Contractor's Environmental and Social Assessment Report

Sewerage Treatment Plant at Digha, Bihar

Jayachitra S 1/23/23 C-ESIA & MP

WABAG

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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

-

CONCESSIONAIRE

DK SEWAGE PROJECT PRIVATE LIMITED

DOCUMENT TITLE

Environmental and Social Assessment report -Digha

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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
ARAP	Abbreviated Resettlement Action Plan
NTH	Non-Title Holders
PAP	Project Affected Person
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
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 Digha 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 sewerage system in Patna was established way back in 1936. Earlier the city had four sewage treatment plants located at Saidpur (45 MLD), Beur (35 MLD), Pahari (25 MLD) and KarmaliChak (4 MLD). The quantum of sewage reaching the plants was lower than installed capacity because of poor sewage network coverage. Inhabitants living in area without sewer network had to rely on either decentralized collection system in form of inhouse septic tanks or on unhygienic open defecation practice which was ultimately finding way to river Ganga. So, there was an urgent need of new & modern sewerage infrastructure in Patna.

'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 implementing 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

The land identified for the construction of Digha STP belongs to Patna Municipal Corporation (State Government). Land NOC is already in place, which was obtained by Bihar Urban Infrastructure Development Corporation Ltd (BUIDCo) on 30/11/2020. Land parcel of 5.26 ha has been handed over to concessionaire for developing the Sewage Treatment Plant (STP) and its associated structures.
During the reconnaissance survey it was observed that the land parcels allocated for the STP was being used for agricultural activities that included growing of seasonal vegetables. Although these activities were temporary in nature, it is understood that commencement of the project activities could potentially result in loss of livelihood.

The assessment of impact on livelihoods of families/ persons undertaking seasonal cultivation on the government land allocated for the STP was conducted and a detailed report of (Abbreviated Resettlement Action Plan) ARAP is prepared to compensate the affected families. There are *13 PAPs (Project Affected Persons) identified; details are given in ARAP Report. Summary of ARAP is discussed in section-6.6.11 (ESIA) and 7.3.2 (ESMP).

3. Project Description

The proposed STP for the Digha zone will be set up in Patna Sadar sub-district located in Patna District in the State of Bihar and located near the banks of River Ganga. The STP will be constructed and expanded in various phases. The land area estimated for the proposed STP & its supporting structure by the year 2035 (100 MLD)is 5.26 hectares. The plot in addition to the STP will have other supporting infrastructure such as security building, administration building, in built walkway, fire water pump house etc. According to the design, an additional area of 0.88 Ha will be acquired by2050 to expand the project to 116 MLD capacity. The details of the land requirement for present as well as for the future expansion are shown below:

Year	Capacity of STP (MLD)	Land Required (Ha.)
2035	100	5.26
2050	116	6.14 (5.26+0.88)

The sewage treatment is based on a biological treatment process (Activated Sewerage Process-ASP). 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 Disposal- Disposal to Kurji Nallah which in turn connect to river ganga
5.	**Sludge Handling**	• Digester Feed Sump
		• Anaerobic Sludge Digester

		• Digested Sludge Sump
		• Centrifuge
		• Polymer Dosing System
		• Supernatant Sump and Pumps
6.	**Biogas Handling and PowerGeneration**	• Gas Holder
		• Biogas Scrubber
		• Biogas Flare
		• Biogas Engine-1060KVA 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.

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, social, 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

Social Regulations

1. Bihar Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement rules 2014 (BLARR Rules 2016)
2. Bihar Raiyati Land Lease Policy (2014)

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.
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)

5. Project Categorization

The Environmental & 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's 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. Although a RAP is to be prepared due to thecultivation on the government land allocated for the STP as commencement of the project will result into loss of livelihood.
- There are no Indigenous People in project influence area.
- There are no Protected Areas (Wildlife Sanctuaries and National Parks) in project influence area.
- STP location is situated approx. 500m from river bank **(Refer Annex-12.*An Office Memorandum regarding "Guidelines for siting industries which are in close proximity with the river" is issued by MOEF&CC, Impact Assessment Division via F. No. 22-39/2020-IA.III dated-14th Feb,2022 where it is clearly mentioned that the activities undertaken under Namami Gange Programmme like construction/development/renovation of STPs for pollution abatement of river Ganga and its tributaries are not prohibited in flood plain of riverine system)*.**
- **STP with associated structures will be constructed at the Finished Ground Level of 52.82m which is above the HFL of Ganga (52.52m).**
- **Slope protection will also be provided to STP and associated structures to avoid the risk of bank erosion and any potential damage to the plant and is the part of contract. Slope protection design and drawing has been prepared in consultation with IIT Chennai and is attached in Annexure-10.**
- **Further BUIDCo is also in discussion with Water Resource Department (WRD) for flood protection of this area.**

The Environment & Social assessment indicates that the Digha zone is not located near any eco-sensitive area and does not involve any compulsory acquisition of land or displacement of any indigenous people. Based on the project activities and its location, the project is not expected to result in any irreversible or unprecedented impacts. Thus, the project is categorized under **''Moderate Risk"**.

6. Baseline Analysis

A three (3) km radius from the center 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) 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.

b) Land for setting up the STP belongs to Patna Municipal Corporation. However, there were few encroachers or squatters identified on the allotted land.

c) 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.

d) Sewage treated in the STP shall be discharged as per statutory limits.

e) 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 south-north direction with higher wind speeds (0.3 – 10.8 m/s) are experienced from the south-north and south west to north-east direction of the study area.

Physical Resources

The 24-hour average concentration of NOx and SO_2 on two consecutive days of monitoring in the study area were observed to be well within NAAQS standard and WHO guideline values. The $PM_{2.5}$ and PM_{10} levels exceeded the limits provided by the WHO guidelines and NAAQS standard values at both 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 site boundary and project influence area (study area of buffer 3 km) lie in Patna and Saran Districts. The study area can be determined in two parts (south-west and north-east) as per the physiographic feature and land use. The south-west part of study area is characterized with high dense built fabric while the north-east part of study area is a vast Ganga flood plain. The topography is flat flood plains as the study area is part of Indo-Gangetic flood plains. The predominant slope is observed from south to north and south-east to north-west. 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.

The project location is in the flood plain area of the river Ganga (***An Office Memorandum regarding "Guidelines for siting industries which are in close proximity with the river" is issued by MOEF&CC, Impact Assessment Division via F. No. 22-39/2020-IA.III dated-14th Feb,2022 where it is clearly mentioned that the activities undertaken under Namami Gange Programmme like construction/development/renovation of STPs for pollution abatement of river Ganga and its tributaries are not prohibited in flood plain of riverine system)***.Refer annexure-12.

The study area lies in 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 lie under "critical" zone while Dinapur and Sonepur of Patna district and Saran district respectively lie under "safe" zone for ground water development. The project area falls under the critical zone. The ground water monitoring analysis showed parameters of Total Hardness as CaCO3 (mg/L) and Iron as Fe (mg/L) are beyond acceptable limits at all locations while the parameters of Magnesium as Mg (mg/L) and Calcium as Ca (mg/L) were exceeding acceptable limits but were within permissible limits as per the BIS 10500 standards at GW1 (On-site) monitoring location.

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 Very High Damage RiskZone for cyclones. The study area is also located in an area vulnerable to floods. However, as the project site is located approx. 500 meters away from the river bank as per actual measurement done by the authority and the google image measurement attached in **Annexure-11**.

Further, in the design & drawing of STP, all possible mitigation measures have been considered for flood protection. The STP with associated structures will be constructed at the Finished Ground Level of 52.82m which is above the HFL of Ganga to avoid the risk of bank erosion and its possible consequences. Slope protection measures has been finalized in consultation with IIT Chennai and its drawing is attached in Annexure-10. In addition to the above, BUIDCo is in discussion with Water Resource Department, Bihar for provision of the river bank protection to the STP area.

Ecological Hazards

The study area does not comprise of Reserved/ Protected Forests. There are no Important Bird Areas (IBA) in the study area. However, e-Bird hotspot (15 species) was identified at St. Michael School, Gate no 83, within study area.

Economic Development

The major land cover in the study area is settlements (36%) followed by waterbodies (19%). The project area is accessible from the Danapur – Aarah road connecting to the National Highway (NH)-30. The nearest airport to the project site is Patna Airport which is located at an aerial distance of approx. 6.5 km to the south-west of the site.

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% and Saran District is 54.59%. The proportion of non-working population in Patna District (67.77%) and Saran District (73.68%) is more than that of working population (32.23%) and (26.32%) respectively. There are no places of cultural heritage or archaeological importance and Scheduled Areas in the study area.

7. Stakeholder Consultation

Stakeholder Consultations were conducted in the locations which were selected based on the proximity of settlements from the project location and the impacted community along the approach road used during construction phase of the project. Consultations with the people engaged in cultivation at project site were carried out one-to-one. The consultations were conducted in the form of Focus Group Discussions with potential affected persons and discussions along with 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 envisagedby 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.

8. Analysis of Alternatives

The proposed project involves construction of a new STP of 100 MLD capacity based on Activated Sludge Process (ASP). Patna Muncipal Corporation land has been identified for this project and the NOC has been received for the same. BUIDCo has handed over the land parcel of 5.26 ha for construction of Digha STP.

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 Digha Zone was conducted during DPR preparation phase and on the basis of availability of Govt. land in northern part of Digha zone along the river Ganga), 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 Digha 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.

9. Environment & Social 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 Impact

The Digha 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 Digha Zone is vast, 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.

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

Adverse Impact

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 Impact		
Nature of Impact/ Activity	**Impacted EHS Component**	**Impact Classification**
1. Land Use Change due to setting up of STP	Local Community	**Medium**
2. 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. Alteration of natural drainage pattern due to sitelevelling	Landform, local community	**High**
2 Potential impact of erosion and flooding due to river Ganga	Landform, local community	**High**
3. Obstruction to flows in open *Nallahs* and deteriorationof river water quality due to soil erosion and dumping of construction waste	Surface water quality, local community	**High**
4. Increase in fugitive dust emissions causing air pollutionfrom 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**
5. 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.		
6. Increase in ambient noise levels due to operation of construction equipment.	Worker health	**Medium**
7. 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**
8. Ground water pollution due to leaching of materials and waste into the soil	Ground water Local community	**Medium**

9. Exposure to physical, chemical hazards, exposure to noise, working with construction equipment, fugitive dust, emergencies at site	Construction workers	**Medium**
10. 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**
11. Soil erosion due to site clearance	community health	**Medium**
12. Resource consumption such as water, fuel, causing depletion	Local community	**Low**
13. Loss of flora due to site clearance impacting avian fauna habitat	Flora, avian fauna	**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**

Operation and Maintenance Phase Adverse Impacts		
Nature of Impact	**Impacted EHS Component**	**Impact Classification**
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**

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**

10. 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	3803745
ESMP Monitoring cost	1361000
Unidentified impacts	3000000
TOTAL	**8164745**
Eighty One Lakh Sixty Four Thousand Seven Hundred Forty Five 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 Digha 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.

Abbreviated Resettlement Action Plan

During the reconnaissance survey it was observed that the land parcels allocated for the STP was being used for agricultural activities that included growing of seasonal vegetables. Although these activities were temporary in nature, it is understood that commencement of the project activities could potentially result in loss of livelihood.

The assessment of impact on livelihoods of families/ persons undertaking seasonal cultivation on the government land allocated for the STP was conducted and a detailed report of (Abbreviated Resettlement Action Plan) RAP is prepared to compensate the livelihood loss of affected families. There are *13 PAPs (Project Affected Persons) identified; details are given in RAP Report. Summary of ARAP is discussed in section-6 (ESIA) and 7 (ESMP).

***Please refer ARAP report of Digha STP for details of socio-economic & other condition of identified PAPs. Summary of ARAP is discussed in section- 6.6.11 and Section- 7.3.2.**

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 (neighboring 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 and Environment & Social Officer from BUIDCo. A Community Liaison Officerwill 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 madeavailable through displays at the project site gate. All grievances will be reviewed and resolved by theGRC. 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 Digha 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 an 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 ofthe 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 – Digha (Zone I), Beur (Zone II), Saidpur (Zone III & IV-North), Kankarbagh (Zone IV), Pahari (Zone IV-South & V) and Karmalichak (Zone VI). Of these, Digha 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 records on 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 Punpun, 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 Digha zone is surrounded by River Ganga (north), Patna – Sone canal (west), Saidpur zone (east) and Beur zone (south). It covers a total of 34 sq.km of the total Patna Municipal Corporation (PMC) Area consisting ward 1-9 and 20-28 with a total population of 4.5 lakh as per the 2011 census.

The proposed STP (100 MLD) at Digha 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 (100 MLD) and Sewerage Network (288 km) at Digha 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) Environmental & Social Management Framework (ESMF)

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.

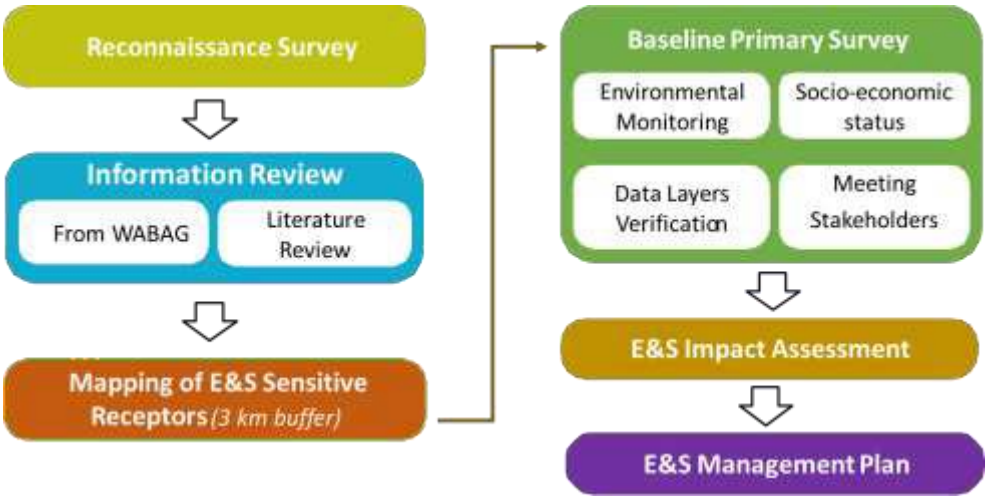


Figure 1: Approach and Methodology for ESIA

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 center 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 conducted from 9 to 14 October 2020 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 (O&M) 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 Operational Policy 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 Brief Study of Allocated Land

The land allocated for the construction of Digha STP belongs to Patna Municipal Corporation (State Government) and the NOC for same is obtained by Bihar Urban Infrastructure Development Corporation Ltd (BUIDCo) on 30/11/2020. The land parcel of 5.26 ha is handed over to concessionaire for developing the Sewage Treatment Plant (STP) and its associated structures.
During the reconnaissance survey it was observed that the land parcels allocated for the STP was being used for agricultural activities that included growing of seasonal vegetables. Although these activities were temporary in nature, it is understood that commencement of the project activities could potentially result in loss of livelihood.

1.5 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.

2 Project Description

2.1 Project Location

The STP for the Digha zone is proposed to be set up in Patna Sadar sub-district located in Patna District in the State of Bihar. Please refer **Annex 1** for the zonal map of Digha and **Figure 2** for the administrative boundaries and project location.

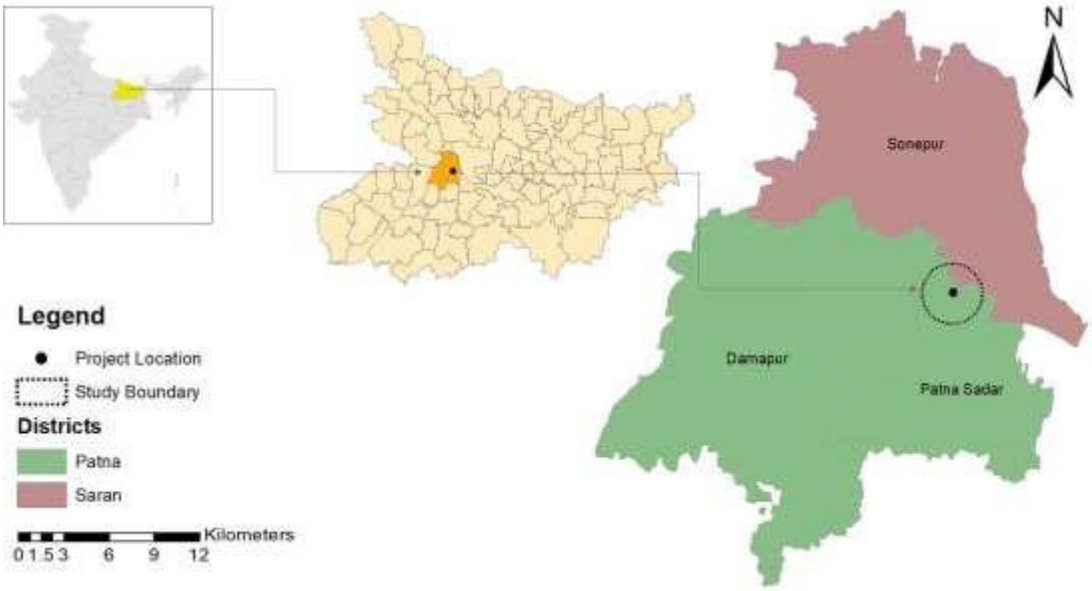


Figure 2: Administrative Boundaries and Project Location

The project area is accessible via Danapur – Aarah road which connects to the National Highway (NH)-30. The nearest airport to the project site is Patna Airport which is located at an aerial distance of about 6.5 km to the south-west of the site. The nearest railway station is the Digha Halt Railway Station (about 1.6 km north of the site) while the major railway station is the Patliputra Junction Railway Station (about 4.86 km north-east of the site).

2.2 Criteria for Site Selection

The site for the proposed Digha zone STP is located near the bank of River Ganga (**Refer Annex-12.*An Office Memorandum regarding "Guidelines for siting industries which are in close proximity with the river" is issued by MOEF&CC, Impact Assessment Division via F. No. 22-39/2020-IA.III dated-14th Feb,2022 where it is clearly mentioned that the activities undertaken under Namami Gange Programmme like construction/development/renovation of STPs for pollution abatement of river Ganga and its tributaries are not prohibited in flood plain of riverine system)***. The designated land belongs to the Patna Municipal Corporation. This land was provided by Bihar Urban Infrastructure Development Corporation Ltd. (BUIDCO) to develop STP (100 MLD) at Digha. (Refer Annex-04 (NOC). The project site is located approx. 500 meters away from the river bank(refer Annexure -11 for joint inspection report and Google image).

The criteria for site selection is based on availability of suitable land and extent of diversion of existing sewage flows. Previously this zone was part of Beur zone and sewage were treated in Beur STP (35 MLD) which was then released into Badshahi Nalla. Later based on the population size and area, Digha Zone was created and under Namami Gange, a separate STP (100 MLD) and Sewerage Network was proposed for the entire zone. The proposed STP will collect sewage from two sewerage networks.

Under the proposed sewerage system for the zone, Sewerage Network 1, will cover wards part of 21 – 26, 28 and part of Digha Diara and Sewerage network 2 will cover wards 1 to 9, 20, 28, Patliputra area, and part of Digha Diara. The diversion of the flow from Sewerage Network 1 will outfall into Mandiri Nalla and Rajapur – Anandpuri Nalla and then pumped to SPS A (104 MLD). The diversion of the flow from Sewerage Network 2 will outfall into Kurji Pul Nalla and then pumped to SPS B (103 MLD). The sewage collected at SPS A and SPS B will then be pumped to the proposed Digha STP.

2.3 Project Design

2.3.1 Land Use of Site

The proposed Digha STP is located on a vacant Govt. land near the bank of River Ganga. The immediate land use is vacant fallow land which are used for cultivation to the west and east of project location and in the north of site boundary is Ganga flood plains and to the south is Loknayak Ganga path Expressway (under construction). The nearest settlement is at a distance of about 500 meters beyond upcoming Loknayak Ganga path Expressway. The project location can be accessed using two unpaved dirt routes i.e. via Gate no 83 and Gate no 93, Danapur-Aarah road, Patna.

Within the project boundary, the total land area for the proposed STP upto the year 2035 (100 MLD) and its supporting treatment infrastructure is 5.26 hectares. The plot will have supporting infrastructure like security building, administration building, in built walkway, and fire water pump house. According to the design period by 2050 an additional area of 0.88 Ha. will be required to expand the project for 116 MLD capacity. The details of land requirement for present as well as for the future expansion are presented below.

Year	Capacity of STP (MLD)	Land Required (Ha.)
2035	100	5.26
2050	116	6.14 (5.26+0.88)

The present immediate landuse and approach road to the site is presented in the pictures below.

North boundary from the centre of Project Location

West boundary from the centre of Project Location

South boundary from the centre of Project Location

East boundary from the centre of Project Location

Access road in front of Project Location

Access road towards Ganga Ghat from Project Location

Access road via Gate no 83 to Project Location

Access road via Gate no 93 to Project Location

Figure 3: Site Photographs on 14.10.2021

Proposal of Permanent access to Digha STP from GangaPath is under process for which all necessary documents have been submitted to concerned department.3D drawing in this reference is attached in **Annex-8.**

2.3.2 Site Conditions

The STP and the treatment scheme has been designed considering the following climatic andtopographic 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	49.3 to 49.8 (Varies across plant area)
6. Finished Ground Level at Site	HFL + 0.30m = 52.82m
7. Ground water table	3 m to 4 m
8. High Flood Level	52.52 m

2.3.3 Design Capacity

The STP has been designed for an Advance Design Capacity. The initial design capacity for STP by 2035 is 100 MLD and the ultimate design capacity by 2050 is 116 MLD. The projected wastewater flows pertaining to the various Design Years for the proposed Sewerage Scheme for a per capita supply of 150 LPCD & 15% floating population as presented below:

Sewerage Zone	Area (Sq.km)	Ward Details	Design Population		
			2020	2035	2050
Digha	34	1 to 9, 20 to 26 &28 (50%)	535406	701106	890250
Flow Generation taking 135 LPCD (MLD)			57.82	75.72	96.15
Floating Population @15% of designed population			80311	105166	133538
Flow Generation taking 45 LPCD for floating population (MLD)			2.89	3.79	4.81
Infiltration for 288km in MLD (taking 2500lit/Km/day)			0.72	0.72	0.72
Total (MLD)			61.44	80.23	101.67
Additional wastewater flow for Patliputra and Mainpura areas, MLD				12.00	14.00
Total (MLD)			**61.44**	**92.23**	**115.67**
Total (MLD) Say			**62.00**	**100.00**	**116.00**

2.3.4 Raw & Treated Sewage Parameters

The Sewage Treatment Plant at Digha is designed on the basis of following inlet and outlet parameters:

Parameter	Raw sewage characteristics	Treated Value as per Concessionaire Agreement	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	<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-B0012-2101)

As per regulatory compliances, all STPs are required to meet the NGT effluent standard. In case of Digha 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-13**).

2.3.5 Dewatered Digested Sludge Characteristics

The digested sludge characteristics are given below:

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 Digha STP is spread across 5.26 hectares of land and 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 Disposal – treated water will be disposed to the Kurji Nalla , which in turn connect to the river. This Kurji Nalla will carry mainly storm water after commissioning of this STP.
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 (1060KVA 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

Refer **Annex 2 & Annex 3** for the proposed Site Layout and Treatment Flow Diagram of the Digha STP.The Annexes provide the project design, various units of the STP, capacities, and treatment flow.

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

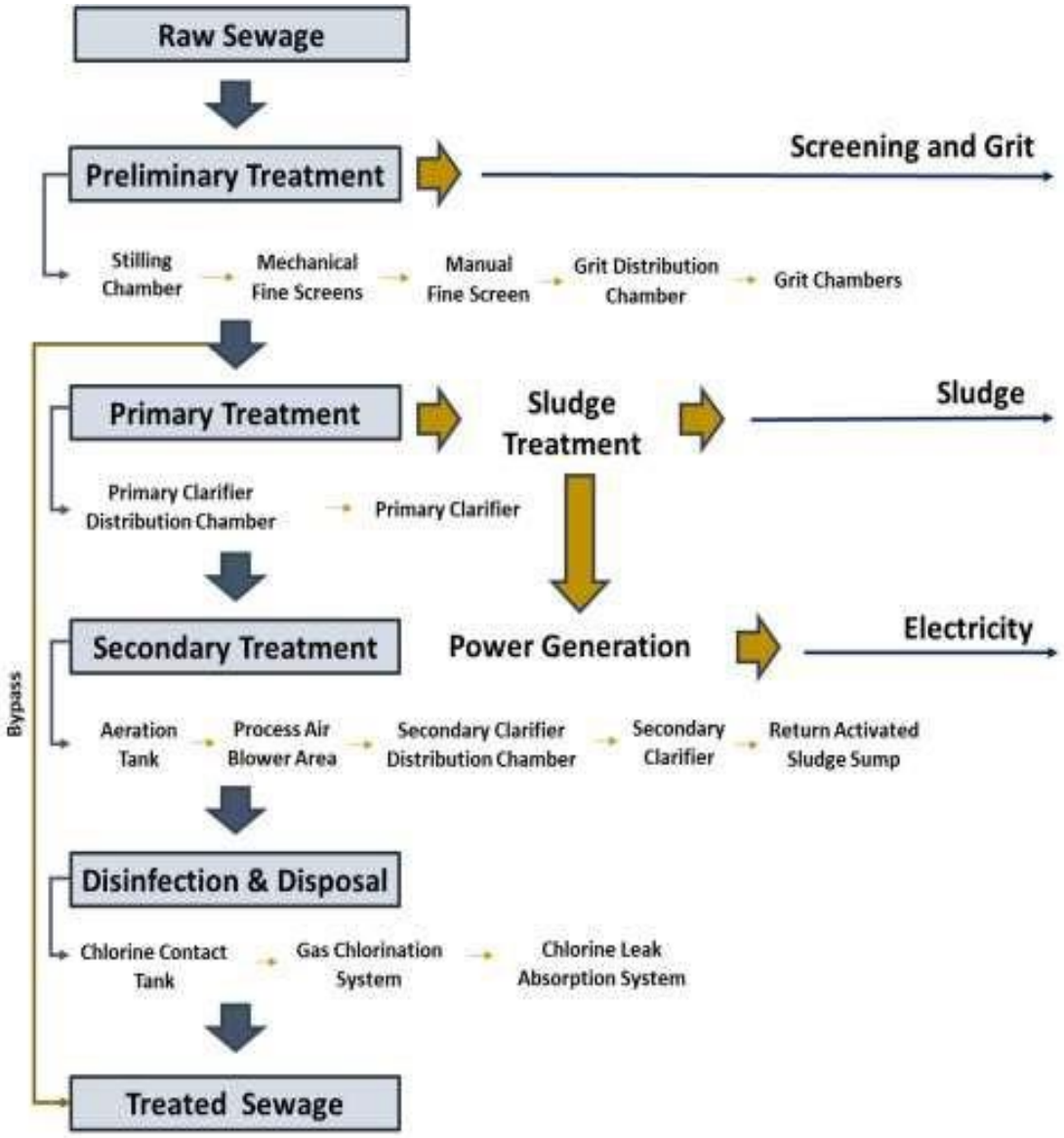


Figure 4: Block Diagram of Proposed Scheme

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 of to the river through disposal pipe / channel. Treated water will be disposed to the Khurji Nalla, which in turn connect to the river.

The potential for reuse of treated waste water is being explored in the areas of irrigation, Gardening and other bulk usage. State Government is in the process of preparing reuse policy in this regard which also reflected in consent to established attached in Annexure-6

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.

5. 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 (H_2S) and Sulphur Dioxide gas (SO_2) 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. Biogas engine of 1060KVA capacity will be installed in the 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.

6. 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. 35^0C. In order to maintain this temperature, the incoming sludge to digesterwill be heated to 35^0C, when the incoming temperature is lower than 35^0C.

The hot fluid required for heating shall be generated from the waste heat available from the Gas Engine.

7. Auxiliary Units Section

The auxiliary units of the STP shall consists 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/ 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 (DIGHA STP AND I&D WORKS)						
Project : Digha STP						
Activity	Digha STP	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Project Part: Digha STP						
- Engineering	**6.00%**	5.9%	0.1%			
- Civil Works	**49.00%**	9%	16%	9%	7%	8%
- MEI Works (Supply + Erection)	**45.00%**	5%	4%	11%	13%	12%
Total	**100%**	**20%**	**20%**	**20%**	**20%**	**20%**

2.5.1 Current Project Phase

The project is at Planning and Land Stage. The process of land transfer from PMC to BUIDCo has been completed and a 'No Objection Certificate '(N.O.C) dated 30/11/2020 for developing the Digha STP in a total area 5.26 hectares has been issued to BUIDCo**.** Refer **Annex 4** for a copy of the NOC.

