	10P155-0001-1101	1:250	3
3	10/10/2020	JA	NM	KS	ISSUED FOR APPROVAL	10P155-0001-1101	1:250	3

PROJECT	DEVELOPMENT AND OPERATIONS OF SEWAGE TREATMENT PLANTS AND SEWERAGE NETWORK AT PATNA - BIHAR
IMPLEMENTING AGENCY	NATIONAL MISSION FOR CLEAN GANGA
CLIENT	BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED
PROJECT INCHARGE	MAHINDRA CONSULTING ENGINEERS LIMITED
CONTRACTOR	DK SEWERAGE PROJECT PRIVATE LIMITED
TITLE	PLANT LAYOUT FOR 50 MLD KANKARBAGH SEWAGE TREATMENT PLANT
SCALE	1:250
DATE	11.07.2020
PREPARED BY	JA
CHECKED BY	NM
APPROVED BY	KS
SCALE	1:250
PROJECT NO.	10P155-0001-1101
REV	3

Annexure:4- Section drawings for Kankarbagh STP





Annexure: 5- TIE up Hospital



UDAYAN HOSPITAL

(NABH ACCREDITED)

An ISO 9001-2015 Certified

(A Multi Speciality Hospital & Trauma Centre)

(A unit of Indira Gopal Institute of Medical Services Pvt. Ltd.)

West Boring Canal Road, Near Rajapur Pul, Patna-800 001

Ph.: 0612-2557550, 2557551



To

Date :- 28/06/2022

Site Project Manager,

VA TECH WABAG LIMITED

Digha Sewerage Work , Patna , City Bihar

Subject :- you're Request for Tie-up with our Hospital Udayan Hospital (A Unit of I.G.I.M.S. Pvt. Ltd.) for Normal & Emergency cases for only one year.

Dear sir,

Greetings


We are happy to provide your our consent for Tie-up with us, as per above mentioned subject.in.ref. with your request letter No. Ref.WABAG/10P55N/061/22-23 date 28/06/2022. We accept your proposal for the same.

Final confirmation through our end depends on your approval/confirmation against our hospital tariff with all other cost & rate of rooms, investigations , procedures, etc., and that will be intimated to you shortly.

Thanking You



Annexure-6: Debris Disposal land


पटना नगर निगम
 कार्यालय-कार्यपालक अभियंता,
 कंकड़बाग प्रमण्डल
 पत्र संख्या-2350

प्रेषक, कार्यपालक अभियंता,
 कंकड़बाग प्रमण्डल,
 पटना नगर निगम, पटना।

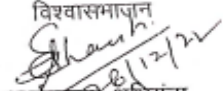
सेवा में, कार्यपालक अभियंता
 दीघा एवं कंकड़बाग सीवरेज परियोजना,
 बुङको।


विषय:- पटना, दिनांक-26/12/2022
 दीघा-कंकड़बाग सीवरेज परियोजना अन्तर्गत किये जा रहे कार्यों के दौरान
 निकले Debris के लिये स्थल/खाली जगह उपलब्ध कराने के संबंध में।

प्रसंग:- आपका पत्रांक-347, दिनांक-13.12.2022

महाशय,

उपर्युक्त प्रसागिक विषय के संबंध में सूचित करना है कि कंकड़बाग
 क्षेत्रान्तर्गत ट्रांसपोर्ट नगर में कुड़ा प्वाइंट के बगल में खाली स्थान पर Debaris को
 Dump किया जा सकता है।
 सूधनार्थ एवं आवश्यक कारवाई हेतु समर्पित।

विश्वासमान

 कार्यपालक अभियंता,
 कंकड़बाग प्रमण्डल,
 पटना नगर निगम।

AR

 03.01.23

Annexure-7: DO for Kankarbagh STP to follow treated effluent standard as per NGT norms

जी अशोक कुमार, भा.प्र.से.
महानिदेशक
राष्ट्रीय स्वच्छ गंगा मिशन
G Asok Kumar, IAS
DIRECTOR GENERAL
NATIONAL MISSION FOR CLEAN GANGA



भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन,
नदी विकास और गंगा संरक्षण विभाग
GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION

D.O. No. T-13/2016-17/763/NMCG-Digha and Kankarbagh

Dated 30th March 2022

Dear Anand,

This has reference to regular review meeting being taken up for the Namami Gange projects in Bihar by Secretary, Ministry of Jalshakti, Chief Secretary (Bihar) as well as by me meant towards faster completion of these projects. It is evident that many bottlenecks incl. requisite permission from RCD, Railways and NHAI, IOCL have now been resolved. However, removal of bottlenecks didn't led to expected improvement in pace of progress. The Minutes of last review meeting taken up by me on 07.03.2022 and Secretary, DoWR,RD&GR, MoJs on 10.03.2022 are enclosed for ready reference.

We are also in-receipt of a letter from SPMG dated 24.03.2022 seeking specific clarification regarding the effluent norms to be followed for the Digha and Kankarbagh STP project in light of the CTE issued by BSPCB on 17.02.2022 and subsequent clarification provided by them on 08.03.2022.

In this regard, I wish to inform you that already several DO letters were sent on 8th November 2021 by DG, NMCG followed by DO letter sent by Secretary MoJS on 6th and 24th January 2022 (copies enclosed) bringing out the stand of NMCG in the matter. Accordingly, the issue related to locating the STP within 500m from the river line has been resolved after joint effort of WRD and UD&HD and revised CTE has been provided by BSPCB on 17.02.2022.