A visit was conducted to the project site from 09 to 14 October 2020 as part of the ESIA site visit. It was observed the proposed site is being used for cultivation (seasonal vegetables) by nearby residents. Refer **Section 4.8.2.** for the details. Refer **Figure 3** for an understanding of the current site condition. After the instruction of World Bank a survey on these Non-Title Holders (NTH) was conducted and an Abbreviated Rehabilitation Action Plan (ARAP) was prepared.

The Cost for Digha STP Project (HAM) CAPEX- is Rs. 105 Cr and OPEX is Rs. 26.8 Cr.

2.6 Organizational Structure

The organizational structure for the project will be developed and updated as per the Environmental Social Health and Safety (ESHS) Plan for Digha STP project.

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) – 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** but 13 non-title holders were observed in seasonal farming at the proposed land so to compensate the Project Affected Persons (PAP) an Abbreviated Rehabilitation Action Plan (ARAP) has been conducted.

- River Board Act, 1956 - The project site allocated is located near the River Ganga at about 500 m, that lies within the buffer zone regularized by the Board. However, an Office Memorandum regarding "Guidelines for siting industries which are in close proximity with the river" is issued by MOEF&CC, Impact Assessment Division via F. No. 22-39/2020-IA.III dated-14th Feb,2022 where it is clearly mentioned that the activities undertaken under Namami Gange Programmme like construction/development/renovation of STPs for pollution abatement of river Ganga and its tributaries are not prohibited in flood plain of riverine system. Refer Annexure-12 for detail.

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 31st 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	**Construction Phase:** • A Consent to Establish for Digha 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 **O&M Phase:** 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 (Preventionand 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.		
4.Environmental Protection Second Amendment Rules 2002 (DG Set) & 2004	The Rule provides regulations to controlnoise limits and emission limits for a Diesel Generator.	**Construction Phase & O & M Phase:** • 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.

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.	**Construction Phase:** • 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 permissiblelimits. **O&M Phase:** • 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.
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, anddisposal of Hazardous Waste.	**Construction and O&M Phase:** • Obtain an Authorization from the BSPCB for handling and managementof hazardous waste mainly generated in the switchyard and from DG sets (if any) for backup power. • Comply with conditions of theauthorization. • Store hazardous waste (waste oil, oil & grease laden cotton, empty paint tins, spent filter, spent media etc.) on impermeable surfaces protected from environment • Segregate the hazardous and nonhazardous waste • Dispose hazardous waste to an authorized Transfer, Storage and Disposal Facility.	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; 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.
7. Construction and Demolition Waste Management Rules, 2016	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.	**Construction phase:** • Submit a Waste Management Plan with approvals from the local authority before starting constructionor 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	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 provided by BUIDCo. (Verbally PMC disposal site in Patliputra industrial area is designated for waste disposal. Letter is awaited).

8. Solid Waste Management Rules, 2016	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.	**Construction and O&M phase:** • 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 burry the solidwaste generated, on streets, in open public spaces outside the premises orin 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.	Wastes generated from site offices and camp site is collected through municipal waste collection trucks. Other solid wastes will be disposed at a designated place provided by BUIDCo as per concession agreement.
9. E-Waste (Management) Rules, 2016	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 practicesthat results into higher pollution and less recovery, thereby causing wastages of precious resources and damage to environment. 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	**Construction and O&M phase:** • Ensure e-waste generated is channelized to authorized collection centers 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	E-waste waste will be hardly generated during construction phase. 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.

10.The Batteries (Management & Handling) Rules, 2001	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 collectedback and sent to registered recyclers. Responsibilities are also fixed on other stakeholders such as dealers, recyclers, bulk-consumers, and auctioneers to maintain records and file annual returns	**Construction & O&M Phase:** • Deposit used batteries with the dealer, manufacturer, importer, assembler, registered recycler, and re-conditioner or at the designatedcollection centers. Lead batteries like troche light batteries, DG set batteries, and so on	Whatever wastes under this category will be generated during O&M phase will be disposed through authorized agencies.
11.Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules1989	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 chemicalsbased on its chemical characteristics and outlines measures to taken for safeusage and storage of the chemicals.	**O&M Phase:** • Take adequate steps to prevent majoraccidents 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 andconduct mock drills. Notify local authorities in case of a major accident to authority	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.
12.Public Liability Insurance Act 1991	The main objective of the Public LiabilityInsurance Act 1991 is to provide for damages to victims of an accident whichoccurs as a result of handling any hazardous substance. The Act applies toall owners associated with the production or handling of any hazardous chemicals.	**O&M Phase**: • 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. • Copy of the same shall be submitted to SPCB • Renewal before expiry of validity period	Applicable during O & M phase.
13. The Bihar Ground Water (Regulation and Control of Development and Management) Act, 2006 14. Central Ground Water Authority Guidelines to	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.	**Construction Phase:** • 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	**NOC is available**

regulate and control Ground Water Extraction in India dated 1 June, 2019		theirbranches while developing their infrastructure or carrying on their activities **O&M Phase:** Approval from Authority for digging borewell for water withdrawal during O&M.	
15. Ancient Monuments and Archaeological Sites and Remains Act, 1958	Conservation of cultural and historical remains found in India notified under ASI Act - 1958	**Construction Phase:** No such area is observed during site visit near project location	If any observed in due course of work, necessary permission will be required from Art & Culture department, Gob.

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 RAP is 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 acquisition.
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	Compliance Status
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:** • Registration with Labor Department (for recording maximum number of workers tobe present at site during construction) • Engagement of Contractor registered with the LabourDepartment • Ensure that Contractor employs measures on worker health andsafety during construction	BOCW license and Labour license are available
2. The FactoriesAct, 1948 and Bihar Factories Rules, 1950	The main objective of the Act is to ensureadequate 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. The Act along with Rules (state specific) outlines requirements to ensure occupational safety, health, and welfare of workers at work place	**O&M phase:** 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: • 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 FireOfficer • Conduct health check-up of employees and/or non-employeeworkers • Establish Occupational HealthCentre based on number of workers • File Annual Factory	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.

		Returns forthe calendar year every year before 31 January of the next year. • Adhere to Bihar Factories Rules (BFR), 1950 on labour safety andwelfare.	
3. Central Motor Vehicles Act 1988	An Act that regulates all aspects of road transport vehicles. It also seeks to consolidate and amend the law relating to motor vehicles. 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.	**Construction phase:** • Construction equipment and transport vehicles (owned or hired) should possess valid driver's license; registration, permit for transportation, fitness certificate, and insurance **O&M phase:** • Vehicles used (owned or hired) should possess valid driver's license; registration, permit for transportation, fitness certificate,and insurance	Records are available at site and reported in quarterly ESMP compliance report also.
4.Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010	The regulation consolidates the laws relating to generation, transmission, distribution, trading and use of electricityand 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.	**Construction phase and O&Mphase:** Employ safety measures specifiedin the Regulation for all electrical work All earthling systems to be tested for resistance during the dry season once every year. Periodic inspection of LT/HT installation - at least once in fiveyears Approval from Electrical Inspector for operation of generating unit >10 kW. 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	This is compiled at site. The fire buckets and fire extinguishers are available at site.

5. The Static and Mobile Pressure Vessels (Unfired) Rules 1981	These SMPV rules stipulate various safety guidelines for the storage and transport of compressed and liquefied gases filled in pressure vessels.	**O&M phase:** • The vessel shall contain the following fittings: ○ 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.	The Compliance will be ensured at site during O & M phase.
6. The BoilersAct, 1923 amended upto 2007	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.	**O&M phase:** • Every boiler has to be registered with the Chief Inspector of Boilers	The Compliance will be ensured at site during O & M phase.

3.1.4 Applicable Employee and Labour Welfare Regulations

Regulation	Brief	Action Required	Compliance status
1. Child and Adolescent Labor (Prohibition and Regulation) Act, 1986 and Amendment Act 2016	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.	**Construction and O&M phase:** • Ensure that child labor is not engaged for any activity	Labour record detail indicated that no child labour was hired at site.
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:** • 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 at 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:** • Ensure deduction and payment of ESI for workers (employed, on contract, through a contractor)	Complied and records are available 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:** • Ensure deduction and payment of provident fund for workers (employed, on contract, through a contractor)	Complied and records available 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 bymeans 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 available at site.
7. The Paymentof 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.	**Construction phase and O&M phase:** Constitute an Internal Complaints Committee. Develop a procedure for recording and resolving complaints related to sexual harassment. Conduct enquiry on receipt of complaint as per the procedure. Submission of Annual Report to the District Officer with details on the number of cases filed and their disposal.	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.

3.2. World Bank Environmental and Social Safeguard Policies

3.2.1 Application of World Bank E&S Safeguard 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.
Applicable of ten environmental and safe guards

WB Operational Policies	How the World Bank Operational Policies is Applicable	Statement on Applicability
Environmental Assessment (OP4.01)	Digha STP and laying of Networks under DK Sewerage Projects fall under the Category A as per OP4.01. Therefore, they will automatically trigger EA safeguards. The activities include, construction of new 100 MLD STP at Digha Diara and laying of network by open excavation and/or micro tunnelling, collection, transportation and treatment of sludge/slurry to be generated from project activities during construction and during operation of the facilities.	Applicable
Natural habitats (OP4.04)	Treated Water Disposal – treated water will be disposed to the Khurji Nalla .	Applicable
Pest Management	It is expected not to require major pest management	Not Applicable

(OP4.09)	measures.	
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 but it may impact (minimal) livelihood of non- title holders at STP site. This is likely to trigger OP 4.12.	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 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's 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. Although a RAP is to be prepared due to thecultivation on the government land allocated for the STP as commencement of the project will result into loss of livelihood.
- There are no Indigenous People in project influence area.
- There are no Protected Areas (Wildlife Sanctuaries and National Parks) in project influence area.

- STP location is situated approx. 500m from river bank **(Refer Annex-12.*An Office Memorandum regarding "Guidelines for siting industries which are in close proximity with the river" is issued by MOEF&CC, Impact Assessment Division via F. No. 22-39/2020-IA.III dated-14th Feb,2022 where it is clearly mentioned that the activities undertaken under Namami Gange Programmme like construction/development/renovation of STPs for pollution abatement of river Ganga and its tributaries are not prohibited in flood plain of riverine system)*.**
- **STP with associated structures will be constructed at the Finished Ground Level of 52.82m which is above the HFL of Ganga (52.52m).**
- **Slope protection will also be provided to STP and associated structures to avoid the risk of bank erosion and any potential damage to the plant and is the part of contract. Slope protection design and drawing has been prepared in consultation with IIT Chennai and is attached in Annexure-10.**
- **Further BUIDCo is also in discussion with Water Resource Department (WRD) for flood protection of this area.**

The Environment & Social assessment indicates that the Digha zone is not located near any eco-sensitive area and does not involve any compulsory acquisition of land or displacement of any indigenous people. Based on the project activities and its location, the project is not expected to result in any irreversible or unprecedented impacts. Thus, the project is categorized under **''Moderate Risk".**

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 5.** The rationale for defining the 3 km buffer is presented below.

Figure 5: 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. However, there were few 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
- Wetlands/Waterbodies
- Sandy Area
- Built-up
- Waterbodies/Rivers/Streams
- Scrub Land
- Mining

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	4 locations and 4 samples at each location in 48 hours	4 parameters analysed (PM_{10}, $PM_{2.5}$, SO_2, NOx).

Aspect	Number of samples	Parameters
Ambient Noise Quality	4 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 (33 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.

b) 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.

c) 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.

d) Baseline environmental monitoring – based on the sampling plan described in sub-section 4.1.3.

4.2 Meteorology

Satellite derived climate data of 30 years (1984 to 2013) for four (4) 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 6** 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).

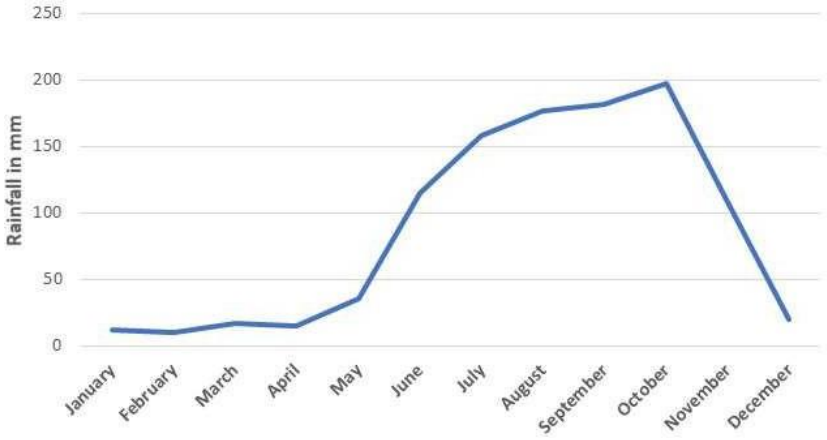


Figure 6: Variation in Rainfall in Project area

4.2.2 Temperature

The annual mean temperature across the study area is studied for 30 years. **Figure 7** 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).

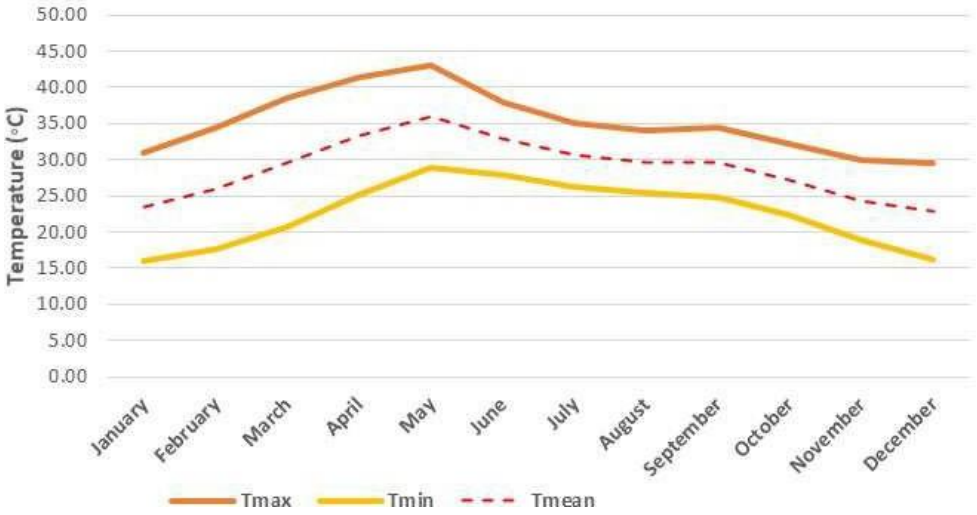


Figure 7: Temperature Variation in Project Area

4.2.3 Wind Speed

The predominant wind direction is observed to be from south-west to south-north direction. Refer **Figure 8** for the annual wind rose at Digha [2] indicating the direction of wind flow in terms of number of hours per year. Higher wind speeds (0.3 – 10.8 m/s) are experienced from the south-north and south west to north-east direction of the study area.

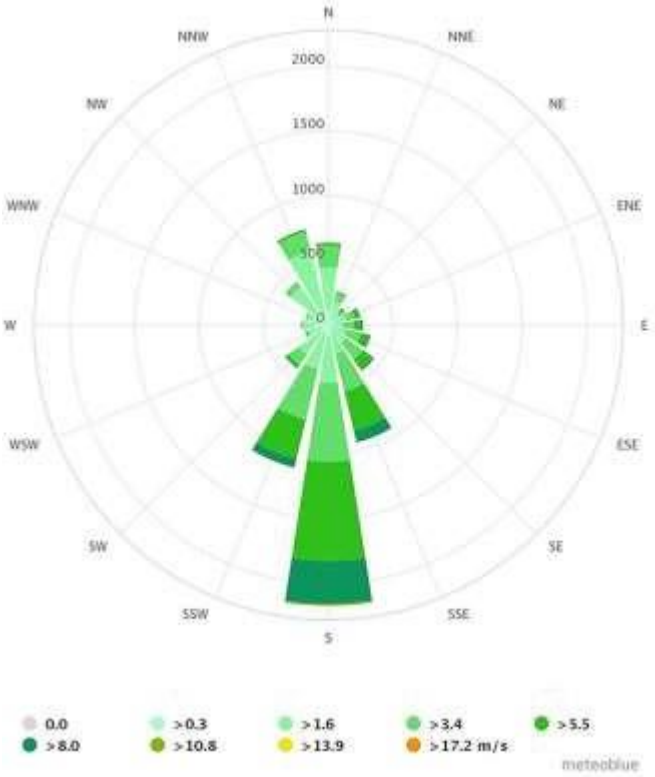


Figure 8: Wind Rose Diagram - Digha

4.3 Physical Resources

4.3.1 Air Environment

The baseline air quality was monitored at two 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 9** for locations of the monitoring stations. One location (AAQ1) is located in the downstream direction while station (AAQ2) is located in the upstream direction of wind.

Monitoring Locations	Criteria for selection
AAQ 1 – Sun Temple, Gate no 83	The location chosen was at the immediate settlement from the project site. The location represents the baseline condition and is located in the downstream of the wind direction.
AAQ 2 – Primary School, Gate no 93	The locality chosen is a settlement located en route of approach road taken for project site. The location will represent the baseline condition and is located in upstream of the wind direction.

[2] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/Digha_india_1272625 retrieved on 03.01.2021.

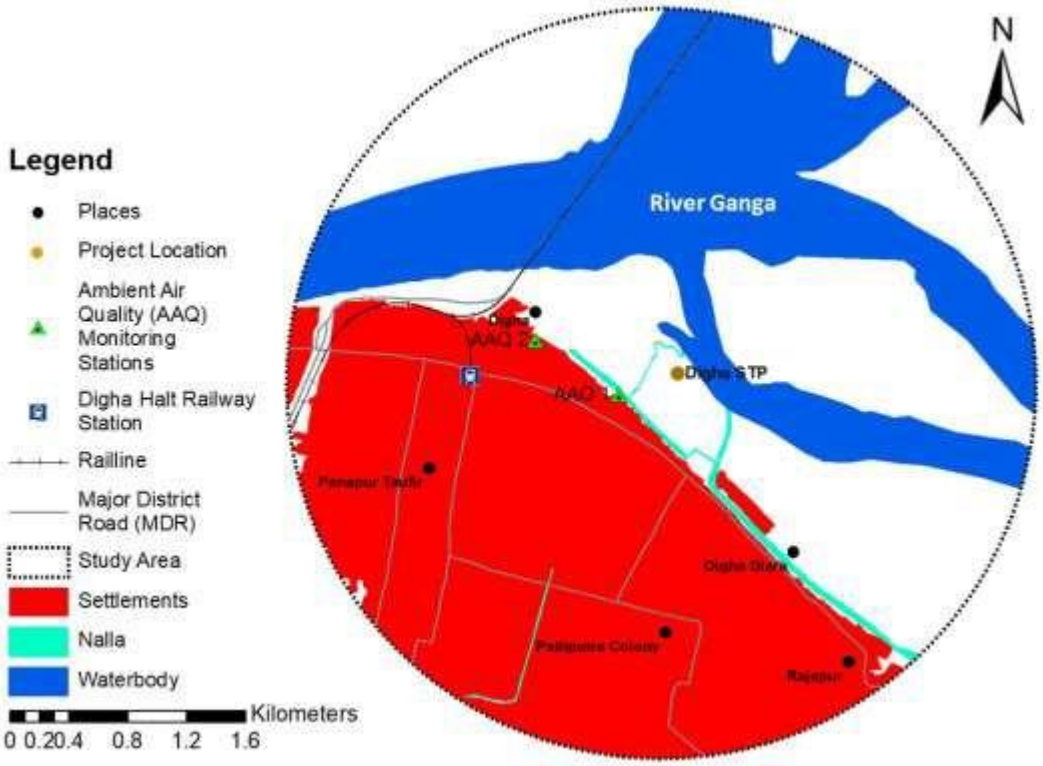


Figure 9: Ambient Air Quality (AAQ) Monitoring Locations

Summary Table of Monitoring Results

Table 2: Ambient Air Quality Monitoring Result

Parameters	CPCB Standard (24 hours)	WHO Guidelines	Result			
			(AAQ 1) Sun Temple, Gate no 83		(AAQ 2) Primary School, Gate no 93	
			Day 1	Day 2	Day 1	Day 2
PM_{10} µg/m³	100	50	96.4	95.4	93.1	92.5
$PM_{2.5}$ µg/m³	60	25	65.2	58.3	58.1	53.3
SO_2 µg/m³	80	20	12.8	14.2	14.8	15.1
NO_x µg/m³	80	40	22.4	24.8	31.2	29.8

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 CPCB and WHO guideline values provided in the World Bank Group's General EHS Guidelines. Refer **Table 2**. The 24-hour average concentration of NOx and SO_2 on two consecutive days of monitoring in the study area were observed to be well within NAAQSstandard and WHO guideline values. The $PM_{2.5}$ and PM_{10} levels exceeded the limits provided by the WHO guidelines and NAAQS standard values at both 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 10** for locations of noise monitoring stations.

Monitoring Locations	Criteria for selection
N1 – Gate no 83, Kurji-Digha road	The location is a residential area (sensitive receptor) located in close proximity to the project site.
N2 – Primary School, Gate no 93	The site chosen will be used as the major access route to the project site.

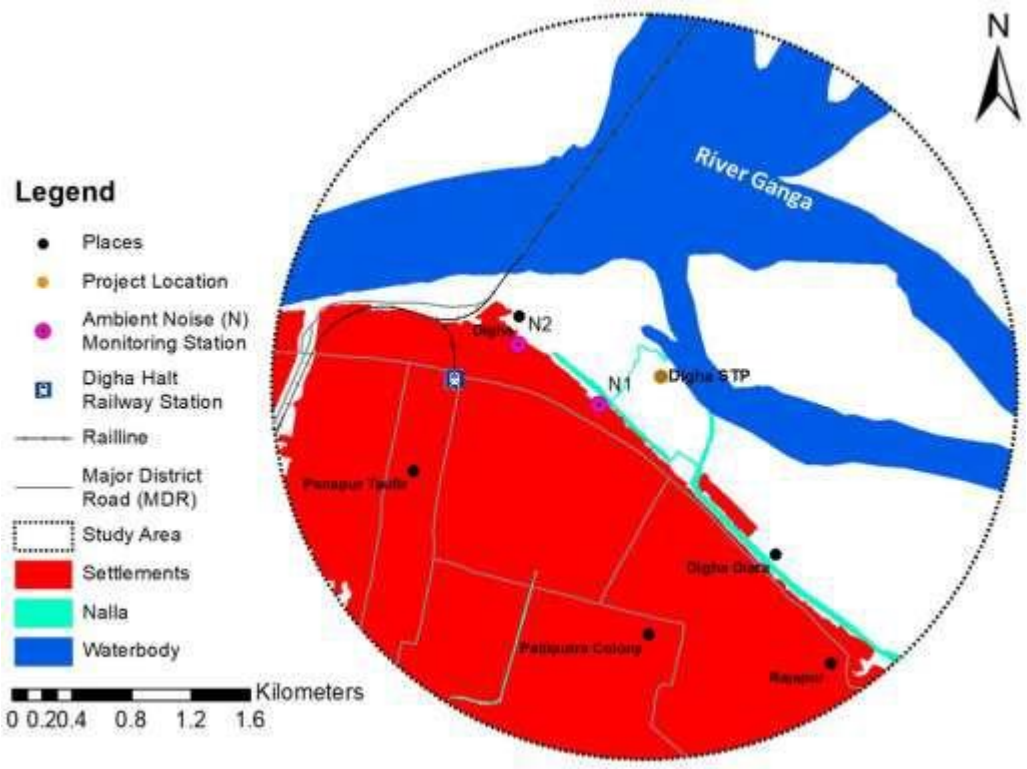


Figure 10: Ambient Noise (N) level Monitoring Locations

Summary Table of Monitoring Results

Table 3: Noise Level Monitoring Results

Receptor	Parameters	CPCB Standards	EHS Guidelines	Result	
				(N1) Residence, Gate no 83	**(N2)** Primary School, Gate no 93
Residential Area	Noise Level Day dB(A)	55	55	54.1	-

Receptor	Parameters	CPCB Standards	EHS Guidelines	Result	
				(N1) Residence, Gate no 83	**(N2)** Primary School, Gate no 93
	Noise Level Night dB(A)	45	45	45	-
Silent Zone	Noise Level Day dB(A)	50	55	-	52
	Noise Level Night dB(A)	40	45	-	45

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 at both 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 project influence area (study area of buffer 3 km) lie in Patna and Saran Districts. The study area can be determined in two parts (south-west and north-east) as per the physiographic feature and landuse. The south-west part of study area is characterized with high densebuilt fabric while the north-east part of study area is a vast Ganga flood plain. The topography is flat flood plains as the study area is part of Indo-Gangetic flood plains. The predominant slope is observedfrom south to north and south-east to north-west. 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. Although the project is a greenfield project and there is change in existing landuse, primary baseline soil analysis was not conducted as the project is not expected to have a longterm impact on soil characteristics. However, assessment of soil baseline was carried out through the secondary sourced[3] soil quality data for the study area. The soil quality as observed from **Table 4** showsalkaline content which indicates high quantities of Calcareous alluvium in the soil.

Table 4: Soil Quality data around project area of Patna

#	Parameter	Gulvi Ghat	Collectorate Ghat	TN Banerji Ghat
1	pH	8.56 (1:5) 26°C	8.85 (1:5) 26°C	7.8 (1:5) 26° C
2	Texture	Loamy sand	Silt loam	Loam
3	Sand (%)	84.2	26.1	38.3
4	Silt (%)	10.2	52.4	34.1
5	Clay (%)	5.6	21.50	27.6
6	Bulk density (g/cc)	1.43	1.29	1.25
7	WHC (%)	30.26	42.67	44.17
8	OM (%)	0.15	0.64	1.59
9	N (mg/k)	92.23	184.46	338.18
10	P (mg/k)	16.25	<4	292.49

[3] "EIA Report of River Front Development, Patna" submitted to NGRBA- retrieved from Environment and Social Assessment Management Plan for Patna (Digha Zone), Bihar under NGRBA.

#	Parameter	Gulvi Ghat	Collectorate Ghat	TN Banerji Ghat
11	Na (mg/k)	20	500	400
12	Ca (mg/k)	13584	11808	4224
13	Mg (mg/k)	2678.4	2966.4	2476.8
14	EC	68.8 (1:5) 25° C	199 (1:5) 25° C	112 (1:5) 25° C

4.3.4 Surface Water

The **Figure 11** presents the water network (waterbody and nalla) in the study area. As seen in the map, the project location is within 500 meter from the flood plain area of the river Ganga. **Table 5** represents the physical and chemical properties of River Ganga for three (3) ghats i.e. Digha Ghat, Kurji Ghat and LCT Ghat which is located in close proximity to study area. Refer **Figure 12.** The data issourced from a 2017 research paper "Analysis of Water Quality of River Ganga from Digha Ghat to GaiGhat in Patna District, Bihar, India"[4] from Department of Biotechnology, A. N. College, Patna, Bihar.

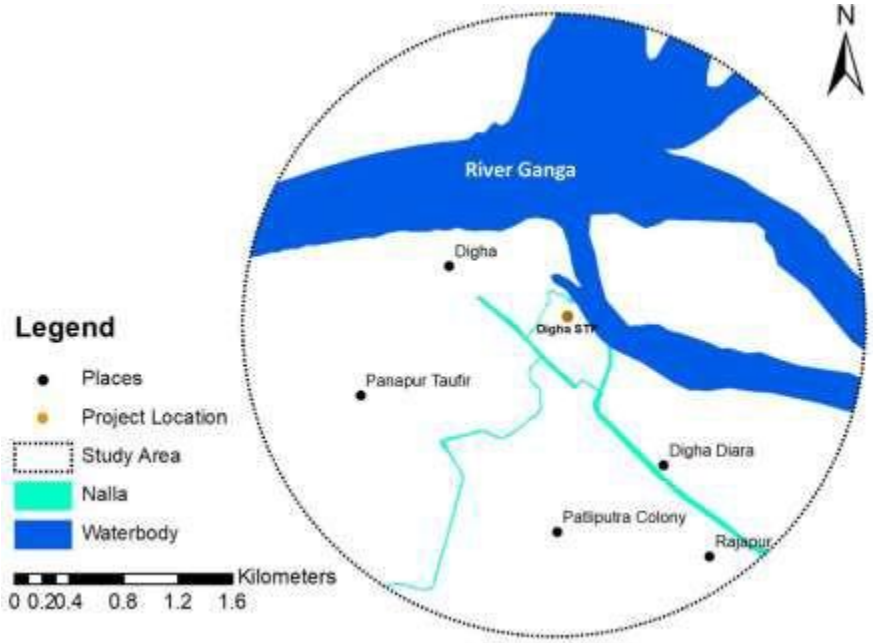


Figure 11: River System in Study Area

Table 5: Surface Water Monitoring

Parameters	Standards			Results		
	IS 10500:2012 (Desirable Drinking Water Standards)	CPCB Class A (Water Quality Criteria)	IFC EHS Guidelines	Digha Ghat	Kurji Ghat	LCT Ghat
pH at 25°C	6.5-8.5	6.5-8.5	6-9	7.86	7.82	8.02
Total Hardness as $CaCO_3$ (mg/l)	250	--	--	118	128	123
Biochemical Oxygen Demand at 27°C for 3 days (mg/l)	--	2	30	0.4	1.2	0.4
Dissolved Oxygen as O_2 (mg/l)	--	>6	--	3.2	3.2	2.4

[4] https://www.academia.edu/34498720/Analysis_of_Water_Quality_of_River_Ganga_from_Digha_Ghat_to_Gai_Ghat_in_Patna_District_Bihar_India retrieved on 12.01.2021

Parameters	Standards			Results		
	IS 10500:2012 (Desirable Drinking Water Standards)	CPCB Class A (Water Quality Criteria)	IFC EHS Guidelines	Digha Ghat	Kurji Ghat	LCT Ghat
Total coliform (MPN/100ml)	Absent	50	400	Present	Present	Present
BLQ – below limit of quantification, LOQ – limit of quantification						

Figure 12: Location of Surface Water Monitoring

4.3.5 Ground Water Development

The study area lies in 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 lie under "critical" zone while Dinapur and Sonepur of Patna district and Saran district respectively lie under "safe" zone for ground water development. Refer **Figure 13**. The project area falls under the critical zone.