As far as discharge norms/standards are concerned a window of 2-year has been allowed by BSPCB to comply with the NGT effluent standards after the project actually starts its operation. The Consent to Establish (CTE) now provided by BSPCB has to be utilized to immediately to start the project construction with the effluent norms stipulated in the contract to avoid further contractual complications as well as delays. After commissioning, if the STPs in Digha and Kankarbagh fails to meet the MoEF&CC/NGT standard then only necessary design modification to be carried out to comply with the NGT standards within a period of 2 years during the O&M phase. Accordingly, necessary declaration for the effective date for the HAM STP may be initiated by SPMG/BUIDCo and the the process should be completed latest by 10th April 2022.

We look forward for your kind cooperation and solicit faster action to implement the one of the largest sewerage infrastructure project in the eastern region.

with best wishes,

Yours sincerely,

(G. Asok Kumar)

Shri Anand Kishore, IAS
Principal Secretary
UD&HD, Government of Bihar,
Room No. 101, 1st Floor, Vikash Bhawan,
New Secretariat, Bailey Road
Patna-800014.



राष्ट्रीय स्वच्छ गंगा मिशन
प्रथम तल, मेजर ध्यान चंद नेशनल स्टेडियम, इन्डिया गेट, नई दिल्ली-110002
NATIONAL MISSION FOR CLEAN GANGA
1st Floor, Major Dhyan Chand National Stadium, India Gate, New Delhi - 110002
Ph : 011-23049528 Fax : 23049566 E-mail : dg@nmcg.nic.in



Prof. Ashok Kumar Ghosh
Ph.D. Erasmus Mundus Fellow
Chairman



Bihar State Pollution Control Board

D.O. No. *Shree G Ashok Kumar To, 516* Patna, dated- *08-03-22*


Dear

This has reference to your D.O. No. T-13/2016-17/763/NMCG-Digha and Kankarbagh, dated-04.03.2022, in view of the facts that the MoEF&CC, Govt. of India is yet to notify the discharge standards as ordered by the Hon'ble National Green Tribunal, Principal Bench, New Delhi in the matter of O.A. No. 1069/2018 on 30.04.2019 and as the discharge standards notified by the MoEF&CC, Govt. of India in the year 2017 has also been stayed by the Hon'ble NGT in the O.A. No. under reference, the construction of the said STP at Digha may be taken up to avoid discharge of untreated sewage into the river Ganga, subject to condition that after completion of the construction the standards as ordered by the Hon'ble NGT would be met. If, the STP would not be meeting the standards, necessary modification will have to be done within two years of commissioning of the said Digha STP.

It is also relevant to mention here that the discharge standards as ordered by the Hon'ble NGT is applicable to all the new and existing/ under construction STPs. In such a situation when the quality of discharged water does not meet the prescribed standards, then the discharged water should be utilized for other purposes as directed by the CPCB, than discharging into river Ganga for which necessary plans and infrastructure shall be developed well in advance to ensure compliance of the orders of the Hon'ble NGT under reference. In no case, violation of the provisions of the Water (Prevention and Control of Pollution) Act, 1974 and the Hon'ble NGT's order be allowed after commissioning of the Digha STP Project. Further, it is also requested to design and construct STPs at other sites in the State of Bihar accordingly well in advance so as to ensure compliance of the prescribed discharge standards.

With regards,

To,
Shri G Asok Kumar, IAS,
Director General
National Mission for Clean Ganga
1st Floor, Major Dhyan Chand National Stadium,
India Gate, New Delhi-110002.
e-mail: dg@nmcg.nic.in

Yours sincerely,

(Ashok Kumar Ghosh)
Chairman.

Parivesh Bhawan, Patliputra Industrial Area, Patna - 800 010
Phone No. : +91 612 2261776. (Direct) EPABX - 2261250 / 2262265. Fax: +91 612 2261050
E-mail: info@bspcb.bih.nic.in Website: <http://bspcb.bih.nic.in>

Annexure-8: Land NOC

Annexure: –NOC

Self-Declaration on Land Ownership

This is to certify that all the Parcel of Land for construction of the facilities for the 103 MLD Sewerage Pumping Station 'B' at Digha Zone under the Namami Gange Project, [DEVELOPMENT AND OPERATIONS OF SEWAGE TREATMENT PLANTS AND SEWERAGE NETWORK AND ASSOCIATED INFRASTRUCTURE AT DIGHA & KANKARBAGH ZONE OF PATNA, BIHAR including 15 years O&M based on Hybrid Annuity Based PPP mode as per Letter of Award Ref: BUIDCo/YO-911/18-3386 dated 19th July 2019] described in greater detail in the below table are under the ownership and possession of BUIDCO (Bihar Urban Infrastructure Development Corporation). We further confirm that :

- (i) All compliances under the National and State laws related to acquisition if any of the subject land including resettlement activities if any were duly completed.
- (ii) There are no encumbrance or outstanding issues, dispute, grievance or court case(s) in relation to the subject land.
- (iii) During execution of the project, if it is found necessary to provide any additional land and / or ROW and / or hindrance free access to site, BUIDCO will undertake to expeditiously comply with such requirements and deal with any compensation or re-settlement issues as applicable under national and state laws or any other standard applicable as per Concession Agreement.

SPS 'B' Locations	Land Details	Ownership
Digha	<u>Co-ordinates</u> N - 2836611.205 E - 308946.200 N - 2836612.108 E - 308965.908	Bihar Urban Infrastructure Development Corporation

*Sub
12/10/2021*

Annexure – 9: Zonal Map of Kankarbagh