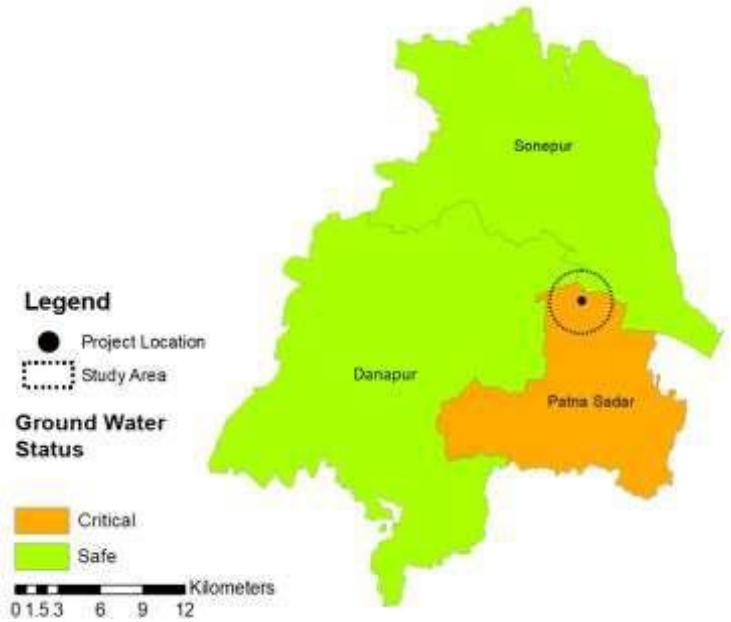


Figure 13: Ground Water Status

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, Digha STP	Proximity to site location
GW 2 – Off site, Gate no 83	

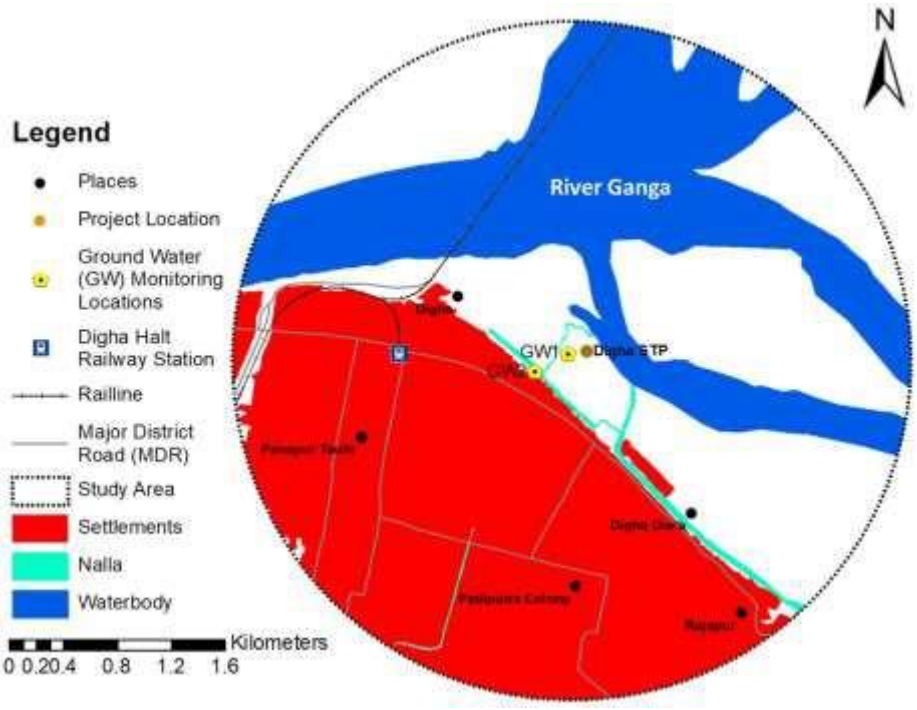


Figure 14: Ground Water (GW) Monitoring Locations

Summary Table of Monitoring Results

Table 6: 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	<1
Taste	Agreeable	Agreeable	Agreeable	Agreeable
Odour	Agreeable	Agreeable	Agreeable	Agreeable
Conductivity (ms/cm)	-	-	0.58	0.48
Turbidity (NTU)	1	5	0.3	0.2
pH at 25 °C	6.5-8.5	No relaxation	7.1	7.3
Total dissolved solids (mg/L)	500	2000	416	316
Total alkalinity as $CaCO_3$	200	-	168	156

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	218	205
Calcium as Ca (mg/L)	75	200	111	39
Magnesium as Mg (mg/L)	30	100	33	26
Chloride as Cl- (mg/L)	250	1000	19	15
Sulphate as SO_4 (mg/L)	200	400	18	32
Iron as Fe (mg/L)	0.30	No relaxation	1.0	2.2
Manganese as Mn (mg/L)	0.1	0.3	<0.005	<0.005
Fluoride as F (mg/L)	1	1.5	<0.01	<0.01
Copper as Cu (mg/L)	0.05	1.5	<0.005	<0.005
Residual Chlorine (mg/L)	0.2 - 1	-	<0.1	<0.1
Zinc as Zn (mg/L)	5	15	<0.01	<0.01
Arsenic as As (mg/L)	0.01	0.05	<0.005	<0.005
Cadmium as Cd (mg/L)	0.003	No relaxation	<0.001	<0.001
Total Chromium as Cr (mg/L)	0.05	No relaxation	<0.005	<0.005
Lead as Pb (mg/L)	0.01	No relaxation	<0.005	<0.005
Selenium as Se (mg/L)	0.01	No relaxation	<0.002	<0.002
Mercury as Hg (mg/L)	0.001	No relaxation	<0.001	<0.001
Nickel as Ni (mg/L)	0.02	-	<0.005	<0.005
Boron as B (mg/L)	0.5	-	<0.25	<0.25
Coli form organism/100 ml	Nil	-	Absent	Absent
E.Coliform Count // 100	Nil	-	Absent	Absent
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 6**. The parameters of Total Hardness as CaCO3 (mg/L) and Iron as Fe (mg/L) were observed to be beyond acceptable limits at both the locations while the parameters of Magnesium as Mg (mg/L) and Calcium as Ca (mg/L) although exceeding acceptable limits were within permissible limits at GW1. 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.

As the project site is located within 500 meters (aerial distance) from the river bank and slope (south to north) of project location is lower than the surrounding area therefore, the risk of flooding alleviates**. Figure 15** shows the timeline google earth images of project site for three consecutive years (2016, 2018 and 2019) for the month of October and November. The imageries validate the risk involved of flooding of project location due to its proximity to the river banks.

Figure 15: Timeline View of Project Location and Risk of Flooding

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) located in the study area. However, e-Bird hotspot (15 species) was found at St. Michael School, Gate no 83, within study area. Refer **Figure 16.**

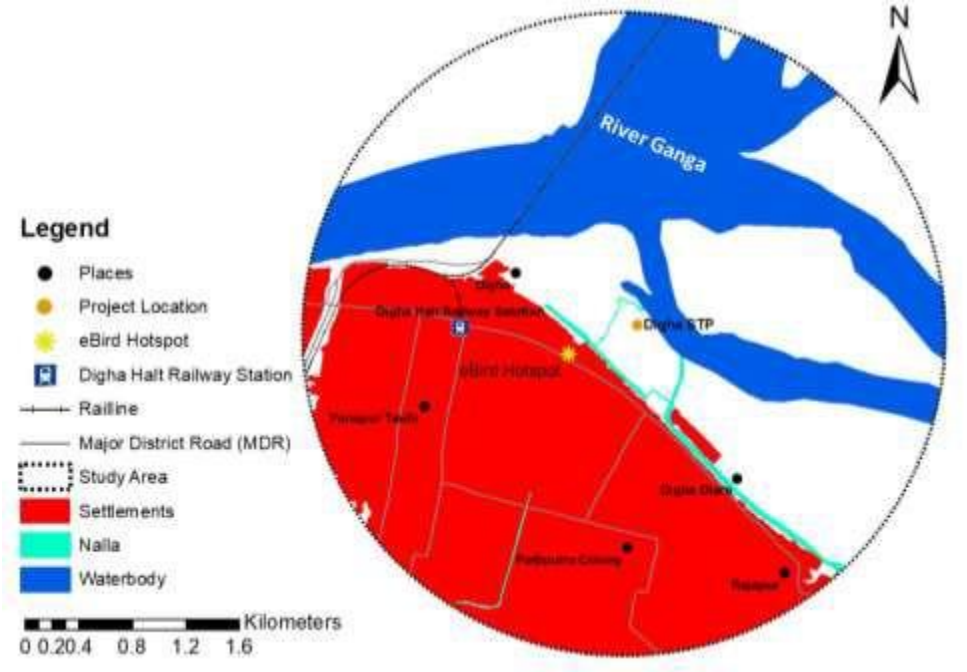


Figure 16: Sensitive Receptors in Study Area

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 17** and **Figure 18.** It can be observed that the major land cover in the study area is settlements (36%) followed by waterbodies (19%).

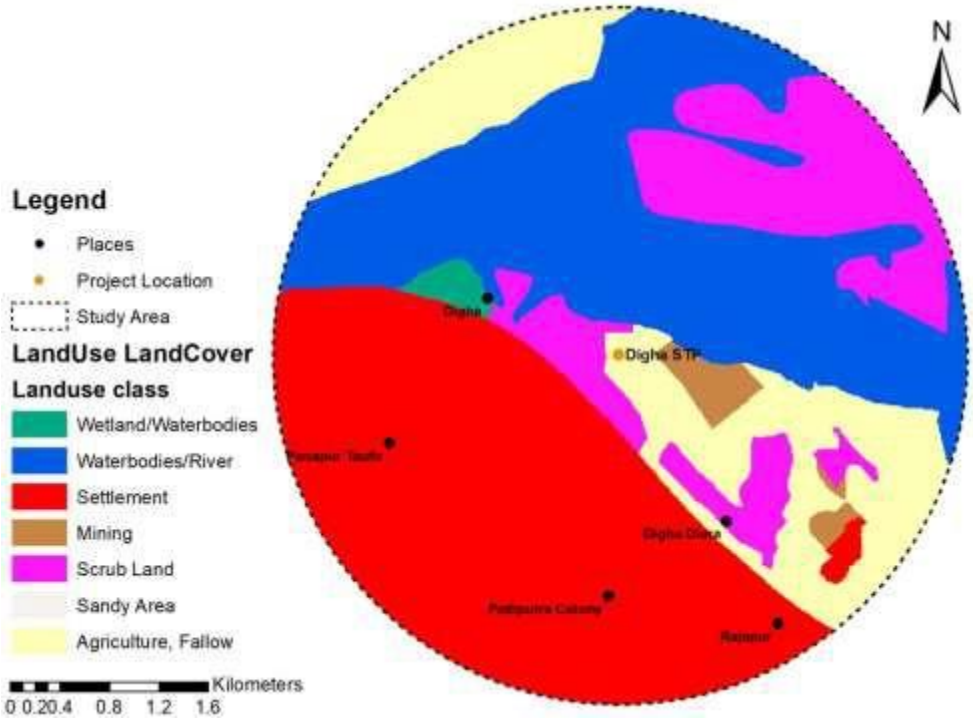


Figure 17: Land Use Land Cover of Study Area

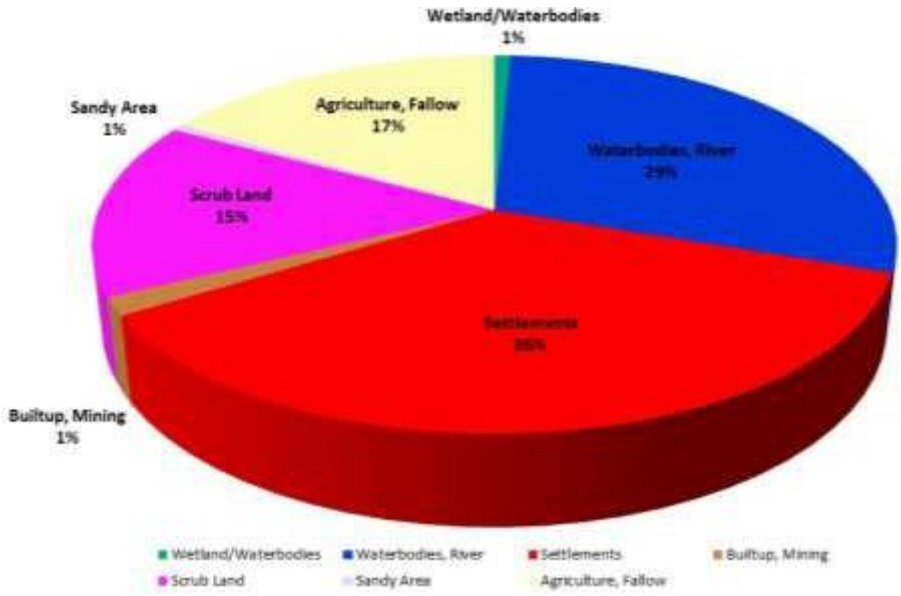


Figure 18: LULC Analysis

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 Danapur – Aarah road connecting to the National Highway (NH)-30. The nearest airport to the project site is Patna Airport which is located at an aerial distance of approx. 6.5 km to the south-west of the site.

The nearest railway station is the Digha Halt Railway Station (approx. 1.6 km north of the site) while the major railway station is the Patliputra Junction Railway Station (approx. 4.86 km north-east of the site). Refer **Figure 19** for transport network in study area.

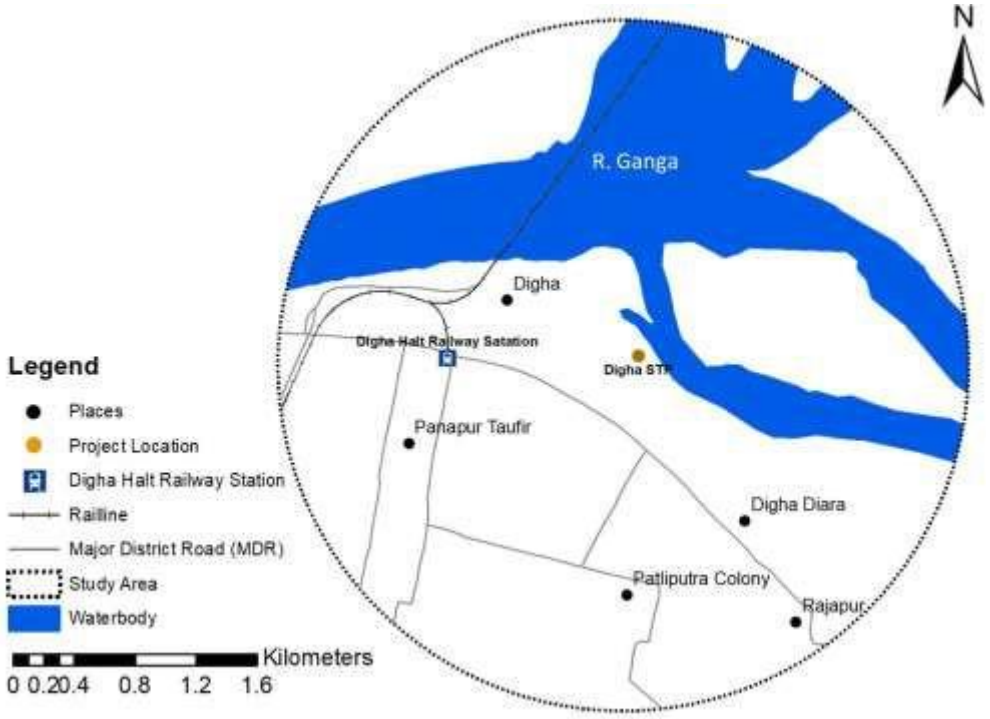


Figure 19: Transportation Network in Study Area

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.[5] 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 south–west and south-east are densely fabricated with residential and commercial establishments and the areas towards the north, north-east and north-west of the study area has River Ganga and its flood plain. Minimal to no industrial establishments were 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 agriculture 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.

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 2011[6]. 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 lies in two sub-divisions – Patna Sadar and Dinapur under Patna District and Sonepur under Saran district.

4.7.1 Population and Communities

The population density (persons/sq. km.) in Patna District (Patna rural and urban) and Saran District (Sonepur) population has been presented in **Figure 20.** The population density in Patna District (Rural and Urban) is 1823persons/sq.km while the population density in Saran is 1496 persons/sq.km.

[5] https://patna.nic.in/economy/ retrieved on 16.10.2020.
[6] More recent demography data was not available with the District Statistical Office.

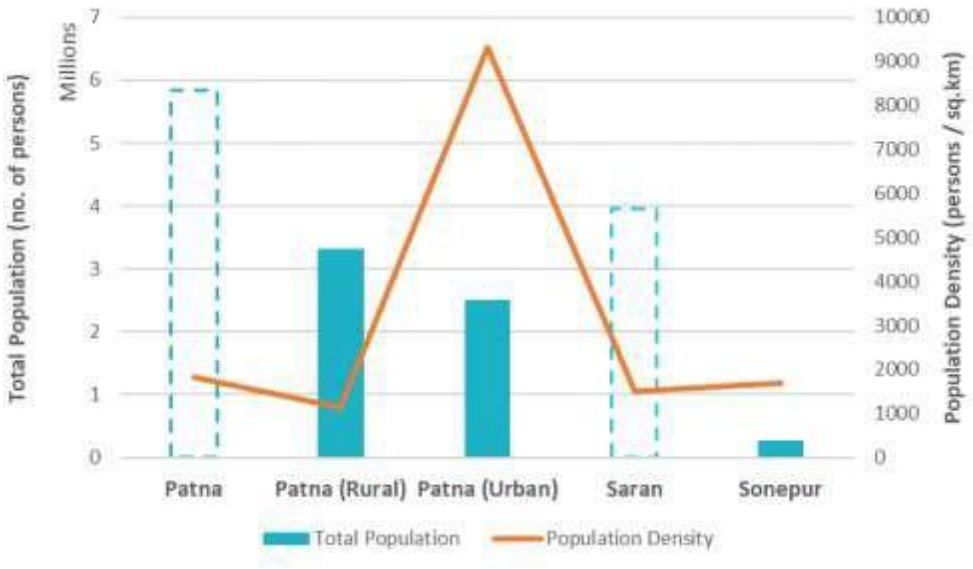


Figure 20: Population Density in the Study Area

The average literacy rate in Patna District is 59.26% and Saran District is 54.59%. 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 21.**

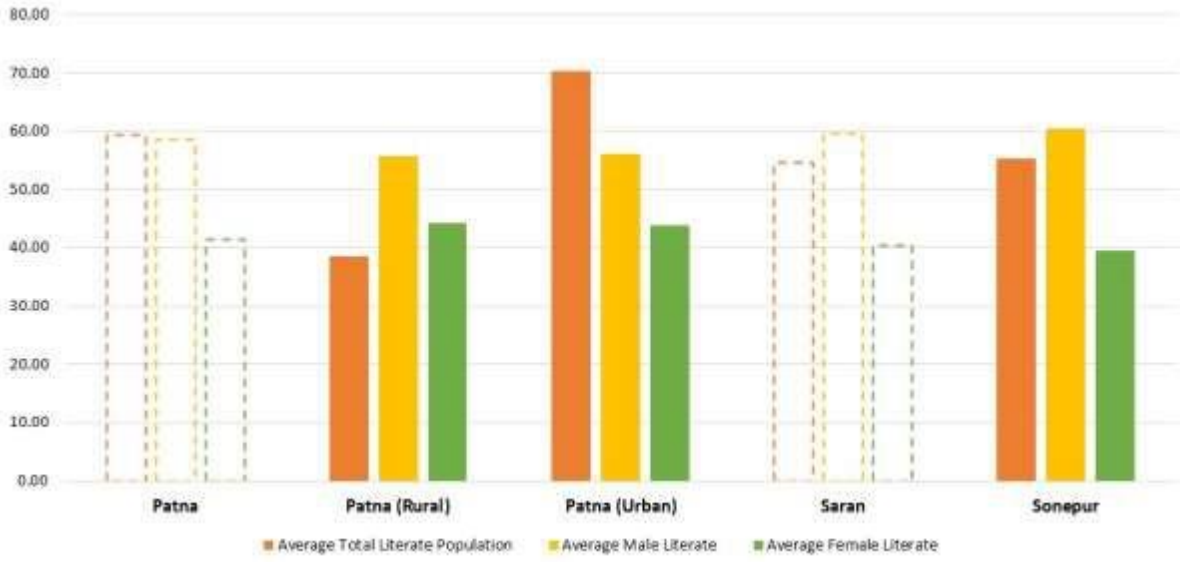


Figure 21: Literacy rate in Study area

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 22.** The study area has notable proportion of SC population. The ST population in both districts is negligible. The SC population is found highest in Patna (rural) 19.98% compared to other sub-districts.

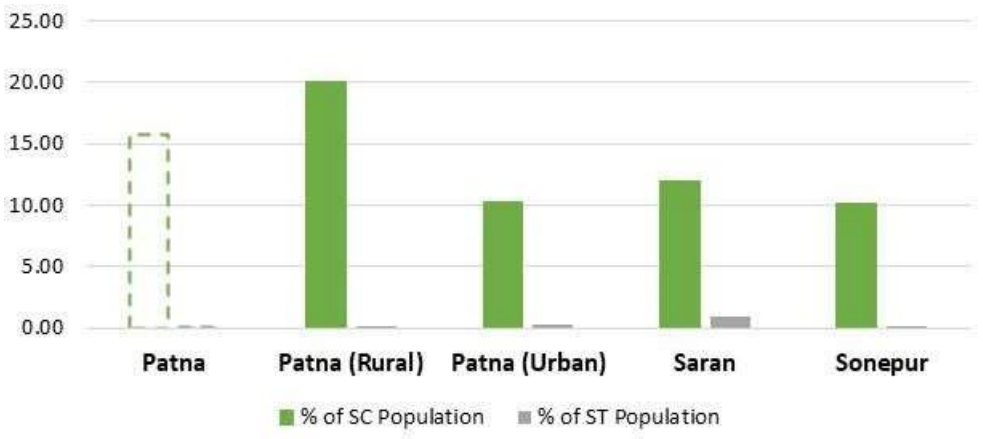


Figure 22: SC and ST Population in Study Area

4.7.4 Occupational Pattern

The proportion of working and non-working population in Patna and Saran District has been presented below **(Figure 23).** The proportion of non-working population in Patna District (67.77%) and Saran District (73.68%) is more than that of working population (32.23%) and (26.32%) respectively.

Amongst the working population, the proportion of main and marginal workers is represented in **Figure 24.** The proportion of main workers is higher than that of marginal working population for both the districts.

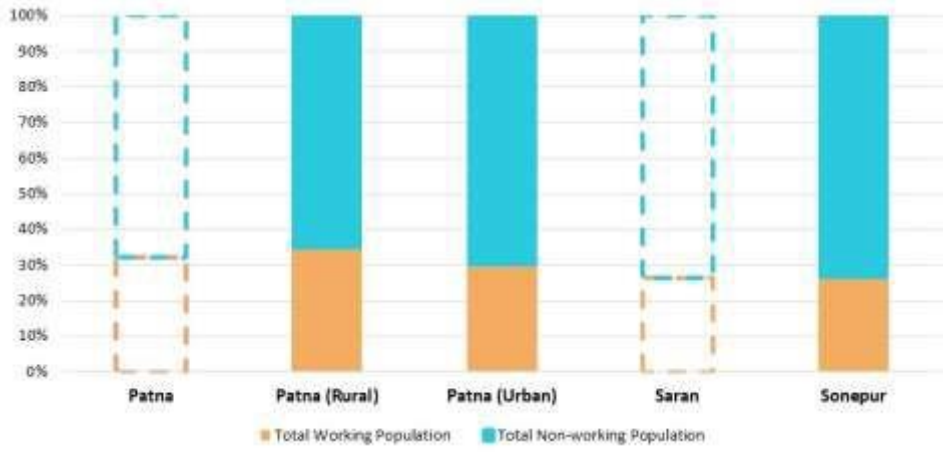


Figure 23: Working and Non-Working Population in the Study Area

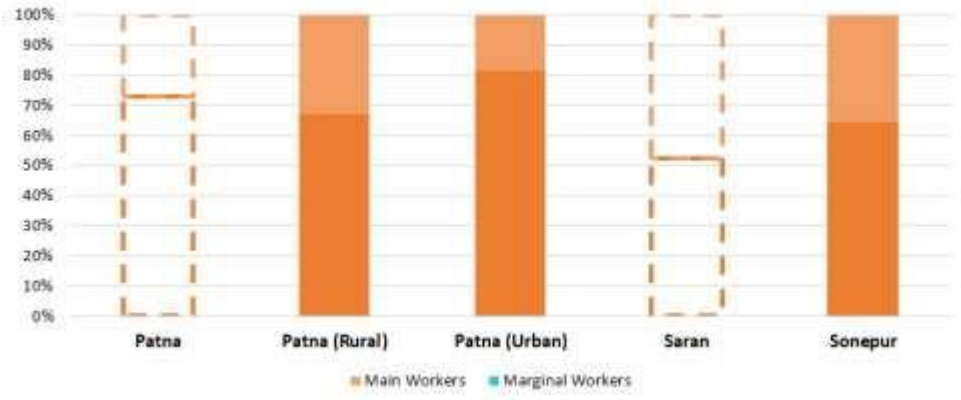


Figure 24: Main and Marginal Workers in the Study Area

The distribution of working population among main and marginal workers across key sectors has been presented in **Figure 25 and Figure 26.**

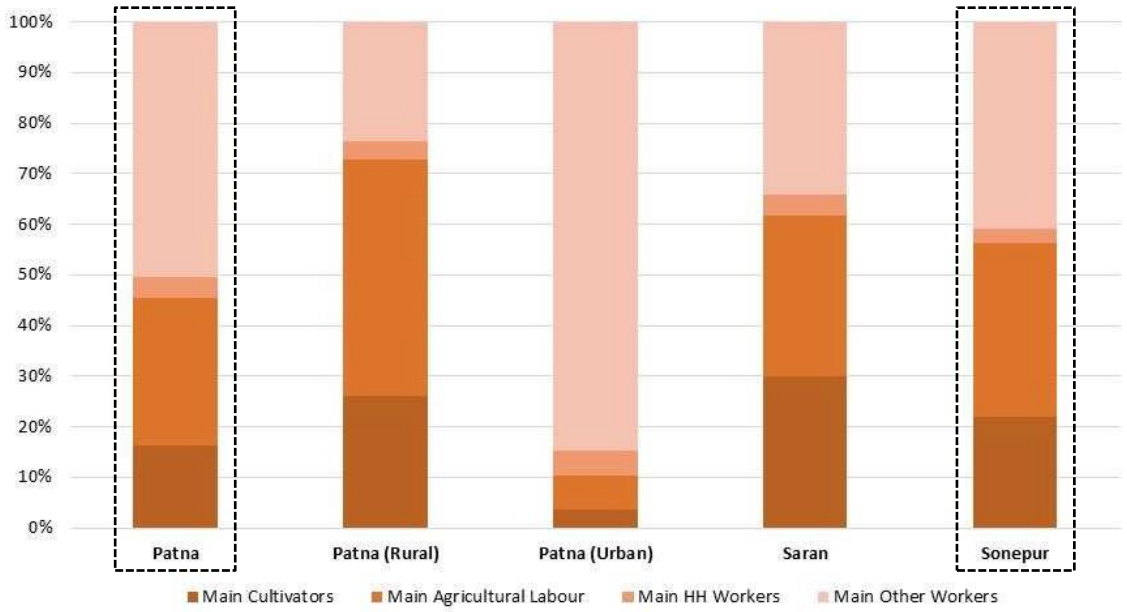


Figure 25: Distribution of Main Workers in the Study Area

Amongst the main workers, the proportions of other workers (50.50%) and (30.30%) in Patna and Saran District respectively dominate the work force in study area. In case of marginal workers, the proportions of agricultural labourers (50.63%) and (64.93%) in both Patna and Saran districts respectively dominate the work force.

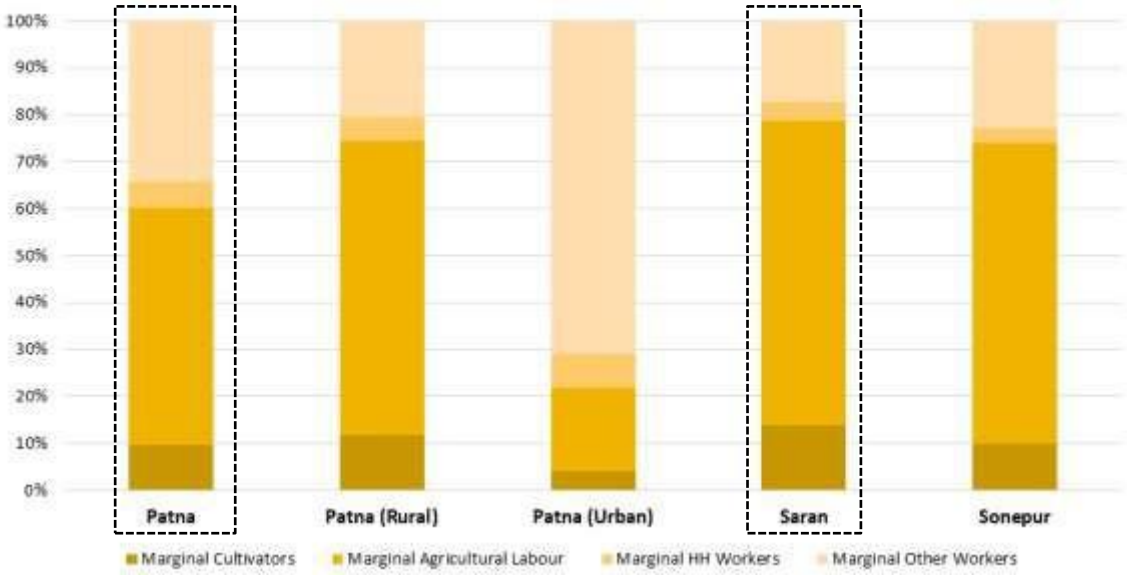


Figure 26: Distribution of Marginal Workers in the Study Area Error! Reference source not found.

4.7.5 Physical and Cultural Heritage

There are no ASI monuments in the study area. Small local religious places were present in the study area. Through consultations with neighboring 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

For the purpose of consultation, the stakeholders of the project were classified under Project Affected Parties and Other Interested Parties loosing livelihood and others. Consultations were carried out with the project affected parties in the project area at five different locations in small informal groups comprising of 3 to 4 personnel. Consultations with the people engaged in cultivation at project site were carried out one-to-one. **(Refer Figure 28)**.

The locations of consultation were selected based on the proximity of settlements from the project location and the impacted community along the approach road used during construction phase of the project. The locations of the consultations conducted within the Study area has been provided in **Figure 27**.

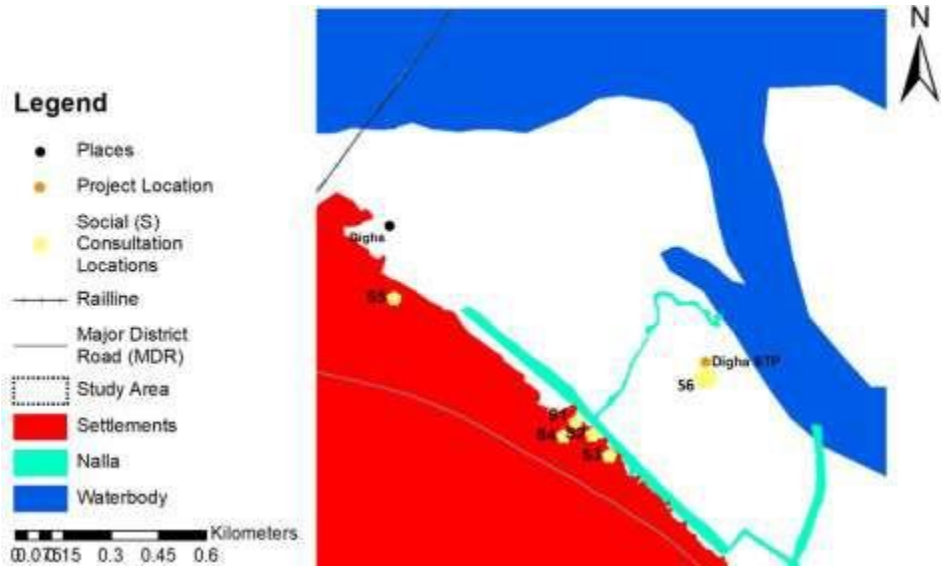


Figure 27: Social Consultation Locations

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**
	Construction Phase:
	• Dust
	• Noise
	• Solid Waste generated due to labour camp
	• Material storage
	• Labour camps
	• Barricading the project site
	• Security
	• Water Usage
	Operation & Maintenance Phase:
	• Air emission
	• Odour
	• Hazardous Wastes
	Shops or commercial establishments
	Construction Phase:
	• 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.

Aspects	Details
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 7** below. Refer **Figure 28** for the photographs of the consultation.

Table 7: Excerpt of Stakeholder Consultation

#	Topic covered	Queries / Concerns raised by stakeholders	Responses by Project Team
1.	Anticipated Impacts	Increase in noise and vehicular traffic in the locality.	The measures planned 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.
2.	Anticipated Impacts	During O&M phase, will there be an increase in foul odour as it's a sewerage plant.	The control measures are planned to taken to minimize the impact. Also along the outer boundary rows of plants and trees will be planted to lower the impact.
	Remarks: It was understood that the community (Gate no 93) had previously experienced similar issues of vehicular traffic and dust emissions (unresolved) resulting from construction of other infrastructure projects. Thus, they desired to understand the difference in the management measures to be employed in this project by WABAG.		
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 Nalla passing parallel at residential locality of Gate no 83 will be covered solving the

#	Topic covered	Queries / Concerns raised by stakeholders	Responses by Project Team
			problem of breeding of mosquitoes and flooding during monsoon season.
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.
	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.		
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.
	Remarks: Although informed as part of the consultation process, this query with details was specifically asked by the women in the group.		
6.	Project Timeline Disclosure	Encroachers on project site were concerned about the commencement of project and had a query if they can get economic assistance e.g. working as casual labour at plant.	The construction plan is as per the annexure 2.5. There is no encroachment and site is being barricaded to avoid external entry once construction picks up post monsoon.
	Remarks: This query was raised during one-to-one meeting with people engaged in cultivation at projectsite.		

Consultation at point S1

Consultation at point S2

Consultation at point S3

Consultation at point S4

Consultation at point S5

One-to-one consultation with Encroachers at Project Site

Figure 28: Stakeholder Consultation conducted within Study Area

5 Analysis of Alternatives

5.1 Site Selection

The allocated land for Digha STP was owned by the Patna Municipal Corporation and has been transferred to BUIDCo for the project. The site premise will comprise of STP, administrative building, security building, laboratory, and project offices (temporary). The total land area allocated is 5.26 hectares. Thus, aspects of land acquisition and resettlement are not triggered. However, at present project land is being used by some encroachers for cultivation and the project implementation will result into loss of livelihood. ARAP has been prepared to compensate the livelihood loss of the affected persons growing seasonal crops.

The project site is also not in close proximity to any significant E&S sensitive receptors such as forests and important bird areas. The project site is bordered by settlements on the south and by River Ganga to the north. The nearest settlement is at a distance more than 500 meters from site and is bifurcated by the expressway. Thus, the project is not directly 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. Large scale public awareness and acceptance of the project was noted during consultations.

5.2 Approach Road

The project site is situated on the banks of River Ganga and can be approached by two routes (unpaved dirt road) via **Route 1 (Gate no 83)** and **Route 2 (Gate no 93)** connecting to main road (Danapur – Aarah road). Refer **Figure 29** for the same.

Figure 29: Approach Roads for Project Location


Route 1 – Gate no 83


Route 2 – Gate no 93

Based on the proximity to site, Route 1 is the best option. However, it is a narrow street road designed for residential society and will not be suitable for movement of heavy vehicles during construction phase of the project. Route 2 is more suitable option to use for movement of heavy vehicles. Also, other upcoming projects in the vicinity use the same route to transport their material to site.

The existing approach road linking to Digha STP is below FGL and gets flooded during monsoon period thereby breaking access to the plant. So as a permanent access to Digha STP, an approach road above FGL is proposed from Gangapath to Digha STP and necessary documents are submitted to Bihar State Road Construction Department in this regard. The detailed proposal is being furnished to BUIDCO in consultation with IIT for implementing this proposal. Refer Annexure -8.


Approach Road during Dry season

Approach Road during Rainy season

5.3 Technology and Operations

The Digha STP is an Activated sludge process(ASP) based process 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 as alternate source of energy.

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 be provided to the nearby agricultural fields for irrigation purposes. This will reduce freshwater usage.

6 Environmental and Social Impact Identification and Assessment

6.1 Methodology of Impact Assessment

The impacts have been assessed for the Digha STP Project near banks of River Ganga, Digha. 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 (ESMF)

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.

EXTENT / NATURE	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 thestage 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 Digha STP project is being developed under a River 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 Digha Zone is highly populated and one of the core areas of the city with no dedicated sewage treatment mechanism. The proposed STP will intake sewerage from two (2) major drains i.e. Mandiri and Kurji drains and two (2) minor drains, Anandpuri –Rajapur drain and Ashiyana drain that covers a large residential and commercial area. Earlier these four drains carried the wastewater/sewage and discharged into River Ganga, polluting the river although the sewage was being treated through Beur STPs but now Digha Zone will get a dedicated STP of 100 MLD.

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 wastewater will also be reused for plant operations and may also be provided for irrigation of the surrounding agricultural fields.

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

6.3 Areas of No Significant Impact

6.3.1 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.

6.3.2 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.**

6.3.3 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. However, an ebird hotspot (15 species) is identified within the study area. As the project is being developed in a plot of near to the banks of River Ganga, minimal cutting of trees is envisaged. Hence **no impacts on protected areas/forests** are anticipated from the project.

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 nearest settlement is at a distance of about 500 meter from site area. The Ganga Expressway is being constructed in the area between the settlements and the Project site. Thus it is expected that viewscape of the Community would be low impacted by the Expressway and the STP Project is thus expected to cause limited viewscape impacts.

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

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

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	**Low**	*Impacts on viewscape will be limited to construction period only*

6.5.2 Land Use Impacts

The proposed Digha STP is located on a site which was previously allocated and owned by Patna Municipal Corporation (State Govt.) and now NOC for 5.26 Ha land has been given to the BUIDCo. The site premises at present is used for cultivation by the nearby settlers. The Digha STP will be constructed within the same premises over a land area of 5.26 hectares. Thus, a change in land use is detected.

Further, as identified during site visit, the encroachers or squatters present in the designated land will trigger the aspects related to compensation, resettlement and rehabilitation. Hence, the impact significance is elevated from 'Low' to 'High'. To give them support a detailed Abbreviated Resettlement Action Plan (ARAP) was prepared in which 13 PAPs were identified.

Nature	Extent	Duration	Impact
Reversible	Local	Short Term	**High**

6.6 Impacts During Pre-Construction & Construction Phase

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

6.6.1 Alteration of Natural Drainage Pattern

The project site is located on the banks of River Ganga. The existing site area is largely a flat flood plain land with minimal variation in slope. The existing drainage channels are however not adequate for the expanded capacity and can potentially result 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	**High**	*The impact significance is elevated from 'Medium' to 'High' as site levelling activity has not been completed and capacity of existing drains are under upgradation.*

6.6.2 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. Labourcamps will consume water for domestic and sanitation purposes. A borewell is has been dug inside the construction premises to extract groundwater for construction purposes.

The ground water table in the project area is high and in the critical zone for ground water 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**

6.6.3 Loss of Flora and Fauna

The project site is located on the banks of River Ganga and 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**	*The impact has been lowered from 'Medium' to 'Low' based on the extent of vegetation on-site.*

6.6.4 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 land where cultivation is carried out, there will be some 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. Also the flood in Ganga river will impact soil erosion frequency.

The impact of soil erosion will be experienced in the immediate vicinity of the project area which includes vacant land and the river. 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	**Medium**	*Although the construction shall span across the rainy season, an embankment is to be built around the project site under good management practice. Thus, ensuring that soil is retained within the site area. However, due to heavy rainfall and site located near banks of river there is a high likelihood of flooding. Hence the impact has been elevated as 'Medium'. The STP will be constructed at the Finished Ground Level of 52.82m which is above the HFL of Ganga and will take care of the Risk of bank erosion and potential damage of the plant. Slope protection is the part of contract for STP and associated structure. Also BUIDCO is proposing to construct Flood Bank protection for the entire area where STP's are under construction.*

6.6.5 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 sandy alluvium soil and is likely to contribute 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 high. Even the

baseline levels for $PM_{2.5}$ and PM_{10} levels has exceeded the limits provided by the WHO guidelines and NAAQS standard values at both locations monitored.

The transportation of raw materials to the site will lead to increase in fugitive dust emissions along the approach roads and emission of SO_2, NOx, CO into the ambient air by movement of vehicles, as the approach road to the site is an unpaved dirt road, thus causing increase in air pollution.

The use of diesel generator sets, and construction equipment will increase the concentration of pollutants (SPM, SO_2, NOx, 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 locality (Gate no 83) is about 0.5 km from the project location and residents of locality (Gate no 93) through which the existing approach road to site traverses will be affected the most. Apart from the settlements, the proximity of Digha Ghat which is used as recreational place by the local people towards the north-west of the project site will also be affected due generation of pollution on-site.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	**Medium**	*Due to close proximity to settlements, and baseline values of $PM_{2.5}$ and PM_{10} being high with reference to the NAAQS standard as per CPCB and WHO guidelines prescribed in the IFC EHS guidelines, the impact is elevated from 'Low' to 'Medium'*

6.6.6 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 settlements in the immediate vicinity and along the approach road to the north and west of the project site respectively.

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

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

6.6.7 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 River Ganga specifically during the rainy season. Wastewater generated during construction could flow into the River. Wastewater from transitmixers, construction debris may be dumped along the open *nallahs* and river. These activities could impact the overall water quality in the River Ganga and *nallahs* and could obstruct the water flow especially in the *nallah*s. The project area receives high rainfall and is prone to waterlogging due to the existing lower level than the surrounding area.

Construction activities will be conducted throughout the town even near the drains flowing to nallas and water bodies has generated significant amount of silt materials. Mobilization of settled silt materials, runoff from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate nearby water body.

Soil erosion may be caused by the exposure of loosen soil to rain and wind during site clearance, earth moving, and excavation activity that may result in sedimentation of surface water

These potential impacts are temporary and short-term duration and can be mitigated through proper implementation of EMP.

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Short term	**Medium**	*The impact is alleviated 'Low' to 'High' as proximity of River Ganga (500 meters) and due to heavy rains as the slopeis from south to north and the river water is likely to get polluted.*

6.6.8 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 not be limited to the project area also it may impact the river if not managed.

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

Nature	Extent	Duration	Impact	Remarks
Reversible	Local	Long term	**Medium**	*As the baseline ground water quality exceeds permissible limits on some key parameters, the impact is elevated from 'Low' to 'Medium'*

6.6.9 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 hardness while also exceeding the permissible limits for iron prescribed in the IS 10500:2012 drinking water standards. Also the project area falls in the "critical" zone for ground water development.

Nature	Extent	Duration	Impact
Irreversible	Local	Long term	**Medium**

6.6.10 Social and Resettlement Assessment

The assessment of impact on livelihoods of families/ persons undertaking seasonal cultivation on the government land allocated for the STP was conducted and a detailed report of (Resettlement Action Plan) RAP is prepared to compensate the affected families. There are *13 PAPs identified, details are given in RAP Report. Summary of ARAP is discussed in section.

*Please refer RAP report of Digha STP for details of socio-economic & other condition of identified PAPs.

Nature	Extent	Duration	Impact
Reversible	Local	Short Term	**High**

6.6.11 Summary of Abbreviated Resettlement and Rehabilitation Action Plan (ARAP)

The Project

1. Conservation and cleaning of river Ganga is a continuous and collective effort of Central and State Govt, local bodies and general public. The first initiative in this regard commenced in 1985 under Ganga Action Plan (GAP) and extended to two phases over more than two decades. GAP-I completed in 2000 and GAP-II started in 1993. Later the programme was merged with National River Conservation Programme (NRCP). The Government of India (GoI) constituted the National Ganga River Basin Authority (NGRBA) on 20th February 2009, for the comprehensive management of the river. In 2014, the Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD & GR, GoI) has taken up an

integrated and comprehensive approach towards Ganga Conservation Mission named "Namami Gange". It envisaged as a flagship programme by integrating all the previous and currently ongoing initiatives by enhancing efficiency, extracting synergies and supplementing them with more comprehensive and better coordinated interventions. NGRBA has been dissolved with effect from 7th October, 2016 consequently under National Council for Rejuvenation, Protection and Management of River Ganga (referred as National Ganga Council) vide notification no. S.O.3187 dt. 07/10/2016 under EPA 1986. Under Namami Gange programme a holistic approach has been adopted to clean the river.

2. The NGRB program is entrusted to adopt a river-basin approach and has been given a multi-sectoral mandate to address both water quantity and quality aspects. The main objective of the NGRBA is that no untreated municipal sewage or industrial effluent be discharged into River Ganga and intends to help the Govt. of India to ensure effective abatement of pollution and conservation of the river Ganga by adopting a river basin approach for comprehensive planning and management.

3. Patna is the capital of Bihar and is the second largest urban center in eastern India, after Kolkata. Digha zone is located on the western part of the city. It is named after Digha Ghat on Ganga River. This project zone is bounded by river Ganga on the North, Patna-Sone canal on the West, Saidpur zone on the East and Beur zone on the South.

4. A draft Abbreviated Resettlement and Rehabilitation Action Plan (ARAP) was prepared and approved for the project. This document comprises the revised ARAP of the project. The revised ARAP meets all Government of India (GOI) and World Bank Resettlement-related requirements and complies with applicable GOI and World Bank (OP/BP 4.12) regulations, policies, and procedures including those on public participation and environmental assessment.

Objective of ARAP

5. The overall objective of the ARAP is to ensure that all project-affected persons (PAPs) at least regain their status of living they had prior to the project implementation or improve upon that. The specific objectives of this ARAP are to:

- Identify the PAPs by the type of loss and extent of damage
- Categorize Entitled Persons (EPs) according to the eligibility criteria mentioned in the R&R policy of Safe Demo Corridor Project.
- Work out entitlements for each Eligible Person based on the criteria as laid down in the R&R policy of the project
- Ensure that all PAPs are aware of their entitlements under the policy and participate actively in the project.

- Identify land for resettlement and the preferences of the PAPs for their relocation if there will be any land acquisition in the future.
- Develop an institutional support for the implementation of R&R process.
- Evolve a suitable mechanism for monitoring and evaluation of the R&R process and indicate the parameters for monitoring.

The ARAP components comprises-

- Introduction and methodology
- Legal Framework and Resettlement Policy
- Census Results
- Public Consultations
- Income Restoration
- Institutional Arrangements
- Grievance Redress Mechanism
- Implementation Schedule
- Estimated Budget for implementation

6. While the policy document describes what need to be done, why and how, the action plan describes in more detail how, when by whom the activities will be carried out.

Impact on Land acquisition and Voluntary Resettlement

The identified plots are vacant land without any habitation including indigenous people/fisherman. No land acquisition (private land) has been identified in the census survey of the area. BUIDCO vide its letter no 16 dated 14 Dec 2020 has handed over land measuring 409 m x 150 m to the concessionaire. This ARAP has been revised to cover the impact assessment for the proposed 100 MLD DIGHA STP construction area measuring 7.07 acres (409mx70m) only. The draft ARAP had identified nine non- title holder (NTH) person engaged in seasonal farming on the identified plot as PAPs. Due to change in position of the STP, four new PAPs were also identified. Altogether, **thirteen persons belonging to NTH category** have been identified as PAPs. This ARAP has been revised to include measures to compensate these PAPs as per the approved entitlement matrix (EM) of the project.

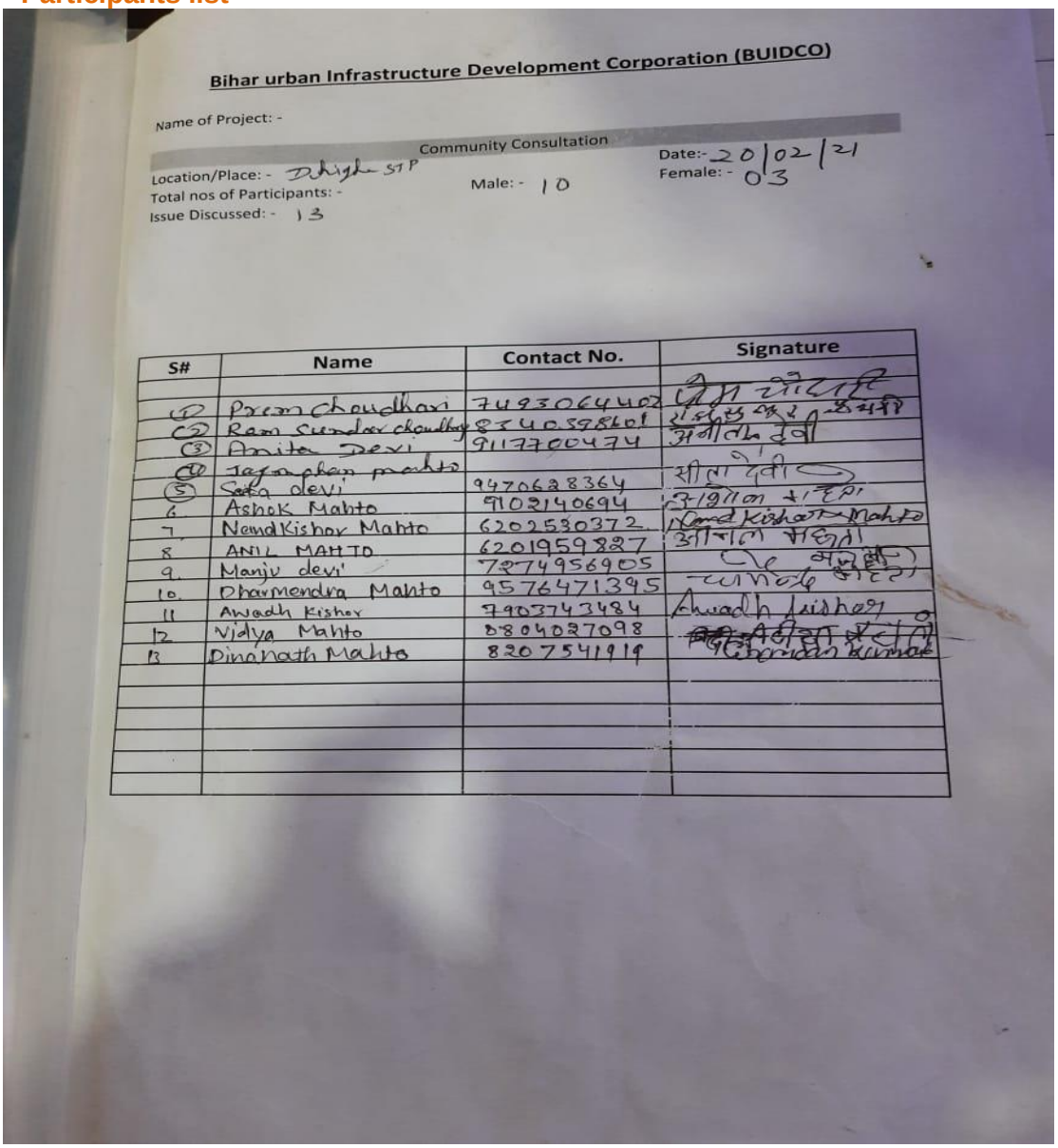
Table 8- Demographic Profile of PAPs

Sl. No.	Head of HH	Gender	No. of family members	Social Category	Religion	Monthly Income	Source of Income	Aadhar Card	Voter Id	Number of Divyang in the family	Whether vulnerable	Type of Impact
1.	Anita Dei	Female	5	OBC	Hindu	6000	Farming	Yes	Yes	0	No	**Loss of livelihood**
2.	Prem Chaudhry	Male	7	OBC	Hindu	8000	Farming	Yes	Yes	0	No	
3.	Jagmohan Mahto	Male	6	OBC	Hindu	6000	Farming	Yes	Yes	0	No	
4.	Ram Sundar Chaudhary	Male	7	OBC	Hindu	8000	Farming	Yes	Yes	1	No	

5.	Sita Devi	Female	9	OBC	Hindu	10000	Farming	Yes	Yes	0	No	
6.	Ashok Mahto	Male	5	OBC	Hindu	6500	Farming	Yes	Yes	0	No	
7.	Dinanath Mahto	Male	7	OBC	Hindu	9000	Farming	Yes	Yes	2	No	
8.	Nand Kishor Mahto	Male	8	OBC	Hindu	5000	Farming	Yes	Yes	0	No	
9.	Anil Mahto	Male	8	OBC	Hindu	8000	Farming	Yes	Yes	1	No	
10.	Manju Devi	Female	6	OBC	Hindu	5000	Farming	Yes	Yes	0	No	
11.	Dharmendra Mahto	Male	7	OBC	Hindu	6000	Farming	Yes	Yes	1	No	
12.	Awadh Kishor	Male	2	OBC	Hindu	7000	Farming	Yes	Yes	1	No	
13.	Vidya Mahto	Male	7	OBC	Hindu	9000	Farming	Yes	Yes	2	No	

(*Note-These PAPs are not permanent in cultivation (seasonal farming) individuals may change at the time of cash assistance because this season these PAPs are cultivating but in upcoming season the PAPs may be different).

Participants list



Bihar urban Infrastructure Development Corporation (BUIDCO)

Name of Project: -

Community Consultation

Location/Place: - Dhigha STP Date:- 20/02/21

Total nos of Participants: - Male: - 10 Female: - 03

Issue Discussed: - 13

S#	Name	Contact No.	Signature
1	Prem Choudhary	7493064402	
2	Ram Sundar choudhary	8340598601	
3	Anita Devi	9117700474	
4	Jagmohan mahto		
5	Sita devi	9470628364	
6	Ashok Mahto	9102140694	
7	Nand Kishor Mahto	6202530372	
8	ANIL MAHTO	6201959827	
9	Manju devi	7274956905	
10	Dharmendra Mahto	9576471395	
11	Awadh Kishor	7903743484	
12	Vidya Mahto	8804027098	
13	Dinanath Mahto	8207541919	

Figure 30: Participant List

Policy, Legal Framework and Entitlement

7. The national, state and local environmental and social regulatory requirements that are applicable to the investments proposed are given in this section. The proposed scheme involves construction of STP, pumping station and sewerage network. The ARAP meets all Government of India (GOI) and World Bank (OP/BP 4.12) regulations, policies, and procedures including those on public participation and environmental assessment and it complies all applicable national, state and local environmental and social regulatory requirements. Moreover, the project requires following the applicable Water Act and obtaining State Pollution Control Board (SPCB) clearance prior to commissioning of any civil works.

8. Provisions mentioned in the Environment and Social Assessment Management Plan (ESAMP) prepared in 2018 has been adopted for this Digha Sewerage Project. It is also in accordance with the National Policies, State Policies and World Bank's Operational policies (OP. 4.12, OP 4.10 and OP 4.11). This Policy and Framework document describes the principles and approach to be followed in minimizing and mitigating adverse socio-economic impacts caused by upgradation of selected corridors for safety enhancement under the project. The action plan has been prepared is based on the broad outline laid down in the above mentioned policies.

9. The principle of the R&R policy is the guiding philosophy to provide a development approach to resettle and rehabilitate the people affected by project. In particular:

    - Wherever possible, displacement will be reduced on or avoided altogether by sensitive design of civil works (e.g. alternative designs or modification to the design).
    - Where displacement is unavoidable, those displaced will have their living standard improved. They will be located as a single unit among the peer groups or will be assisted to integrate into their new community. Attention will be paid to the needs of the most vulnerable groups to be resettled.
    - PAPs will be compensated, at replacement cost, for assets lost.
    - Adequate social and physical infrastructure will be provided.
    - PAPs would be encouraged to participate in the design and the implementation of ARAP

Entitlement Matrix

10. Entitlement matrix for this project has been developed in accordance with the provisions and guidelines adopted in the ESAMP, State, National and World Bank's Operational Policies and analysis of initial identification of project impacts.

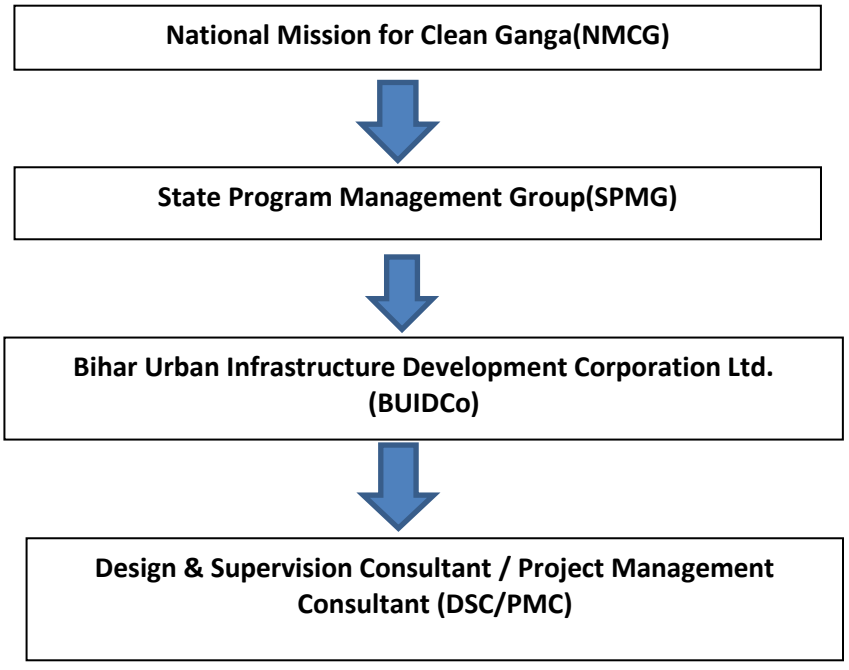
11. The proposed Entitlement Matrix (EM) for Resettlement and Rehabilitation prepared for Digha Sewerage project is given in the Table 9 Chapter 3 of ARAP.

Public Consultations

12. Public participation has been undertaken to make explicit the social factors that will affect the development impacts of planned sewerage project results. It included socio-cultural analysis and design of social strategy, institutional analysis and specifically addressed the issue of how poor and vulnerable groups may benefit from the project. Through public participation, stakeholders and key social issues were identified and appropriate strategy was accordingly formulated.

13. Consultations were held with affected families. The main objectives of the consultation program were to minimize negative impact in the project site and to make people aware of the project.

Institutional Arrangement



14. Within the overall implementation guideline of the NGRBA program, ARAP will be implemented by the executing agency under the overall guidance of SPMG. BUIDCo being an Executing agency will implement the ARAP.

Implementation Schedule, Monitoring and Budget

15. Specific situations may require an increase in timeline for the implementation of ARAP. Such situations include, but not limited to local opposition, seasonal factors, social and economic concerns, training of support staff and financial constraints. Completion schedule will involve continuous coordination among the project management units and various other departments and agencies involved.

16. Implementation of ARAP in this project consists of livelihood loss compensation to all PAPs. As per the conditions in the civil works contracts, land free from all encumbrances has been made available to the contractor[1] for the contract package. However, civil works has not been initiated yet on the said parcel of land. Civil works will commence as per the approved work plan of the project.

Income Restoration

17. The basic objective of income restoration activities is that no PAP shall be worse off than before the project. Restoration of pre-project levels of income is an important part of rehabilitating individuals, households, and socio-economic and cultural systems in affected communities. Based on the information collected on IR activities through the census socio-economic surveys, BUIDCo will compensate the PAPs.

18. While identifying IR options, the supervision consultant shall consider the following factors:

- Education level of affected persons.
- Skill possession.
- Likely economic activities in the post-displacement period.
- Extent of land left.
- Suitability of economic activity to supplement the income, and Market potential and marketing facilities.
- Training assistance to the affected PAPs.

Training

19. Under this project, PAPs belong to NTH category who have squatted the land and are engaged in seasonal agricultural work only for 6-7 months of the year while the remaining period of the year the area is inundated with flood.

20. Adequate budgetary provisions have been kept for skill upgradation of PAPs, if required.

Budget

The total indicative resettlement budget for Digha STP project has been estimated ` **5,43,900. The detailed budget requirements of ARAP is discussed in ESMP.**

6.6.12 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

[1] BUIDCO vide its letter no 16 dated 14 Dec 2020 has handed over land measuring 409 meter x 150 meter to the concessionaire.

- 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'*

6.6.13 Community Health and Safety

During peak construction phase, a portion of the labour requirement will be met from nearby locality. A few migrant labour will also be engaged through labour contractors for whom labor camps will be established. The labour colony will be organized in city so that labour has get access to daily needs which is not available at site. Suitable arrangements for their transport (Pick and drop) and mid-day food will be organized so that they get hygienic food at site.

For transportation of raw materials, the traffic from heavy vehicles is expected to increase along the major district road and local internal 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 residents in the project area, especially along the Gate no 93.

All activities during construction causing air pollution, increasing noise levels and dust emissions (as the approach road to the site is an unpaved dirt road) 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 neighbouring community. The security personnel appointed for protection of the project area during construction could pose risks to the community due to misbehavior.

The Digha Ghat is used as recreational place by the local community and especially during festivals like Durga puja and Chatth puja, it caters to number of people highlighting its religious functionality.

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 soild.

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 and River Ganga in case of breaches and may lead to adverse impacts to the agricultural crops and quality of river water.

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 Odors

Air emissions from sewage treatment and anaerobic digestor 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 $PM_{2.5}$ and PM_{10} were exceeding NAAQS standard and 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. However, as the approach road to the project location is an unpaved dirt road along the banks of river therefore, 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 location of STP is in close vicinity to river Ganga and due to flooding the construction as well as operation of STP may get affected. 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 river.

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 that 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.

- Electrocution 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 inhalationof 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
- ✓ floods

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

6.8.1 Project Development/ Planning Impacts

Nature of Impact/ Activity	Impacted EHS Component	Impact Classification
1. Land Use Change due to setting up of STP	Local Community	**High**
2. Viewscape impacts due to proximity of settlements tothe project area	Local community	**Low**

6.8.2 Pre- Construction & Construction Phase Impacts

Nature of Impact	Impacted EHS Component	Impact Classification
1. Alteration of natural drainage pattern due to sitelevelling	Landform, local community	**High**
2. Potential impact of erosion and flooding due to river Ganga	Landform	**High**
3. Obstruction to flows in open *Nallahs* and deteriorationof river water quality due to soil erosion and dumping of construction waste	Surface water quality, local community	**High**
4. Increase in fugitive dust emissions causing air pollutionfrom 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**
5. 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.		**Medium**
6. Increase in ambient noise levels due to operation of construction equipment.	Worker health	**Medium**
7. 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**
8. Ground water pollution due to leaching of materials and waste into the soil	Ground water Local community	**Medium**
9. Exposure to physical, chemical hazards, exposure to noise, working with construction equipment, fugitive dust, emergencies at site	Construction workers	**Medium**
10. 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**
11. Soil erosion due to site clearance	community health	**Medium**
12. Resource consumption such as water, fuel, causing depletion	Local community	**Low**
13. Loss of flora due to site clearance impacting avian fauna habitat	Flora, avian fauna	**Low**

6.8.3 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**

Nature of Impact	Impacted EHS Component	Impact Classification
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 • 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 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 proceduresare 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/ PlantManager of the STP.

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

The EHS Manager should have atleast 10-12 years relevant past experience of similar infrastructure projects and EHS Engineers should have 2-4 years of relevant past experience in similar infrastructureprojects. 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 checkcompliance to the ESMP.
- Investigate major accidents/ incidents, prepare report of findings, including recommendationsto 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 complianceto the ESMP and report deviations to EHS Manager.
- Conduct training of Contractors or their personnel, where required, on implementation of theESMP.
- Follow-up with Contractors to ensure legal compliance at all times.

7.3 ESMP for proposed STP Plant at Digha

7.3.1 During Pre-Construction, Construction and O&M Phase

The ESMP for project development/ planning, pre-construction and construction phase impacts ispresented in **Table-11** . The legal requirements to be adhered during planning, pre-construction and construction phases ofthe 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 Income Restoration of Project Affected Persons in ARAP/Mitigation measures

(i) The basic objective of income restoration activities is that no project affected person shall be worse off than before the project. Restoration of pre-project levels of income is an important part of rehabilitating individuals, households, and socio-economic and cultural systems in affected communities. Income restoration (IR) schemes will be designed in consultation with affected persons so as to benefit them. Based on the information collected on IR activities through the census socio-economic surveys, PMC will identify suitable IR program for the affected persons. Steps to be followed for income restoration include:

(ii) Identification of target groups and choosing respective income restoration activities –Implementing agency (Design & Supervision Consultant) needs to identify the affected persons and prepare a list of feasible income restoration options. While identifying IR options, the following factors shall also be considered:

- Education level of affected persons
- Skill possession
- Likely economic activities in the post-displacement period,
- Extent of land left
- Suitability of economic activity to supplement the income and market potential and marketing facilities.

- Training assistance for any one adult member of the commercial squatter family for income generation in opted areas.

Income Restoration Plan for Digha Project

(iii) The commissioning of civil works under the proposed project won't trigger any physical displacement however, livelihoods of 13 PAPs will be impacted. Public consultations have been conducted with these PAPs. During Public consultation the PAPs informed that they have been engaged in farming activities since long and that they were not interested in taking any skill development training to augment their income as they are not literate and skilled enough to take up any other works after skill training.

Implementation of ARAP

(iv) Implementation of Resettlement Action Plan mainly entails assistance/compensation to be paid for affected structures; Rehabilitation and Resettlement activities. Implementation plan has been spread over a period of one year. The civil of works contract for each sub-project is normally awarded when compensations and R&R disbursed to entitled persons as per Entitlement Matrix is completed.

(v) Specific situations may require an increase in timeline for the implementation of ARAP. Such situations include, but not limited to local opposition, seasonal factors, social and economic concerns, training of support staff and financial constraints. Completion schedule will involve continuous coordination among the project management units and the various other involved departments and agencies.

(vi) Implementation of ARAP in this project consists of Resettlement & Rehabilitation of all PAPs. As per the conditions in the civil works contracts, land free from all encumbrances is to be made available to the contractors for the contract package. Time frame for implementation of ARAP is synchronized with the proposed project implementation (construction schedule) in a way that commencement and progress of civil works is not jeopardized. A composite implementation schedule for R&R activities in the sub project including various sub tasks and time line matching with civil work schedule shall be further prepared in the design stage of the project. However, the sequence may change or delays may occur due to circumstances beyond the control of the Project and accordingly the time can be adjusted for the implementation of the plan.

(vii) The implementation Resettlement Action Plan(Table 15) starts from the orientation training of staffs of SPMG, BUIDCo and other concerned agencies. The orientation program is more paramount to the staffs who involved in the project. There should be a proper coordination between SPMG, BUIDCo and the PMC for the smooth execution of ARAP.

Table -9- ARAP Implementation Schedule

Activity	Status	Responsibility	Remarks
Activity I. Resettlement and Rehabilitation			
1.Finalization of Site	Completed	BUIDCo	All sites finalised
2.Finalization of identification of PAPs	Completed	BUIDCo	Socio-Economic survey has been carried out.
3.Finalization of draft ARAP	Completed	BUIDCo	ARAP is being revised.
4.Review and approval of ARAP	Draft ARAP approved	World Bank	Submitted to BUIDCO
5.Disclosure of ARAP	Disclosed on the website	BUIDCo/PMC	Submitted to BUIDCO
6.Formation of GRC	Completed	SPMG/BUIDCo	GRC has been formed
Activity II. Land Acquisition			
Land acquisition	Nil (Govt land -Patna Municipal corporation)		No private land acquisition identified

Implementation Procedure

(viii) The proposed R&R activities are divided in to three broad categories based on the stages of work and process of implementation. The details of activities involved in these three phases, i.e. Project Preparation Phase, ARAP Implementation phase and Monitoring and Evaluation period are discussed in the following paragraphs.

Project Preparation Phase

(ix) The major activities to be performed in this period include assigning roles and responsibilities of R&R to the designated persons at SPMG and BUIDCo level; submission of ARAP for WB approval; appointment of consultants and establishment of GRC etc. The information campaign &community consultation will be a process initiated from this stage and will go on till the end of the project.

ARAP implementation Phase

(x) After the project preparation phase the next stage is implementation of ARAP which includes:

- Verification of Properties of affected persons and estimation of their type and level of losses;
- Issues regarding payment of compensation/assistance by BUIDCo/SPMG; payment of all eligible assistance as per EM;
- Site preparation for delivering the site to contractors for construction and finally starting civil work
- Identity Card shall be issued to all title - holders and non-title holders PAPs within one month of declaration of eligibility list.

Implementation Responsibility and the status

(xi) It is the responsibility of the BUIDCO to ensure that the ARAP is successfully implemented in timely manner. The implementation plan of ARAP for a specific route will be prepared by the BUIDCO.

(xii) BUIDCO will be assisted by the PMC. The implementation schedule proposed will be updated as the implementation progresses.

Capacity Building

(xiii) The implementation of the ARAP will require capacity building and orientation of the officers in charge of R&R at the SPMG and BUIDCo level. Therefore, it is planned that these officers will be imparted training and orientation on social safeguards and various aspects of LA and R&R for effectively implementing the ARAP. This training and orientation will be conducted with the help of Project Management Consultants and other experts. The following components will be covered in the training:

- Understanding of the State and Central acts, policies and rules, and WB guidelines and requirements;
- Understanding of the policy and procedure adopted under the Project;
- Understanding of the Implementation Schedule activities step-by-step;
- Understanding of the Monitoring and reporting mechanism; and
- Understanding of the economic rehabilitation schemes

Indicative Resettlement Cost

(xiv) The implementation of ARAP entails expenditure, which is a part of the overall project cost. The R&R budget, gives an overview of the estimated costs of the ARAP and provides a cost-wise, item-wise budget estimate for the entire package of resettlement implementation, including compensation, assistance, administrative expense, and contingencies Values for compensation amounts and other support mechanism will be adjusted, based on annual inflation factor.

(xv) Costs related to land acquisition and transfer of title to property from private individuals will be paid by project authorities. However, no private land acquisition is required.

(xvi) Around 5% of the total cost has been set aside for physical contingencies. Such type of contingencies may arise as a result of time overrun of the project or due to various other unforeseen circumstances.

(xvii) In Digha, the STP land is a government land and handed over to WABAGH free of all encumbrances. The site is being barricaded to eliminated any unauthorised entry during construction/Operation Phase.

Table 16- Indicative Resettlement Budget

Type of Impact	No. of persons / families impacted	Provision as per entitlement Matrix	Duration	Compensation Amount per family	Total amount
Loss of livelihood	13	` 3000 / month/ family	1 year	` 36000	` 468,000[7]

Public consultation etc.					` 50,000
Total Cost					` 5,18,000
Add 5% as contingency cost					` 25,900
Final R&R cost					` **5,43,900**

Temporary barricades for Digha site

Table 11: ESMP for Pre-Construction and Construction Phase

Nature of Impact	Impacted ESHS Component	Impact Classification	Management Mitigation Measures	Responsibility- Implementation/Monitoring & Supervision	Cost estimate (in INR)
1. Land for the project and Loss of Livelihood	Encroachers and Non Title Holders (Temporary Seasonal Farmers)	**Medium**	a) The assessment of impact on livelihoods of families/ persons undertaking seasonal cultivation on the government land allocated for the STP was conducted and a detailed report of (Resettlement Action Plan) RAP is prepared to compensate the affected families. b) The total indicative resettlement budget for Digha STP project has been estimated INR **5,43,900.**	• Contractor and BUIDCo will implement this in monitoring & supervision by SMCG/NMCG.	ARAP report can be referred for this. Tentative cost- INR 5,43,900
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 usedfor 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 Patliputra PMC disposal area. (letter is awaited from PMC) 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.	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG	Part of contract

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	Air quality Community health Worker health	**Medium**	a) Area of clearance and excavations will be limited to area required immediately for construction. b) Water sprinkling will be done twice a day – however it may change based on the weather condition and the dust level. 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 minimised 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. d) Semi-pucca haul roads will be tried to build by spreading and compacting aggregate/metal/waste concrete mix. e) Construction material will be stored in covered sheds. f) Periodic air quality monitoring i.e quarterly except monsoon season will be conducted and compared with baseline.	• Implementation-Contractor • Monitoring & Supervision-BUIDCo/SMCG/NMCG	INR 3,00,000 (Lumpsum cost)

4. Increase in concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NOx from burning of fuel in construction equipment and transportation vehicles and cooking in labour camps.	Air quality Communityhealth Worker health	**Medium**	a) Fitness certificate of construction equipment will be checked before mobilization at site. b) PUC Certificate of all vehicles will be collected before mobilization at site. c) Periodic maintenance of construction equipment and transport vehicles will be ensured foroptimum engine performance. d) Dumpers will be covered during transporting construction spoil. e) Exposed earthworks and surfaces will be covered when not underactive work. 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. g) Quarterly ambient Air Quality monitoring except monsoon season, at the active construction site will be carried out with the help of NABL approve laboratory. h) Wood burning will be restricted through physical inspection in cooking purpose at labour camp and construction site in winter season.	• Implementation-Contractor • Monitoring & Supervision-BUIDCo/SMCG/NMCG	INR 40,500 (ESDDR-EMP cost)

5. Increase in ambient noise levels due to operation of construction equipment and vehicles	Local communityhealth Worker health	**Medium**	a) Periodic preventive maintenance of construction equipment for optimum engine performance will be practiced. b) D.G set including vehicle and construction machinery will be provided with acoustic enclosures and thickly padded to prevent vibration. c) Idling of engines will be limited when not in use to reduce itscontribution to noise emissions. d) Signage's signaling no honking will be installed inside the site area e) Drivers and workers will be oriented on good noise managementstrategies in Tool Box Talk. f) Quarterly ambient noise monitoring will be conducted as per monitoring plan from NABL lab.	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG	INR: 784760 and also Refer ESDDR-EMP with cost estimation

7. Ground water pollution due to leaching of materials and waste intothe soil	Ground water Local communit y	**Medium**	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.	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMC G	Part of contract
8. Exposure to physical, chemical hazards, exposure to noise, working with construction equipment, fugitive dust, emergencies at site	Constructio nworkers	**Medium**	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 workpractices in TBT. e) Any near miss/injuries at site will be properly recorded and investigated injuries. f) PPEs will be provided to construction workers a. Safety shoes, hard hat/helmet, and hand gloves withgrip 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 paintingactivities e. Face shield for those engaged in welding	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/N MCG	INR 18,28,000

9. Exposure to migrant workers, air and noise pollution, project security personnel, obstruction to community activities and accidents caused in the nearby community due toconstruction activities	Local community	**Medium**	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. 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. c) Health condition will also be checked before mobilizing the labour at site. 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. e) Orientation training on safety requirements, Code of Conduct, and other working conditions will be provided. f) Awareness will be created about local tradition and culture among outside migrant and encouraging respect for same. g) Awareness programme will be conducted about sexually transmitted diseases among the migrant workers, labourers . h) Hospital tie up is done with UDAYAN HOSPITAL, Boring road,Patna. 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) Employ security personnel from reputed security agencies.	• Implementation -Contractor • Monitoring & Supervision-BUIDCo/SMCG /NMCG	INR 306585 and also Refer ESDDR-EMP with cost estimation

10. Alteration of natural drainage pattern due tosite levelling	Landform, local community	**Medium**	a) Stormwater drainage will be provided within and at the bordersof the site to channelize the stormwater during monsoon season. b) Procurement of aggregates and soil will be ensured from authorized quarriesand borrow areas. Royalty receipt of the same will be submitted to BUIDCo. c) Natural drainage pattern of the site and its immediate surrounding will be considered during site levelling.	• Implementation-Contractor • Monitoring & Supervision-BUIDCo/SMCG/NMCG	Part of contract
11.Resource consumption such as water and fuel causing depletion	Local community	**Low**	a) Preventive maintenance of construction equipment will be conducted to ensure proper engine performance and optimum level of fuel consumption b) Running hours of the equipment and machinery will be optimize through proper planning of activities. 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. d) Water taps will be ensured in closed position while not in use. e) Usage of water will be monitored and its usage for various activities will be optimized. f) Workers and all relevant personnel will be trained/oriented on the aspects of resource conservation and its importance.	• Implementation-Contractor • Monitoring & Supervision-BUIDCo/SMCG/NMCG	Part of contract

12. Loss of flora and fauna due to site clearance	Flora Avian fauna	**Low**	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.	• 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**	a) Drainage lines or temporary bunds will be planned and constructed around construction areas and at the site boundary toprevent runoffs into the nearby agricultural lands. b) Area of clearance and excavations will be limited to the areарequired immediately for construction. c) Large trees will be preserved on site, as feasible. d) Procurement of aggregates and soil will be taken from authorized quarriesand borrow areas. e) Compaction of the cleared areas will be done.	• 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**	a) Feasibility will be checked for locating dump yards, storing construction materials and construction vehicle & equipment parkingaway 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.	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG	Part of contract

Total Cost = INR 3803745/ -

Table 12: ESMP for O&M Phase

Nature of Impact	Impacted ESHS Component	Impact Classification	Management Mitigation Measures	Responsibility-Implementation/Monitoring & Supervision	Cost estimate (in INR)
1.Natural resource consumption causing depletion	Local community	**Medium**	**A. Measures for water efficiency** 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. b) Reuse of treated sewage will be ensured for landscaping, plantcleaning, flushing etc. where to reduce freshwater consumption. c) Workers and all relevant personnel will be trained on the aspectsof resource conservation. **B. Measures for energy efficiency** a) Preventive maintenance of all equipment and machinery including pumps, air compressors and motors will be conductedto ensure optimum level of energy consumption. b) Energy efficient lighting systems will be used. c) Monitoring of energy consumption across various equipment andtreatment stage will be done through use of energy meters. 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. f) Optimum utilization of biogas will be ensured for co-generation ofheat and electricity. g) Sufficient insulation will be ensured in hot water systems to prevent loss of heat.	• Implementation-Contractor • Monitoring & Supervision-BUIDCo/SMCG/NMCG	Part of contract

2. Soil contamination and groundwater pollution due to spillages and unscientific managementof various types of waste	Soil quality Groundwater quality	**Medium**	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. b) Hazardous waste will be stored in secured rooms with secondary containment in compliance with the Hazardous Waste Management Rules. c) Waste oil will be stored separate container and dispose through authorized recyclers. d) Quantity of solids generated will be minimized by the watertreatment process through optimizing coagulation processes. e) Where feasible, treated spent sludge will be reuse as manure for landscaping. f) Monitoring of soil (once in a year) and groundwater (twice in a year) will be conducted from NABL lab.	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG	Part of contract
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**	a) Cover emission points (e.g., aeration basins, clarifiers, sludge thickeners, tanks, and channels), and vent emissions to control systems (e.g., compost beds, bio-filters, chemical scrubbers, etc.) as needed to reduce odours and otherwise meet applicable national requirements. b) Where necessary, consider alternate aeration technologies or process configurations to reduce volatilization. c) Low Sulphur content diesel will be used in DG sets. d) Ambient Air Monitoring will be conducted twice in a year from NABL lab. e) Green area will be developed along the boundary of the plant to check the odour.	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG	Part of contract

4. Leakages and overflows resulting contamination of soil, freshwater bodies, and groundwater	Surface water quality Groundwater quality Soil contaminationn Local community	**Medium**	<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 andmaintenance program will be scheduled which includes: ○ Development of an inventory of system components ○ Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris. ○ Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. ○ Monitoring of sewer flow to identify potential inflows and outflows. d) Repairs will be prioritized and conducted based on the nature andseverity of the problem. e) Bypass of the treatment system will be minimized by using separate storm water and wastewater systems andproviding 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 solids and hydrogen sulfide generation. 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 h) Faecal sludge and septage discharging at storage and treatment facilities will be facilitated so that untreated septage is not discharged to the environment.	• Implementation-Contractor • Monitoring & Supervision-BUIDCo/SMCG/NMCG	Part of contract

5. Exposure to various occupational health and safety impacts including ○ Physical hazards ○ Biological hazards ○ Chemical hazards ○ Noise & vibration Odor Exposure to operational/natural/ manmade emergencies at project site	Local community STP workers and employees Visitors to the STP	**Medium**	**A. <u>Accidents and Injuries</u>** a) Railing is proposed to be installed around all process tanks and pits. Use of a lifeline and personal flotation device(PFD) will be make 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.	• Implementation- Contractor • Monitoring & Supervision- BUIDCo/SMCG/NMCG	Part of contract

			B. <u>Hazardous chemicals</u> 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 canbe effectively treated in the wastewater treatment facility and reduce the amount of air-strippable 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.		

			a) Air quality monitoring will be conducted as per monitoring plan in work areas for hazardous conditions (e.g. explosive atmosphere, oxygen deficiency). b) Engineering controls will be installed to limit worker exposure, for example collection and treatment of off-gases from air stripping. c) Personnel will be rotated among the various treatment plant operations to reduce inhalation of air-stripped chemicals, aerosols, and other potentially hazardous materials. **C. <u>Chlorine system safety</u>** d) Alarm and safety systems will be installed, including automatic shutoff valves, that are automatically activated when achlorine release is detected. e) Containment and scrubber systems will be installed to capture and neutralize chlorine leak if occur. f) Storage of chlorine will be ensured away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures. g) 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. h) Ammonia storage and feed areas will be isolated from chlorine and hypochlorite storage and feed areas to avoid any incident. i) Amount of chlorination chemicals storage will be minimized on site while maintaining a sufficient inventory to cover intermittent disruptions in supply.		

			a) A prevention program will be developed and implemented that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures. b) Emergency response plan will be developed and implemented as a part of O&M manual. **D. <u>Pathogens</u>** a) On job training program for workers shall be conducted on safe handling, and personal hygiene practices to minimizeexposure to pathogens and vectors with Use vacuum trucks or tugs for removal of fecal sludge instead of manual methods. b) Required personal protectiveclothing and equipment to prevent contact with wastewater will be provided (e.g., rubber gloves, aprons, boots, etc.). c) Areas will be demarcated for workers to shower and change clothes before leaving work and orient them on washing of these workclothes. d) Workers at wastewater facilities will be trained on regular hand washing. e) Worker immunization (e.g. for Hepatitis B andtetanus) and health monitoring program will also be developed, including regular physical examinations.		

			f) Aerosol formation and distribution will be reduced by, adopting following measures, for exampleby: ○ 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 g) Good housekeeping will be maintained in sewage processing andstorage areas. h) Individuals with asthma, diabetes, or suppressed immune systems will be avoided to work at wastewater treatment facilities, especially composting facilities, facility becauseof their greater risk of infection.		

			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 treatedwastewater will be avoided, if possible. j) Personal protective equipment will be provided to all field workers, such as rubber gloves and waterproof shoes. **E. <u>Operational noise</u>** a) Adequate PPE (ear-plugs and earmuffs) will be provided to personnel. b) Periodic maintenance of the high noise generating equipment will be conducted. c) If required, noise insulating materials will be used where noise level will be observed high. **<u>Other precautions</u>** a) Access to safe drinking water and sanitation will be provided (including hand washing) facilities b) Health monitoring of workers will be conducted, including regularphysical examinations		

6. Community Impacts	Local community	**Medium**	a) Grievance register will be maintained at site for record of grievances if any to nearby community. b) Healthy relationship will be maintained with nearby community through CSR activities.	• Implementation by contractor • Monitoring by BUIDCo/SMCG/NMCG	Part of contract

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 analysed 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.

Environmental Component	Stage	Parameters	Locations	Total No. of Samples	Frequency	Standards /Methods	Implementation Agency
Environmental Monitoring Plan							
Air quality	Construction	PM10 µg /m3, PM2.5 µg/m3, SO2, NOX, 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 (NOx, CO, PM	Contractor though 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 (NOx, CO, PM)	STP	10 Samples	Twice in every year (pre & post monsoon) for first 5 years		
Noise levels	Construction	Leq dB (A) (Day and Night) Average and Peak values	STP	6 Samples	Once in every season (except monsoon) for 2 yrs	National Ambient Air Quality Standards with respect to Noise Standards, CPCB	Contractor though approved monitoring agency/Lab (NABL/ MOEF&CC accredit Laboratory)
	Operation		STP	10 Samples	Twice in every year (pre & post monsoon) for first 5 years		

Environmental Component	Stage	Parameters	Locations	Total No. of Samples	Frequency	Standards /Methods	Implementation Agency
Environmental Monitoring Plan							
Water Quality (Surface and Groundwater)	Construction	Ground Water Parameter as per IS:10500 (2012) and surface water parameters (Surface Water Quality ofthe nearest drains (outfall) asper CPCB guideline for discharge of treated effluents in Inland water bodies	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 though approved monitoring agency/Lab (NABL/ MoEF&CC accredit Laboratory)
	Operation		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 Ministryof Agriculture	Contractor though 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							
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)

Environmental Component	Stage	Parameters	Locations	Total No. of Samples	Frequency	Standards /Methods	Implementation Agency
Environmental Monitoring Plan							
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 carewill 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)
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 kindof 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 -11(ESMP for preconstruction and construction phase),12 (ESMP for O&M phase) and 13(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 13: 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.3803745/-and ESMP Monitoring Rs.1361000/- and unidentified impacts Rs.3000000/-.

Hence total cost of ESMP is 3803745 + 1361000 + 30,00,000 = **8164745/- (Eighty One Lakh Sixty Four Thousand Seven Hundred Forty Five only).**

7.5 Stakeholder Engagement and Information Disclosure

7.5.1 Context of Stakeholder Engagement

As presented in World Bank's Safeguard policies, 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.

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

7.5.2 Stakeholder Identification and Analysis

A. <u>Stakeholders of WABAG</u>

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. Neighboring Communities	• Neighboring residents of the STP • Encroachers at site practicing cultivation • Owners of agricultural land neighboring the project site	Other neighboring communities within study area
2. Community Representatives	• Ward Parishad	--
3. Industrial Establishments	• None present in project influence area	--
4. Regulators	• BUIDCo • Patna Municipal Corporation	--

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
	• Other Regulators (State Pollution Control Board, Factories Department, Labour Department)	
5. Institutional Stakeholders	• Equity Investors • Lenders	--
6. Other Groups	--	• 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/encroachers/ owners of neighbouring land	• Inconvenience during construction due to noise, fugitive dust and other forms of pollution. • Loss of livelihood to encroachers due to commencement of project • Inconvenience during operation & maintenance due to noise, emissions from the facility activities, odour, and other forms of pollution.	• Agitation in case of increased nuisance created from STP activities • 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.	• Contribution to infrastructural development of the area • Company assesses the loss of livelihood to encroachers and accordingly rehabilitates them. • Economic and employment opportunities • Company adopts management systems on environment, health & safety to prevent adverse impacts on the community.	**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
	• 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		• 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	• 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 fumes endangering health. • Exposure to emissions from fire emergency at the facility that may impact the life and property.	• 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.	• 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**
Other neighboring communities within study area	• Increase in vehicular traffic during construction and O&M phases. • Unavailability of groundwater for	• Public Interest Litigations. • Agitation in case of increased nuisance created from STP activities	• Company adopts management systems on environment, health & safety to prevent adverse impacts on the community.	**Medium 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
	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	• Show Cause Notice/ Closure Notice from State Pollution Control Board • Complaints to Ward Office/ District Administration that can lead to stoppage of activities.	• Company establishes a community grievance redress mechanism.	
Community Representatives				
Ward Parishad	• None	• Issue permits and approvals as applicable to the STP operations • Complaints to regulatory authorities that can lead to penalties or stoppage of activities	• All applicable permits and approvals are obtained timely and periodically as applicable • Concerns of villagers are addressed timely and appropriately	**High influence**
Regulators				
BUIDCo	• Fulfilling the institution's objective of improving the urban infrastructure	• Approve the project components. • Issue directives to stop work based on complaints form stakeholders.	• 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	• Improving quality of life in the City.	• Issue permits and approvals as applicable to the project. • Issue directives to stop work based on complaints from Ward Parishad.	• All applicable permits and approvals are obtained timely and periodically as applicable. • Complaints of Ward Parishad are addressed timely and appropriately.	**Medium 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
Applicable regulators (State Pollution Control Board, Factories Department, Labour Department)	• Assistance in treatment of sewage and reduction pollution of the river systems	• Issue permits and approvals as applicable to the project. • Levy penalties if STP Plant found non-compliant.	• 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	• 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	• Provide financial and technical resources contributing to business growth	• 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**	• None	• File PILs. • Collective bargaining through public support.	• Project operates within the regulatory framework. • Have a robust grievance redress mechanism.	**Medium influence**
Political Parties	• None	• Collective bargaining through public support.	• The Company operates within the regulatory framework. • Have a robust grievance redress mechanism.	**Low influence**
Media	• None	• Publish adverse reports about the company.	• 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 Digha 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
Neighboring Communities				
Nearby community	Construction and	• To maintain 'social license to operate'	• Consultations through one-to-one	• Facility description and benefits

Relevant Stakeholders	Stage of Engagement	Purpose of Consultation	Mode of engagement	Minimum Information to Disclose
Encroachers at the project site **Farmers owning land neighbouring the STP** **Other neighbouring population in the vicinity**	Operations Phase	• To identify the PAPs, extent of loss of livelihood, discus rehabilitation options for encroachers. • Alleviate community (or individual) grievances	meetings/ group discussions • Through written communication to Ward Parishad • Response to queries raised (if any)	• Provide information about STP activities concerning the community in a pro-active and timely manner in a language understood by community • Offsite Emergency Preparedness and Response Plan • Grievance redress contact details
Civil Society Organizations				
Ward Parishad	Construction and Operations Phase	• To maintain 'social license to operate' • Alleviate community (or individual) grievances	• Through written communication	• Facility description and benefits • Grievance redress contact details
Regulators				
BUIDCo **Patna Municipal Corporation** **Regulatory bodies issuing various environmental, labour and factory safety related approvals**	Construction and Operations Phase	• Various approvals, permissions and licenses related to setting up of the project • Land NOC • Submission of compliance related returns	• In-person meetings • Official communications as required by the law and the permits issued. • Response to queries raised, notices/ letters received	• Information required by the law and under the permits issued
Institutional Stakeholders				
Equity Investors/ Lenders	Project Lifecycle	• Inform investors about the growth and direction of the Company	• Investment/ Loan Agreement • Official communication on overall E&S performance • Response to queries raised	• 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	• Discussion on specific issues of concern to environment and social issues	• Partnerships • Response to queries raised (if any)	None in specific

Relevant Stakeholders	Stage of Engagement	Purpose of Consultation	Mode of engagement	Minimum Information to Disclose
		• Building and maintaining WABAG reputation		
Political Parties	Project Lifecycle	• Uninterrupted operations of the STP	• One-to-One meetings • Receipt of verbal grievances	None
Media	Project Lifecycle	• Building and maintaining WABAG reputation	• 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:

- Stakeholder group
- Location
- Date of communication
- Purpose of communication
- 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 legalsystem of the country.

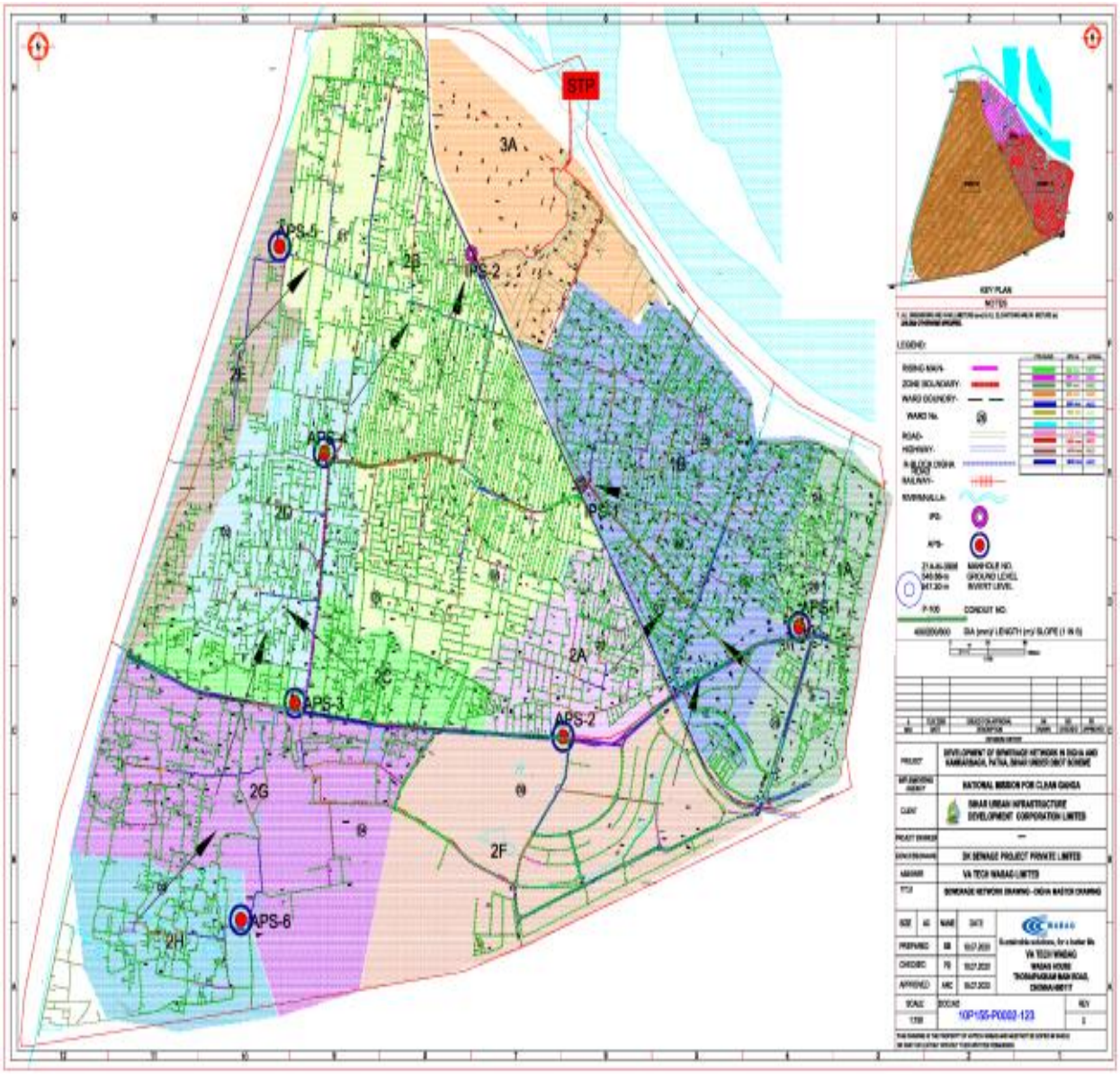
Contact details of the Community Liaison Officer should be communicated to the neighboring community, community representatives, civil society organizations (if any). Contact details of the GRCmembers should also be made available as escalation contact. The contact details should be communicated through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

7.7 Conclusion

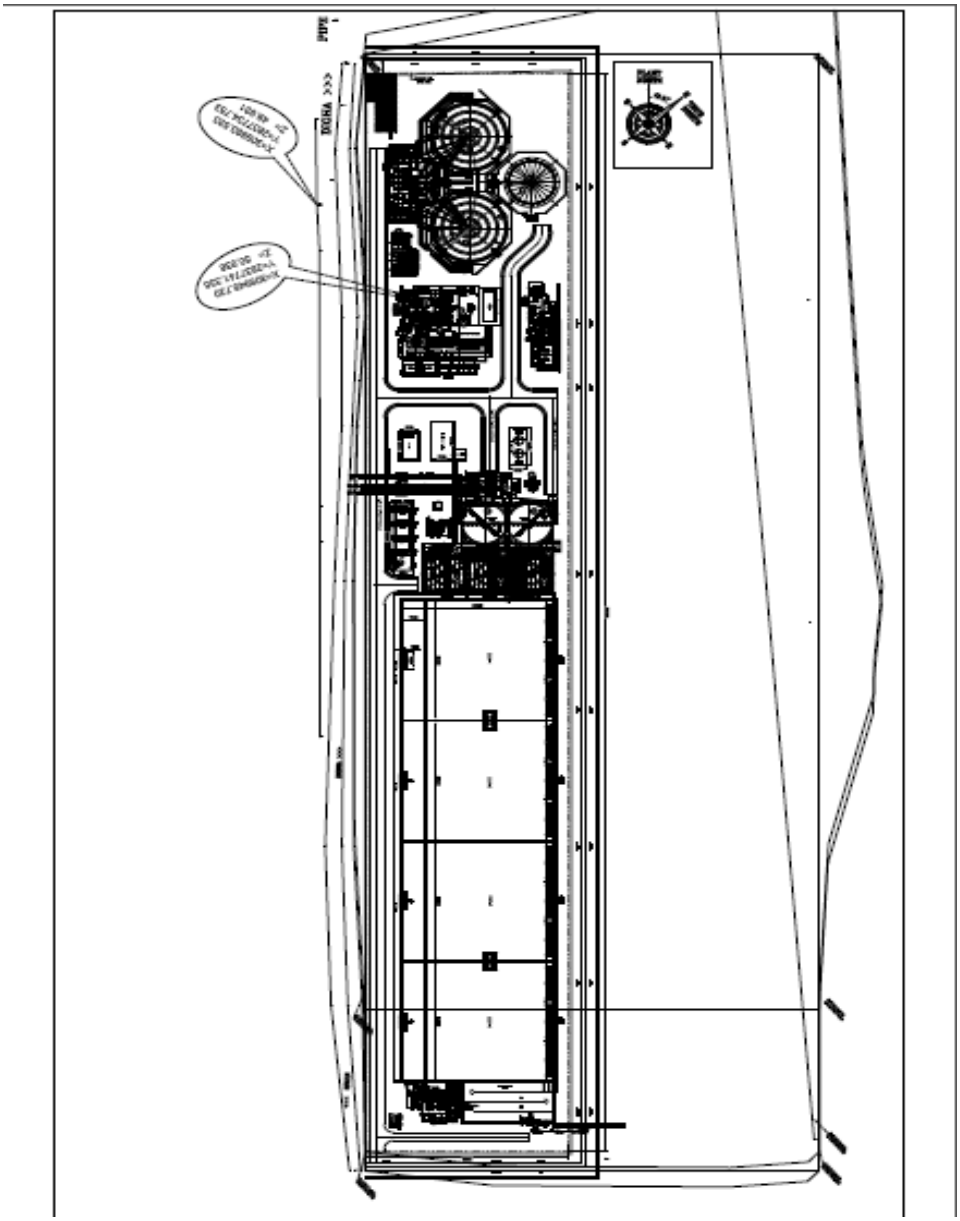
The scope of this report is limited to the Digha STP project. Environment & Social analysis of the " Proposed Digha STP project " concludes that the Projects falls under Medium Risk Category and has overall positive benefits on the life and environment of the people. There has been no reported land acquisition 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.

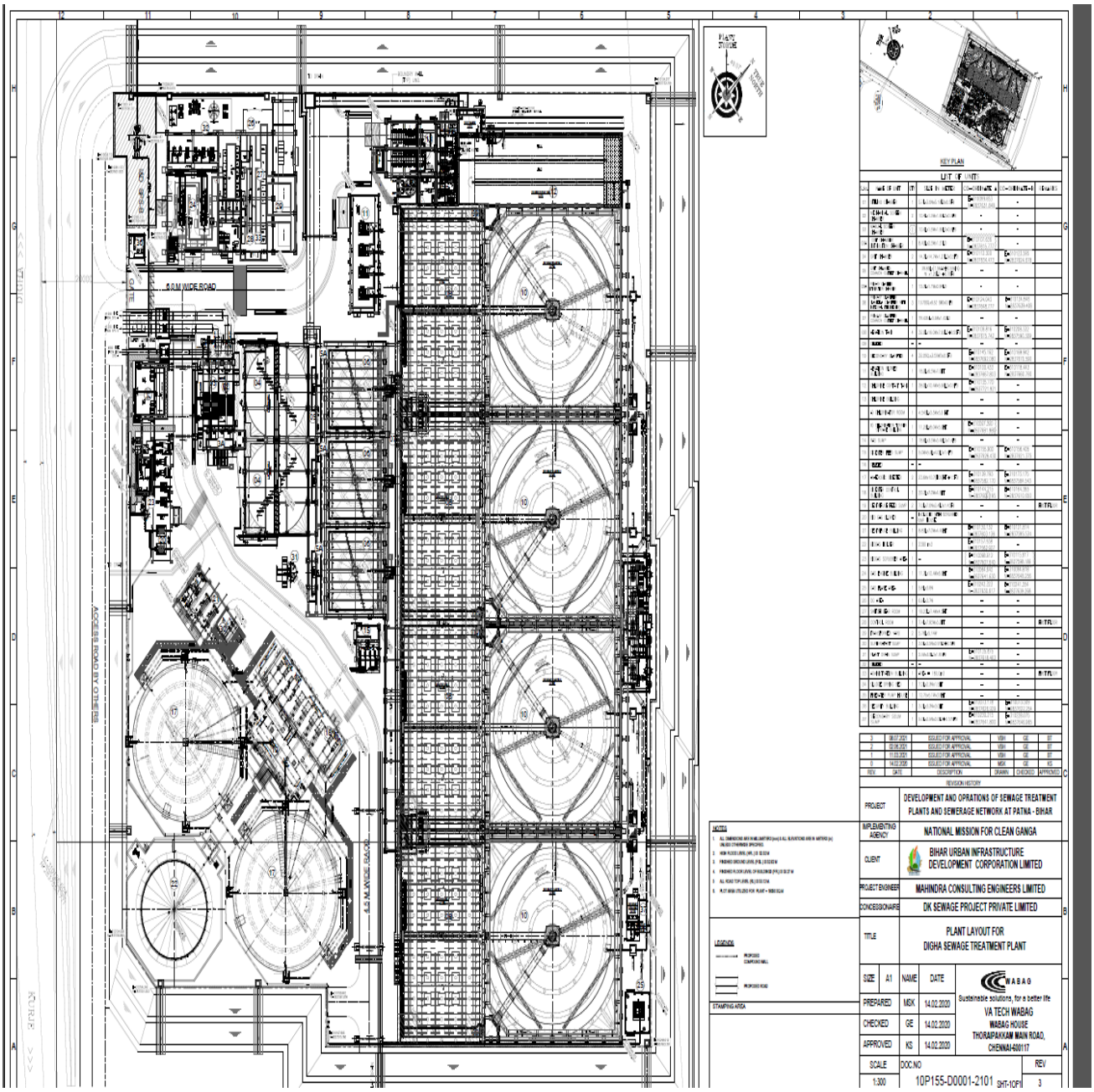
ANNEXURES:

ANNEX-01: DIGHA ZONE MAP

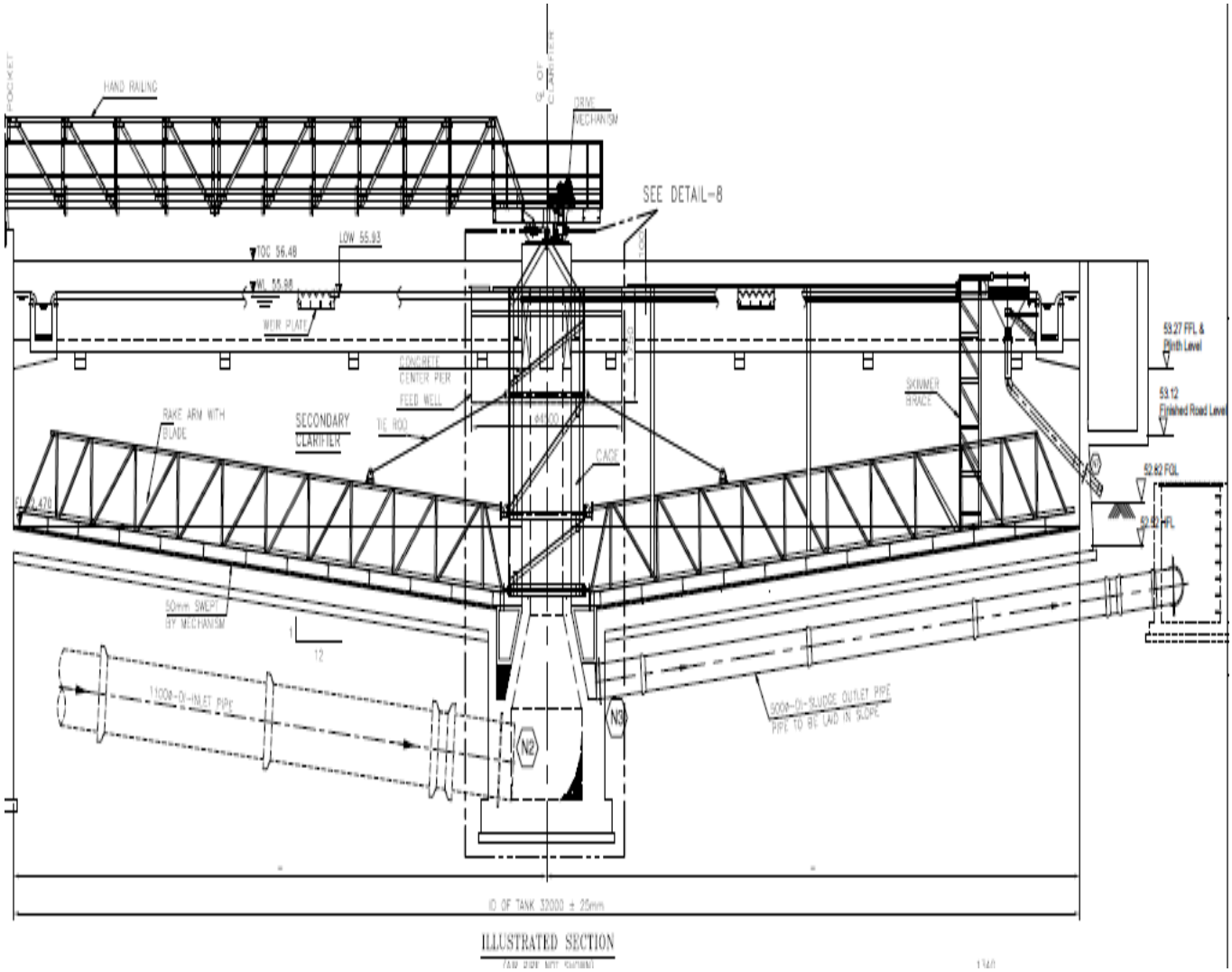


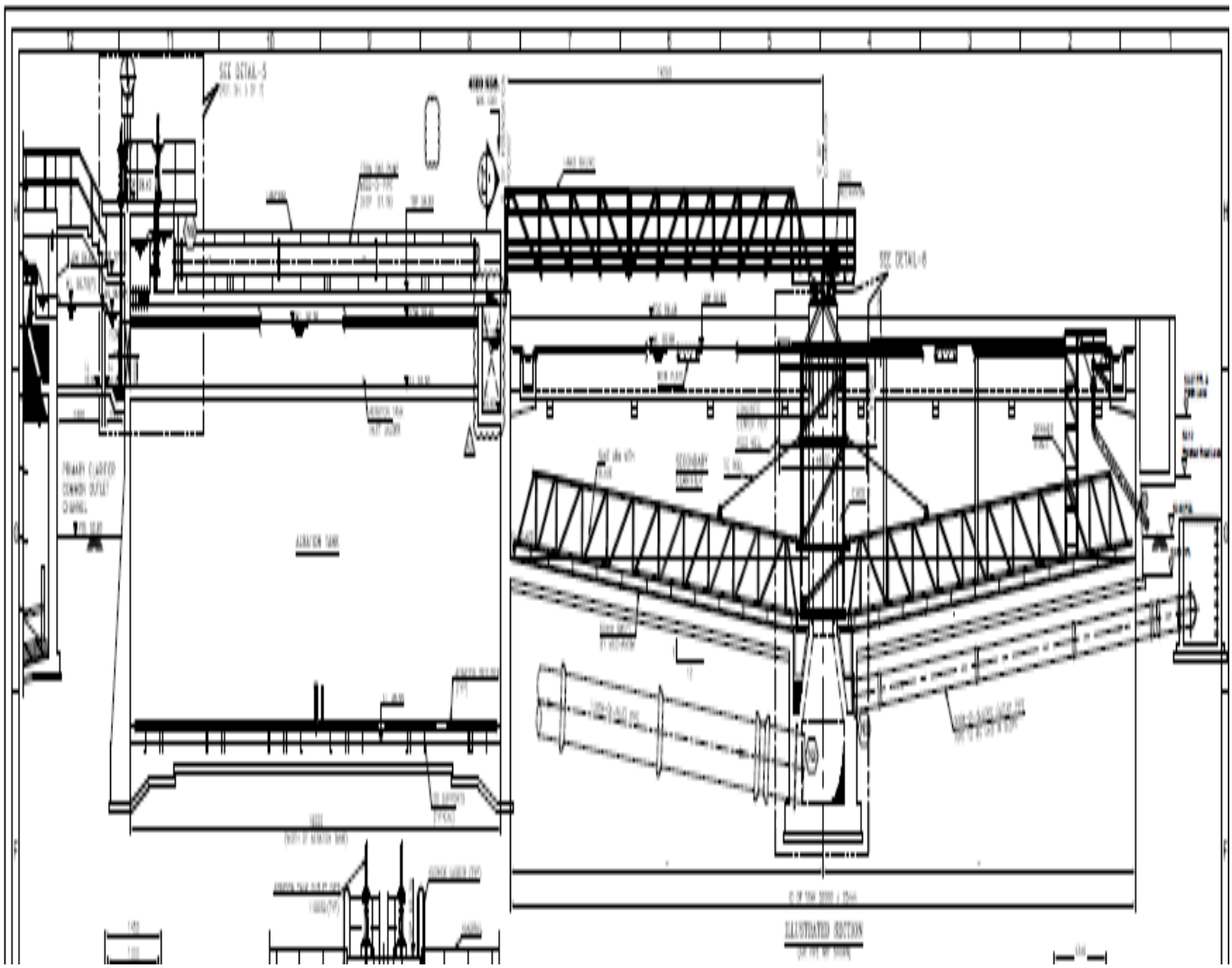
ANNEX-02 : SITE PLANT LAYOUT



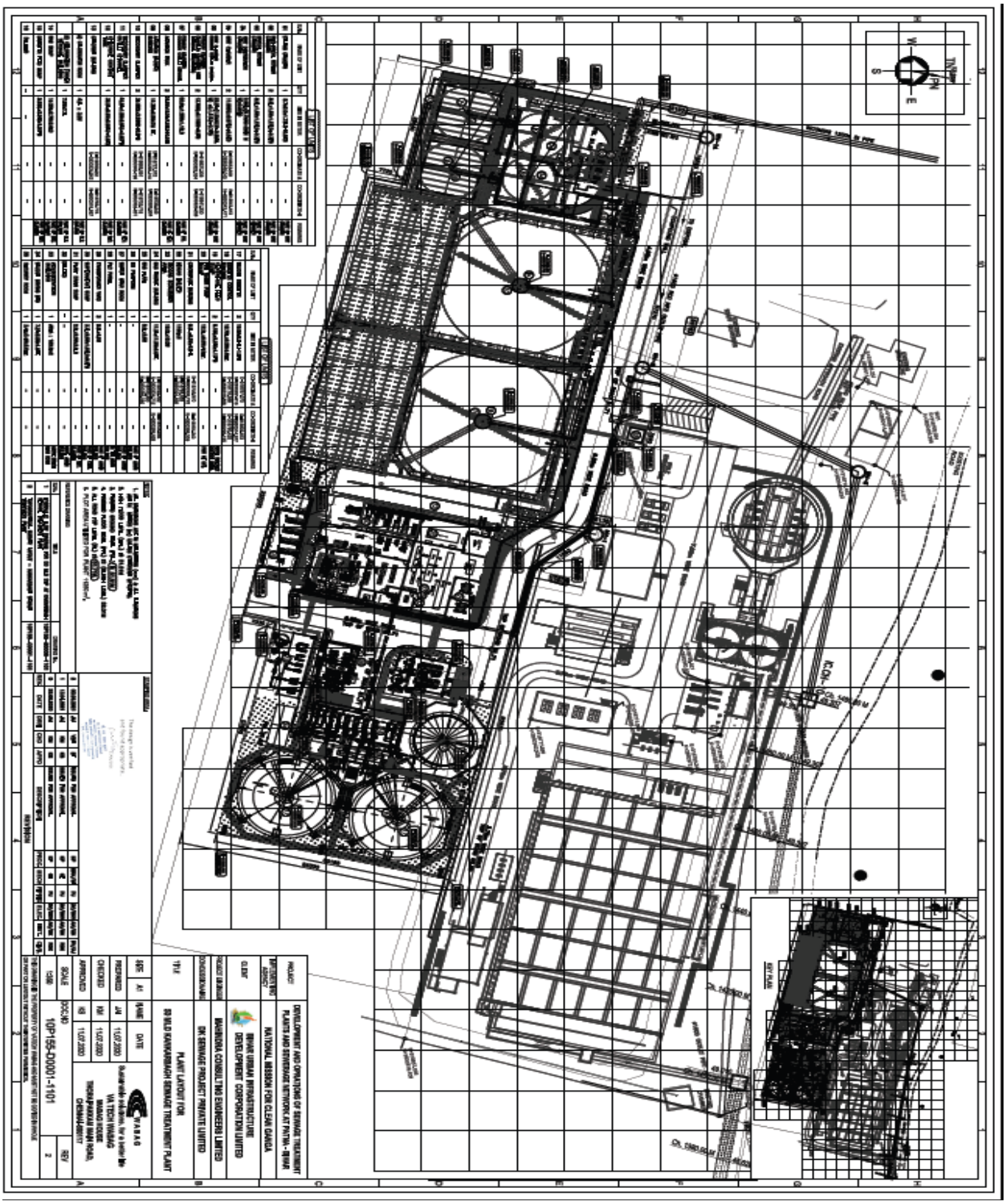

KEY PLAN
LIST OF UNITS
NOTES
LEGEND
STAMPING AREA
PROJECT
DEVELOPMENT AND OPRATIONS OF SEWAGE TREATMENT PLANTS AND SEWERAGE NETWORK AT PATNA - BIHAR
IMPLEMENTING AGENCY
NATIONAL MISSION FOR CLEAN GANGA
CLIENT
BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED
PROJECT ENGINEER
MAHINDRA CONSULTING ENGINEERS LIMITED
CONCESSIONAIRE
DK SEWAGE PROJECT PRIVATE LIMITED
TITLE
PLANT LAYOUT FOR DIGHA SEWAGE TREATMENT PLANT
SIZE A1
PREPARED MSK 14.02.2020
CHECKED GE 14.02.2020
APPROVED KS 14.02.2020
VA TECH WABAG
WABAG HOUSE
THORAPAKKAM MAIN ROAD, CHENNAI-600117
SCALE 1:300
DOC.NO 10P155-D0001-2101 SHT-1OF1
REV 3

Sectional Drawing




SEE DETAIL-5
SEE DETAIL-6
ILLUSTRATED SECTION

ANNEX-03: PROJECT FLOW DIAGRAM



PROCESS DESIGN CALCULATION

BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED	sustainable solutions for a better life. WABAG					REVISION
	PROCESS DESIGN CALCULATION DIGHA 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
	DIGHA	10P155	B0001	2101	2	9 / 56

5.3	**TREATED SEWAGE PARAMETERS**						
	Reference: Schedule 10 : KPI						
	pH			=	6.5 - 9.0		
	TOTAL SUSPENDED SOLIDS, TSS			<	50	mg/L	1
	BIOLOGICAL OXYGEN DEMAND, BOD			<	20	mg/L	1
	FECAL COLIFORMS			<	1000	MPN/100 mL	1
	COD (EXPECTED)	NOTE-1		<=	100	mg/L	1
	RESIDUAL CHLORINE (MAXIMUM)	NOTE-1		>=	1	mg/L	1
5.4	**DEWATERED SLUDGE CHARACTERISTICS**						
	Reference: Schedule 10 : KPI						
	SLUDGE CONSISTENCY			>=	20%		
	FECAL COLIFORMS			<=	2000000	MPN/g TS	
	SITE INFORMATION						
	AMBIENT TEMPERATURE	NOTE-2	MIN	=	15	deg C	1
		NOTE-2	MAX	=	45	deg C	1
		NOTE-2	AVE	=	25	deg C	1
	RELATIVE HUMIDITY	NOTE-2	MIN	=	58	%	1
		NOTE-2	MAX	=	85	%	1
	NATURAL GROUND LEVEL			=	49	m	1
	HIGH FLOOD LEVEL			=	52.52	m	
	FINISHED GROUND LEVEL			=	52.82	m	
	DETERMINATION OF ATMOSPHERIC PRESSURE						

$$P_{atm,H} = P_{atm,0} \times \exp\left\{\frac{-gM(H-0)}{RT}\right\}$$

WHERE					
$P_{atm,0}$	=	ATMOSPHERIC PRESSURE AT ZERO ALTITUDE	=	101325	N/m²
g	=	ACCELERATION DUE TO GRAVITY	=	9.81	m/s²
M	=	MOLAR MASS OF AIR	=	28.97	kg/kg mole
H	=	SITE ELEVATION	=	52.82	m
R	=	UNIVERSAL GAS CONSTANT	=	8314.00	N.m/kgmole K
T	=	SITE TEMPERATURE			
ATMOSPHERIC PRESSURE PREVAILING AT SITE			=	100692.1	N/m²
(AT MINIMUM TEMPERATURE)					
ATMOSPHERIC PRESSURE PREVAILING AT SITE			=	100713.3	N/m²
(AT AVERAGE TEMPERATURE)					
ATMOSPHERIC PRESSURE PREVAILING AT SITE			=	100751.6	N/m²
(AT MAXIMUM TEMPERATURE)					

NOTES:

1 THE VALUES SHOWN ARE THEORETICAL AND ARE NOT FOR GUARANTEE PURPOSE

2 AS PER THE CLIMATE DATA OF SCHEDULE 17 OF SCTION 4A

ANNEX-04: NO OBJECTION CERTIFICATE FOR DIGHA STP

बिहार शहरी आधारभूत संरचना विकास निगम लि0
(बिहार सरकार का उपक्रम)
राजापुर पुल, पश्चिमी बोरिंग कैनाल रोड, पटना-800001.
फोन -10-91-612-2508412, email - mdbuidco@gmail.com

Letter No. :- 16 Date:- 14.12.2020

DK Sewerage Projects Private Limited
WABAG HOUSE,
No. 17, 200 Feet Thoraipakkam - Pallavaram Main Road,
SunnambuKolathur,
Chennai - 600 117.

Subject: **Handover the site for development of Sewage Treatment Plant at Digha Zone, Patna, Bihar**

Reference: 1) The Concession Agreement signed on 30th December 2019 executed between BUIDCO, NMCG and the Concessionaire (the "Concession Agreement")
2) Circle Officer, Patna Sadar letter no. 4362 dated 30.11.2020 and Additional District Magistrate Memo No. 2482 dated 04.12.2020

Dear Sir,

We hereby grant to the Concessionaire, the license over the Sites including the exclusive right to occupy and use the Sites to construct, renovate and/or operate and maintain the Facilities along with all necessary rights of way and access road(s) to the Sites, free of all encumbrances and encroachments, and this license shall also include each of the rights set out under Concession Agreement.

The license granted by BUIDCO shall be valid till the expiry of the Term or till the termination of the Concession Agreement, whichever is earlier, subject to the exercise of any substitution rights by the Lenders, in accordance with the terms of the Concession Agreement and the Substitution Agreement.

The Co-ordinates & land details of the Digha Zone Sewage Treatment Plant land is as below:

Co-Ordinates:

N = 2837783.078	E = 309862.184
N = 2837314.319	E = 310171.405
N = 2837628.242	E = 310269.68
N = 2837896.901	E = 309960.458

Enclosed: - A self-declaration/NOC on the possession of the land & Maps.

Yours faithfully,

14.12.20

Executive Engineer,
Digha Kankarbagh Project,
BUIDCo, Patna

Accepted, agreed and acknowledged by:

14.12

For DK Sewerage Projects Private Limited

ANNEX-05: SELF-DECLARATION ON LAND POSSESSION

Self-Declaration on Land Possession

This is to certify that all the Parcel of Land for construction of the facilities for the 100 MLD Sewage Treatment Plant 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-911/18-3385 dated 19th July 2019) described in greater detail in the below table are under the 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.

STP Locations	Land Details	Under Possession of
Digha STP, Location – Digha Diyara, Thana No.-141, Un surveyed land	Co-ordinates: N = 2837783.078 E= 309862.184 N = 2837514.919 E = 310171.405 N = 2837629.242 E = 310069.68 N = 2837896.901 E = 309960.458	Bihar Urban Infrastructure Development Corporation

12-12-20

Executive Engineer,
Digha - Kankarbagh Project,
BUIDCo, Patna

12-12-2020

ANNEX-06: CONSENT TO ESTABLISH (CTE)

BIHAR STATE POLLUTION CONTROL BOARD
PARIVESH BHAWAN, PLOT NO. NS-8/2, PALIPUTRA INDUSTRIAL AREA,
PATLIPUTRA, Patna – 800 010

Ref. No.- Patna, Dated-

7. That, they shall comply with the order dated 30.04.2019 in O. A. No.-1069/2018 of Ho'ble NGT, Principal Bench, New Delhi;
8. That, sludge generated from the STP will be dried and later it will be used as manure in agriculture and for green belt development/gardening/horticulture;
9. That, 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 + 0.2√KVA) m; it should be installed on pucca base with anti vibration pads;
10. 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;
11. 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;
12. 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;
13. 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;
14. That, in case of construction activities, they shall comply with the provisions (whichever applicable) of the Construction and Demolition Waste Management Rules, 2016;
15. That, the surface having unpaved and loose soil, if any, shall be adequately sprinkled with water to suppress dust;
16. That, maximum efforts will be made to retain existing tree cover as well as new sapling shall be planted during coming season; and
17. That, the project proponent shall submit half yearly compliance report of CTE condition in hard and soft copy. Soft copy of the report shall be mailed to the Board through e-mail ID:bspcb@yahoo.com.

General Conditions

1. 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;
2. That, they shall obtain all mandatory clearance/ permission from all relevant agencies;
3. That, the Environmental Statement as prescribed in the E (P) Rules, 1986 [see rule 14] for the each financial year ending the 31st March, shall be submitted by the month of September every year;
4. That, maximize recycling of water and utilization of treated sewage water in irrigation/rain water in harvesting;
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 withstand 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.

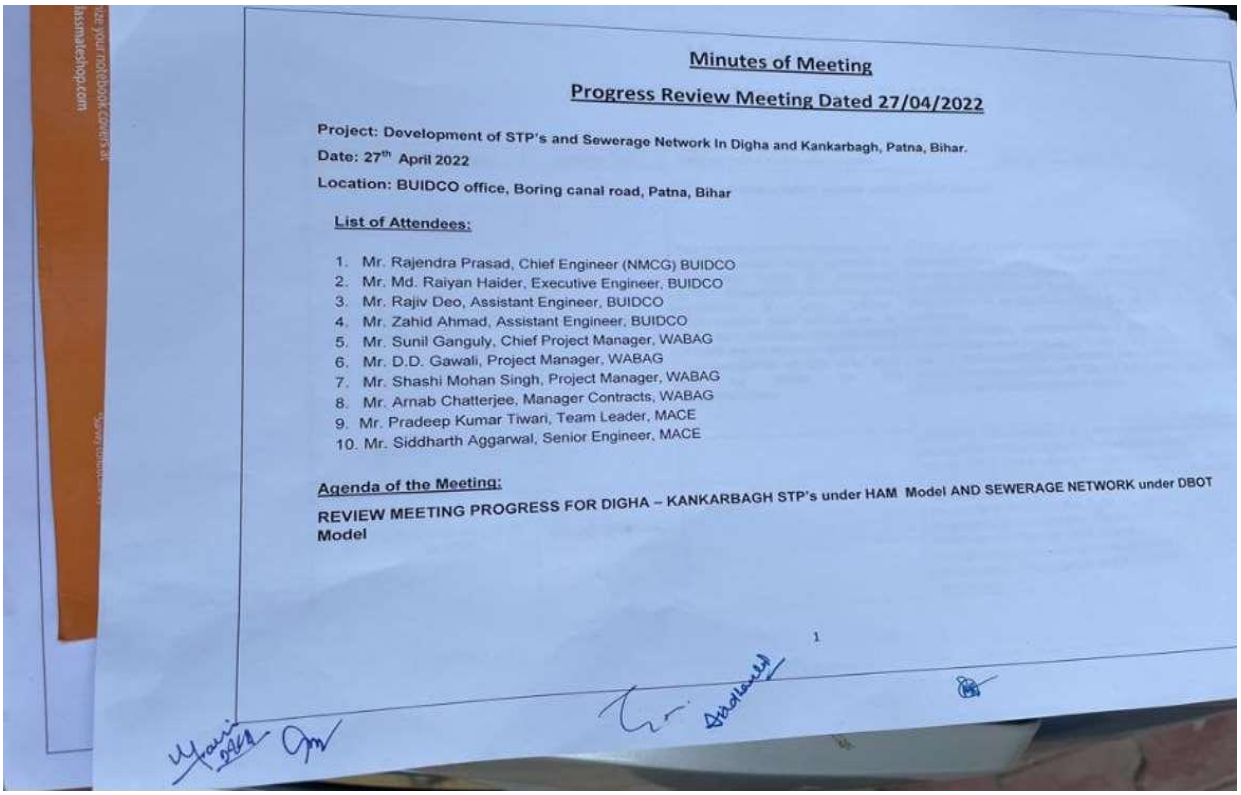
Sd/-
(S. Chandrasekar)
Member Secretary

Memo No.:- 504 **Patna, Dated:-** 17-02-22

Copy forwarded to:BUIDCO, Digha Kankarbagh (DK) Sewage Project Pvt. Ltd., Digha-Cum-Khagaul, Block-Digha, Patna for favour of information and necessary action.

17/2/22
(S. Chandrasekar)
Member Secretary

ANNEXURE 7: MOM OF BUIDCO REGARDING APPROACH ROAD



Minutes of Meeting

Progress Review Meeting Dated 27/04/2022

Project: Development of STP's and Sewerage Network In Digha and Kankarbagh, Patna, Bihar.

Date: 27th April 2022

Location: BUIDCO office, Boring canal road, Patna, Bihar

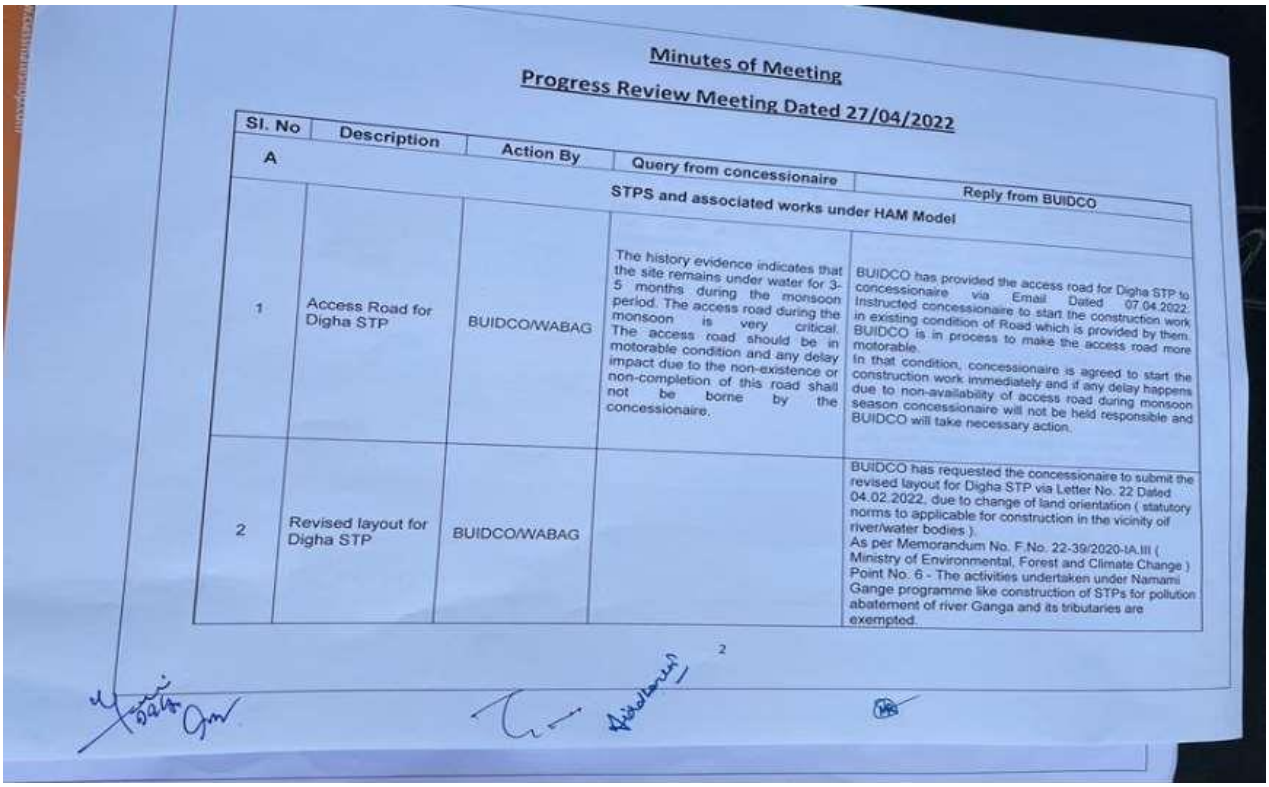
List of Attendees:

1. Mr. Rajendra Prasad, Chief Engineer (NMCG) BUIDCO
2. Mr. Md. Raiyan Haider, Executive Engineer, BUIDCO
3. Mr. Rajiv Deo, Assistant Engineer, BUIDCO
4. Mr. Zahid Ahmad, Assistant Engineer, BUIDCO
5. Mr. Sunil Ganguly, Chief Project Manager, WABAG
6. Mr. D.D. Gawali, Project Manager, WABAG
7. Mr. Shashi Mohan Singh, Project Manager, WABAG
8. Mr. Arnab Chatterjee, Manager Contracts, WABAG
9. Mr. Pradeep Kumar Tiwari, Team Leader, MACE
10. Mr. Siddharth Aggarwal, Senior Engineer, MACE

Agenda of the Meeting:

REVIEW MEETING PROGRESS FOR DIGHA – KANKARBAGH STP's under HAM Model AND SEWERAGE NETWORK under DBOT Model

1

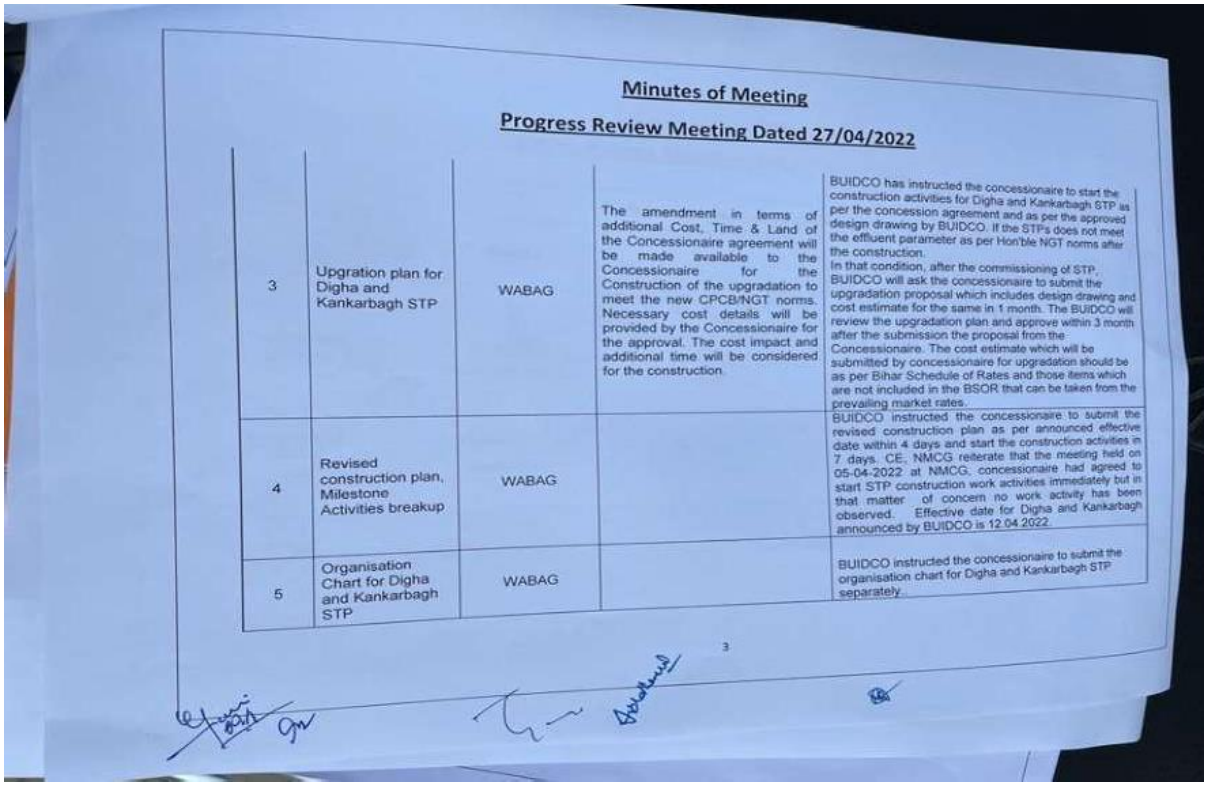


Minutes of Meeting

Progress Review Meeting Dated 27/04/2022

Sl. No	Description	Action By	Query from concessionaire	Reply from BUIDCO
A			STPS and associated works under HAM Model	
1	Access Road for Digha STP	BUIDCO/WABAG	The history evidence indicates that the site remains under water for 3-5 months during the monsoon period. The access road during the monsoon is very critical. The access road should be in motorable condition and any delay impact due to the non-existence or non-completion of this road shall not be borne by the concessionaire.	BUIDCO has provided the access road for Digha STP to concessionaire via Email Dated 07.04.2022. Instructed concessionaire to start the construction work in existing condition of Road which is provided by them. BUIDCO is in process to make the access road more motorable. In that condition, concessionaire is agreed to start the construction work immediately and if any delay happens due to non-availability of access road during monsoon season concessionaire will not be held responsible and BUIDCO will take necessary action.
2	Revised layout for Digha STP	BUIDCO/WABAG		BUIDCO has requested the concessionaire to submit the revised layout for Digha STP via Letter No. 22 Dated 04.02.2022, due to change of land orientation (statutory norms to applicable for construction in the vicinity oif river/water bodies). As per Memorandum No. F.No. 22-39/2020-IA.III (Ministry of Environmental, Forest and Climate Change) Point No. 6 - The activities undertaken under Namami Gange programme like construction of STPs for pollution abatement of river Ganga and its tributaries are exempted.

2

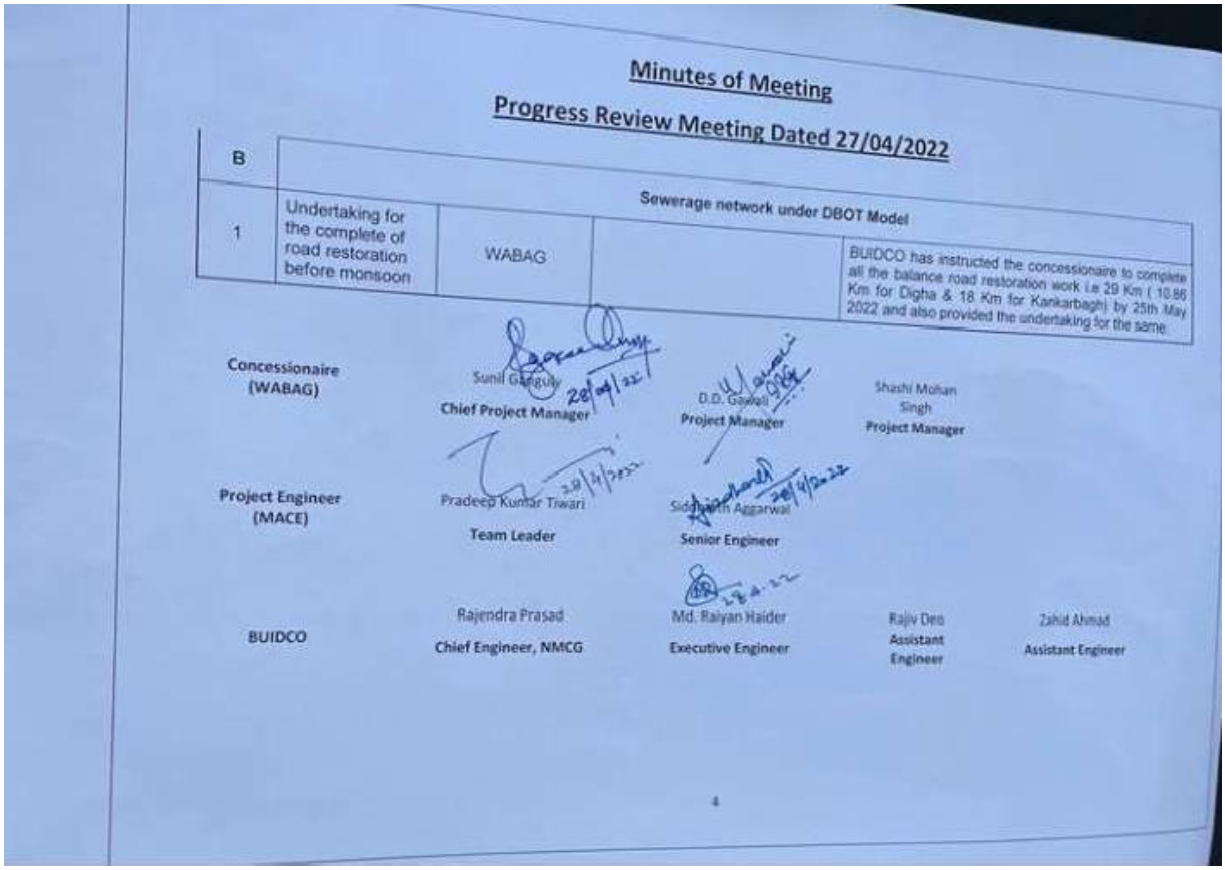


Minutes of Meeting

Progress Review Meeting Dated 27/04/2022

3	Upgration plan for Digha and Kankarbagh STP	WABAG	The amendment in terms of additional Cost, Time & Land of the Concessionaire agreement will be made available to the Concessionaire for the Construction of the upgradation to meet the new CPCB/NGT norms. Necessary cost details will be provided by the Concessionaire for the approval. The cost impact and additional time will be considered for the construction.	BUIDCO has instructed the concessionaire to start the construction activities for Digha and Kankarbagh STP as per the concession agreement and as per the approved design drawing by BUIDCO. If the STP's does not meet the effluent parameter as per Hon'ble NGT norms after the construction. In that condition, after the commissioning of STP, BUIDCO will ask the concessionaire to submit the upgradation proposal which includes design drawing and cost estimate for the same in 1 month. The BUIDCO will review the upgradation plan and approve within 3 month after the submission the proposal from the Concessionaire. The cost estimate which will be submitted by concessionaire for upgradation should be as per Bihar Schedule of Rates and those items which are not included in the BSOR that can be taken from the prevailing market rates.
4	Revised construction plan, Milestone Activities breakup	WABAG		BUIDCO instructed the concessionaire to submit the revised construction plan as per announced effective date within 4 days and start the construction activities in 7 days. CE, NMCG reiterate that the meeting held on 05-04-2022 at NMCG, concessionaire had agreed to start STP construction work activities immediately but in that matter of concern no work activity has been observed. Effective date for Digha and Kankarbagh announced by BUIDCO is 12.04.2022.
5	Organisation Chart for Digha and Kankarbagh STP	WABAG		BUIDCO instructed the concessionaire to submit the organisation chart for Digha and Kankarbagh STP separately.

3



Minutes of Meeting

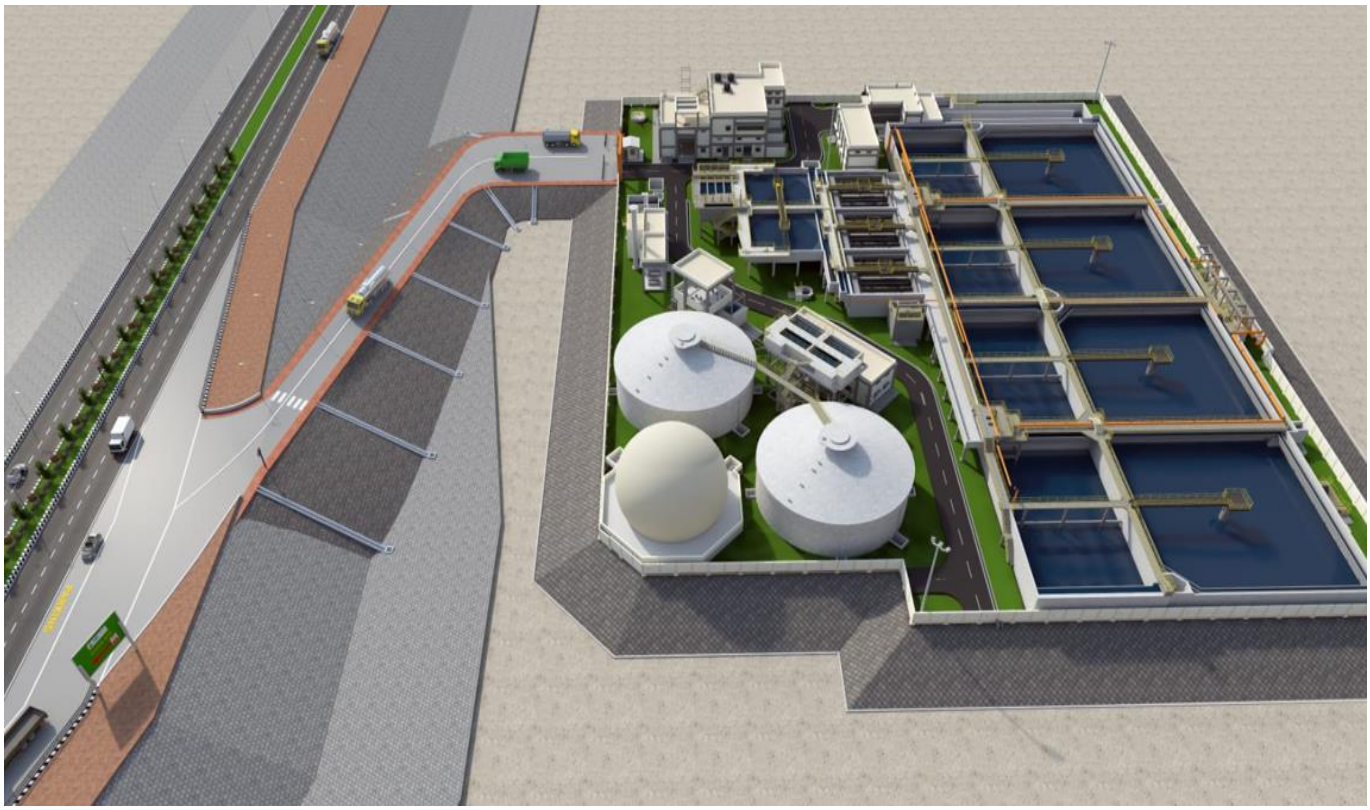
Progress Review Meeting Dated 27/04/2022

B	Sewerage network under DBOT Model			
1	Undertaking for the complete of road restoration before monsoon	WABAG		BUIDCO has instructed the concessionaire to complete all the balance road restoration work i.e 29 Km (10.86 Km for Digha & 18 Km for Kankarbagh) by 25th May 2022 and also provided the undertaking for the same.

Concessionaire (WABAG)	Sunil Ganguly Chief Project Manager	D.D. Gawali Project Manager	Shashi Mohan Singh Project Manager	
Project Engineer (MACE)	Pradeep Kumar Tiwari Team Leader	Siddharth Aggarwal Senior Engineer		
BUIDCO	Rajendra Prasad Chief Engineer, NMCG	Md. Raiyan Haider Executive Engineer	Rajiv Deo Assistant Engineer	Zahid Ahmad Assistant Engineer

4

ANNEXURE 8: APPROACH ROAD 3D DRAWING



ANNEXURE 9: HOSPITAL TIE UP

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

In Service to Save Life

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

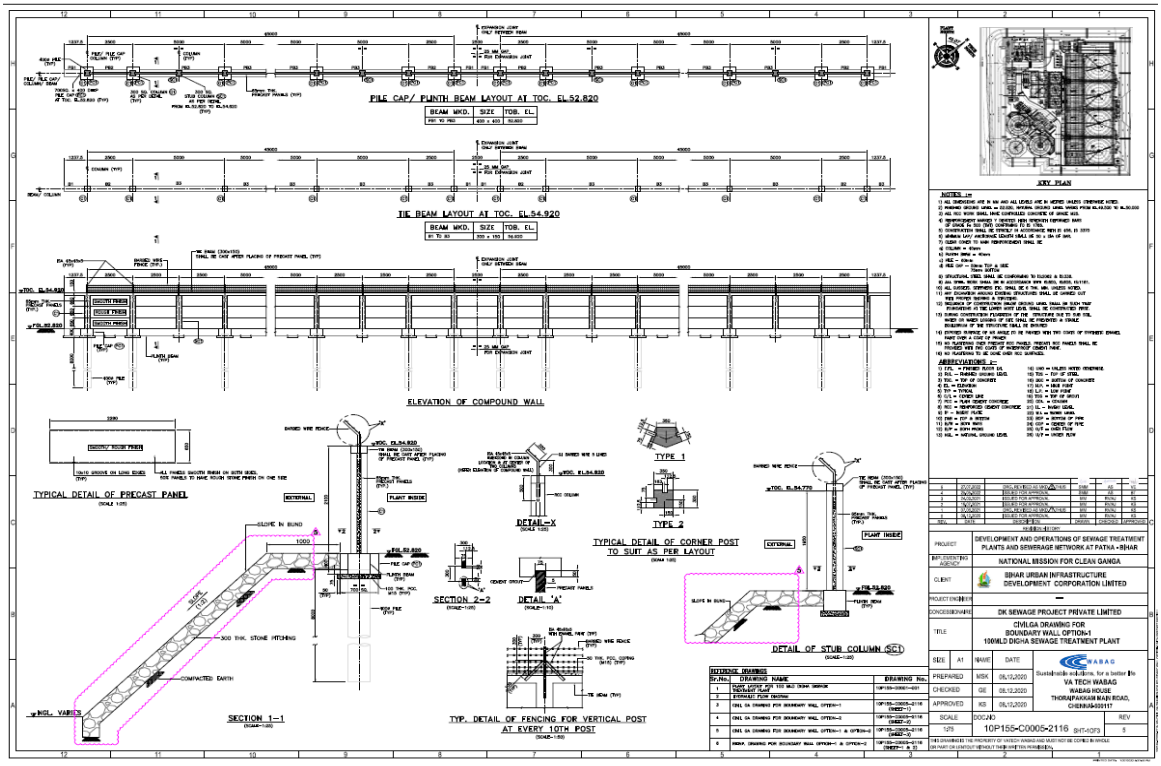
For

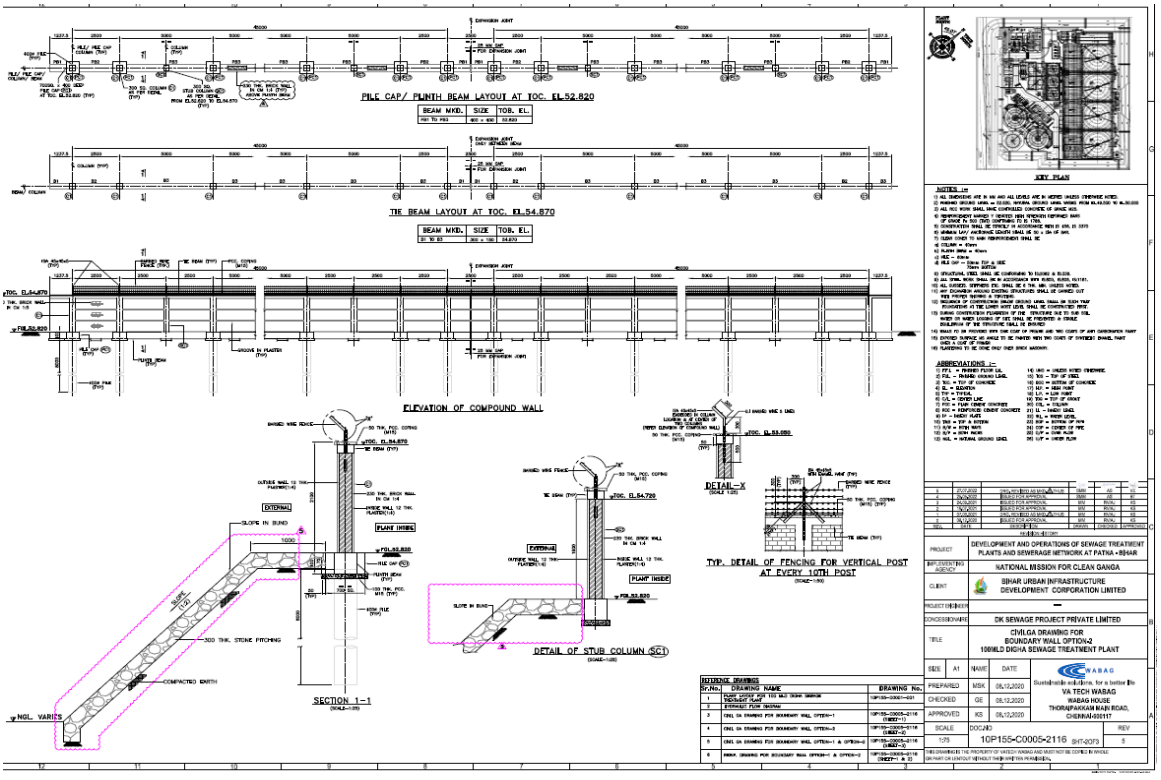
DIRECTOR

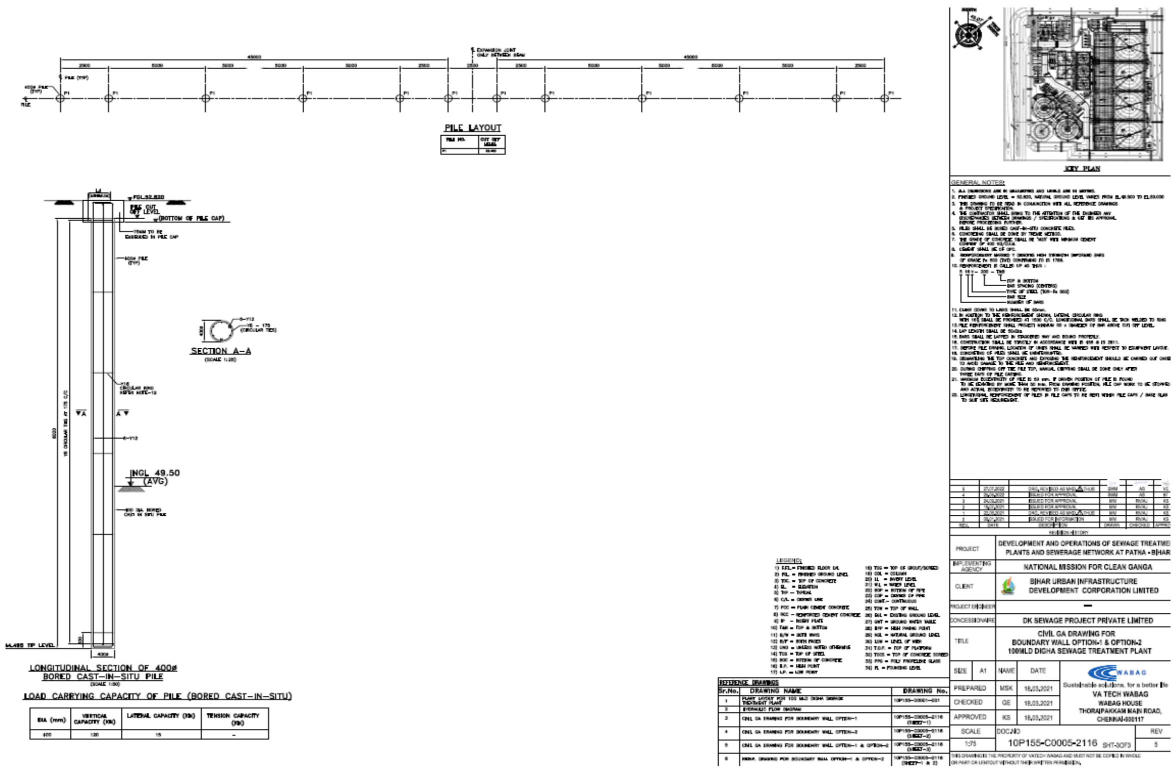
A Unit of Indira Gopal Institute of Medical Services Pvt. Ltd.

UDAYAN HOSPITAL
West Boring
Canal Road
Patna - 1

ANNEXURE 10: SLOPE PROTECTION DRAWING






PILE LAYOUT
SECTION A-A
NGL 49.50 (AVG)
LONGITUDINAL SECTION OF 400ø BORED CAST-IN-SITU PILE
LOAD CARRYING CAPACITY OF PILE (BORED CAST-IN-SITU)
KEY PLAN
GENERAL NOTES:
LEGEND:
REFERENCE DRAWINGS
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
CONCESSIONAIRE
DK SEWAGE PROJECT PRIVATE LIMITED
TITLE
CIVIL GA DRAWING FOR BOUNDARY WALL OPTION-1 & OPTION-2 100MLD DIGHA SEWAGE TREATMENT PLANT
SIZE
A1
NAME
DATE
PREPARED
MSK
18.03.2021
CHECKED
GE
18.03.2021
APPROVED
KS
18.03.2021
Sustainable solutions, for a better life
VA TECH WABAG
WABAG HOUSE
THORAIPAKKAM MAIN ROAD, CHENNAI-600117
SCALE
1:75
DOC.NO
10P155-C0005-2116
SHT-3OF3
REV
5

Mahindra Consulting Engineers

Mahindra Consulting Engineers Ltd.
Mahindra Towers, Ground Floor
No. 17/18, Pattullous Road
Chennai 600 002 India

Tel : +91 44 2854 2325/4240 4477
Fax : +91 44 2854 2324
E-mail : mace@mahindra.com
CIN : U74210MH1993PLC074723
mahindramace.com

Regd. Office :
Gateway Building, Apollo Bunder,
Mumbai 400 001 India
CIN U74210MH1993PLC074723

MACE: P1012: 15270
July 29, 2022

The Executive Engineer
Digha & Kankarbagh Sewerage Project,
Buidco, Room no. 205 Rajapur Pul,
West Boring Canal Road
Patna, Bihar

Sir,

Sub: Development of Sewage Treatment Plants (STPs) & Sewerage networks for 15 years in Patna, State of Bihar –Recommended for approval on Reinforcement drawing and Civil GA of Boundary Wall for Digha Sewage Treatment Plant-Revision 5 -reg.

Ref: Documents received DKSPPL Transmittal No. 10P155-STP-D/DT-CL-231 dated 28-07-2022

With reference to the above, please find our recommendation for approval for the document tabulated below for your perusal. We request you to instruct DKSPPL to do the needful and Concessionaire shall be advised to send the approved document / drawing for our reference.

Sl. No.	Drawings / Documents No.	Drawings / Documents Name	Revision
1	10P155-C0005-2116	Reinforcement drawing of Boundary for Digha Sewage Treatment Plant	R5
2	10P155-C0006-2116	Civil GA of Boundary Wall for Digha Sewage Treatment Plant	R5

Thanking you.

Yours faithfully,
for **Mahindra Consulting Engineers Limited**

A. Srinivasan
Sr. General Manager

Encl: Compliance Resolution Sheets

CC: 1) Saumyasib Mukhopadhyay, Sr. Environmental Specialist, NMCG
2) Mr. Madhavakumar, Sr. Economic & Finance Expert, NMCG
3) The Chief Engineer, BUIDCo

Annexure:11-NGTR guidelines/NOC/Image with 500 meters' distance.

बिहार शहरी आधारभूत संरचना विकास निगम लि0, पटना
(बिहार सरकार का एक उपक्रम)
राजापुर पुल, पश्चिमी बोरिंग कैनाल रोड, पटना – 800001
कमरा संख्या 205, E-mail-eedk.buidco@gmail.com

पत्रांक :– बुडको/दी0का0/चौ0 – 11/2021 – 22 दिनांक :– 04/02/2022

प्रेषक,

कार्यपालक अभियंता
दीघा एवं कंकड़बाग सीवरेज नेटवर्क परियोजना
बुडको।

सेवा में

मुख्य अभियंता
एन0एम0सी0जी0
बुडको।

विषय : दीघा एवं कंकड़बाग सीवरेज परियोजना अंतर्गत प्रस्तावित 100 MLD STP Digha Site से गंगा नदी के EDGE के बीच की दूरी मापी के संबंध में।

प्रसंग : कार्यपालक अभियंता, गंगा सोन बाढ़ सुरक्षा प्रमंडल, दीघा, पटना का ज्ञापांक– 136 दिनांक 02.02.2022

महाशय,

उपयुर्क्त विषयक प्रासंगिक पत्र के संबंध मे कहना है कि कार्यपालक अभियंता, गंगा सोन बाढ सुरक्षा प्रमंडल, दीघा, पटना एवं अधोहस्ताक्षरी के साथ संयुक्त रूप से उक्त परियोजना अंतर्गत प्रस्तावित 100 MLD STP Digha Site से गंगा नदी के EDGE के बीच की दूरी मापी की गई जो लगभग 500 मी0 पाई गई है। संयुक्त रूप से किए गए मापी का measurement sheet (छाया प्रति संलग्न) अग्रेतर कार्रवाई हेतु पत्र के साथ संलग्न कर समर्पित की जा रही है।

अनु0 यथोक्त।

विश्वासभाजन
ह0/–
कार्यपालक अभियंता
दीघा एवं कंकड़बाग सिवरेज परियोजना
बुडको।

ज्ञापांक – 22 दिनांक – 04/02/2022

प्रतिलिपि :– 1. अधीक्षण अभियंता, नगर विकास अंचल 01, नगर विकास एवं आवास विभाग को सादर सूचनार्थ एवं अग्रेतर कार्रवाई हेतु समर्पित।
2. DK Sewerage Project Pvt. Ltd. को सूचनार्थ प्रेषित। निदेश दिया जाता है कि उक्त measurement sheet के आलोक मे डिजाईन/ड्राईंग बनाकर यथाशीघ्र समर्पित किया जाना सुनिश्चित करें।
3. Team Leader, Mahindra (MACE) को सूचनार्थ एवं अग्रेतर कार्रवाई हेतु प्रेषित।

04.02.22
कार्यपालक अभियंता
दीघा एवं कंकड़बाग सिवरेज परियोजना,
बुडको।

कार्यपालक अभियंता का कार्यालय
गंगा सोन बाढ़ सुरक्षा प्रमंडल, दीघा, पटना।

पत्रांक :— ..... दीघा, पटना दिनांक— ...../2022

सेवा में,

अधीक्षण अभियंता
बाढ़ नियंत्रण एवं जल निस्सरण अंचल
पटना।

विषय:— **नमामि गंगे योजना अंतर्गत प्रस्तावित दीघा 100 MLD STP स्थल से गंगा नदी के Edge के बीच की दूरी मापी के संबंध में।**

प्रसंग :— मुख्य अभियंता, बुडको, पटना का पत्रांक— 8927 दिनांक—20.12.2021 एवं इस कार्यालय का पत्रांक— 46, दिनांक—12.01.2022

महाशय,

उपर्युक्त विषयक के संबंध मे कहना है कि आज दिनांक 01.02.2022 को बुडको के द्वारा प्रस्तावित 100 MLD STP दीघा प्लांट एवं गंगा नदी के Edge के बीच की दूरी मापी की गई जो लगभग 500 मी० पाई गई है। वर्णित कार्य हेतु संयुक्त रूप से की गई measurement sheet अग्रेतर कार्रवाई हेतु पत्र के साथ संलग्न कर भेजी जा रही है।

अनु० : यथोक्त।

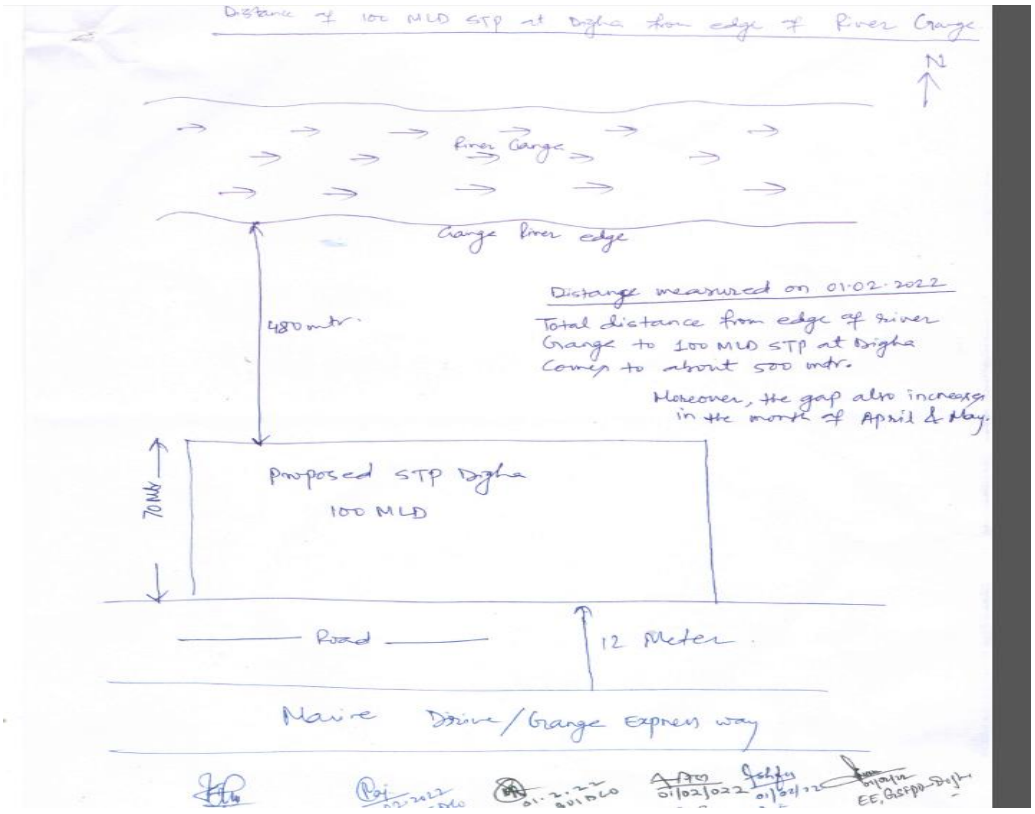
विश्वासभाजन

(इं० खाजा जमाल नासीर)
कार्यपालक अभियंता
गंगा सोन बाढ़ सुरक्षा प्रमंडल
दीघा, पटना।

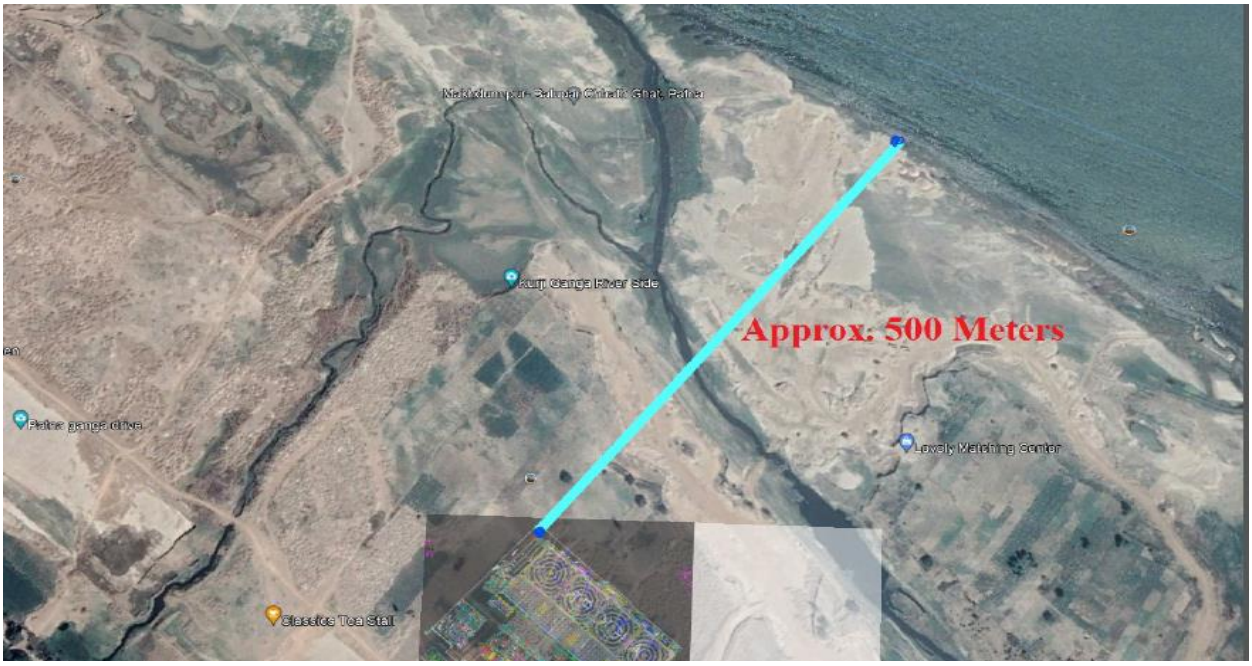
ज्ञापांक :— 136 दिनांक — 02/02/22

प्रतिलिपि :— कार्यपालक अभियंता, दीघा—कंकड़बाग सीवरेज परियोजना, बुडको, पटना को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

(इं० खाजा जमाल नासीर)
कार्यपालक अभियंता
गंगा सोन बाढ़ सुरक्षा प्रमंडल
दीघा, पटना।
02/02/2022



Google image:



Annexure:12- MOEFCC guideline -Exemption for activities under Namami Gange Programme

F. No. 22-39/2020-IA.III
Government of India
Ministry of Environment, Forest and Climate Change
Impact Assessment Division
*****

Indira ParyavaranBhawan
JorBagh Road, Aliganj
New Delhi – 110003
diriapolicy-moefcc@gov.in

Date: 14th February, 2022

Office Memorandum

Subject: Guidelines for siting industries which are in close proximity with the river – reg.

In light of various court directions about the criteria for siting of industries, which are in close proximity to a river, the requirement for framing specific criteria with regards to siting of industries has arisen.

2. The "Environmental guidelines for industries" of the Ministry with regard to siting of industries prescribes that industrial sites shall maintain at least ½ km., from flood plain or modified flood plain affected by dam in the upstream or by flood control systems.

3. The Hon'ble National Green Tribunal while considering restoration measures for Yamuna and Ganga rivers dealt with the issue of flood plains vide judgment dated 13.01.2015 in OA No. 6/2012 and O.A. No. 300/2013, in the context of river Yamuna, observed that, "*it is necessary to call upon the authorities to demarcate the floodplain for the flood of once in 25 years and to prohibit any kind of development activity in the area in question*".

4. Further vide judgement dated 13.07.2017 in OA No. 200/2014, M.C. Mehta vs. Union of India & Ors. reported in 2017 NGTR (3) PB1 in the context of river Ganga, it was observed that "*till the demarcation of the floodplains and identification of permissible and non-permissible activities by the State Government of this judgement, we direct that 100 meters from the edge of the river would be treated as no development/construction zone in Segment-B of Phase-I (Haridwar to Unnao, Kanpur)*".

5. Based on the above, the aspect related to siting of industries was deliberated in the Ministry and suggestions/comments/observations were sought from different Ministries including Ministry of Jal Shakti (MoJS). Based on the inputs received, it is hereby directed that the following criteria for siting of industries in close proximity to rivers shall be followed:

> "*Industries shall not be located within the river flood plain corresponding to one in 25 years flood, as certified by concerned District Magistrate/ Executive Engineer from state water resource Deptt. or any other officer authorised by State Govt. for this purpose.*"

6. This above criterion is subjected to following conditions:

i. The activities undertaken under Namami Gange Programme like construction/development / renovation of STPs, CETPs, RFDs, bathing ghats, crematoria, toilets etc. for pollution abatement of river Ganga and its tributaries are not prohibited. Further, any "developmental project" taken by MoJS under the said program are also exempted from these guidelines.

ii. River Ganga (Rejuvenation, Protection and Management) Authorities Order notified vide Notification no. S.O. 3187(E) dated 07.10.2016 which defines the floodplain as such area of river Ganga and its tributaries which comes under water on either side of it due to floods corresponding to its greatest flow or with water on either side of it due to floods corresponding to its greatest frown or with a flood or frequency once in hundred years, will prevail over any other guideline.

iii. Further, in respect of regulatory activities in floodplain of the river Ganga and its tributaries, prior approval of National Mission on Clean Ganga (NMCG) is required to be taken by the concerned authorities/ departments/agencies /persons.

iv. As per the draft Flood Plain Zoning Bill, 2020 prepared by Central Water Commission (CWC), a Flood Plain Zoning Authority shall, on the basis of the remote sensing/modeling results/ground survey, establish flood plain zones of different frequencies. After its creation, guidelines/decisions/orders of Flood Plain Zoning Authority will prevail over above guidelines.

v. Any other directions/judgments of Courts/Tribunals with regard to siting of Industries in the proximity of rivers and/or demarcation of flood plain.

7. The siting criteria prescribed in "Environmental guidelines for industries" in respect of flood plains of the riverine systems shall get modified to this extent.

8. This is issued with the approval of the competent authority.

(A K Agrawal)
Director

To

1. Chairman of all the Expert Appraisal Committees
2. Chairperson/Member Secretaries of all the SEIAAs/SEACs
3. Chairperson of all State/UT Pollution Control Boards and Pollution Control Committees

Copy for information to

1. PS to Hon'ble Minister for Environment, Forest and Climate Change
2. PS to Hon'ble MoS (EF&CC)
3. PPS to Secretary (EF&CC)
4. PPS to AS (TK)/ AS(RS)/ AS (NPG)/JS (SKB)
5. Website MoEF&CC/Guard file

Annex 13: DO for Digha 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 24.03.20222 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.

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

Bihar State Pollution Control Board

D.O. No. Shree G Ashok kumar Ji/ 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,

Yours sincerely,

08/03/22

(Ashok Kumar Ghosh)
Chairman.

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

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Website http://bspcb.bih.nic.in