Initial Environmental Examination

Project Number: 56283-001

July 2023

India: Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam

(Proposed Guest Hostel for Water Resources Department's Trainees in Assam Water Centre, Kamrup Metropolitan District)

Prepared by the Flood and River Erosion Management Agency of Assam (FREMAA) and Water Resources Department for the Asian Development Bank.

CURRENCY EQUIVALENTS

(As of 22 May 2023)

Currency Unit Rupee (INR)

1.00 = $0.012

$1.00 = 82.59

ABBREVIATIONS

AADB	-	Assam Agroforestry Development Board
ADB	-	Asian Development Bank
AIFRERMIP	-	Assam Integrated Flood and Riverbank Erosion Risks Management Investment Program
DMO	-	Disaster Management Organization
EMoP	-	Environmental Monitoring Plan
EMP	-	Environmental Management Plan
FREMAA	-	Flood and River Erosion Management Agency of Assam
FRERM	-	Flood and Riverbank Erosion Risk Management
IEE	-	Initial Environmental Examination
IUCN	-	International Union for Conservation of Nature
IWAI	-	Inland Water Transport Authority
MFF	-	Multitranche financing facility
MOEFCC	-	Ministry of Environment Forest and Climate Change
NGO	-	Non Government Organization
PMU	-	Project Management Unit
PCBA	-	Pollution Control Board, Assam
WRD	-	Water Resources Department

WEIGHTS AND MEASURES

dB	-	decibel
ha	-	hectare
km^2	-	square kilometer
km	-	kilometer
m	-	meter
mm	-	millimeter
m^3/s	-	cubic meter per second
l	-	liter

NOTES

(i) The fiscal year (FY) of the Government of India ends on 31 March. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2023 ends on 31 March 2023.

(ii) In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

A. The proposed Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project (CRBIFRERMP) in Assam will build on the Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program (AIFRERMIP) to increase the reliability and effectiveness of flood and riverbank erosion risk management (FRERM) systems in flood-prone areas.[1] It will focus on the climate-resilient, holistic, integrated, systematic, and reach-wise approach to manage riverbank erosion and the attendant flood risk of the Brahmaputra River in the five selected project districts in Assam.

B. Climate impacts are projected to worsen the floods and riverbank erosion while Assam already suffers from recurrent flooding and continual riverbank erosion from the Brahmaputra River.[2] These are critical development inhibitors of the state as natural hazards and remoteness have led to long-term slower development than the national average, while population growth and density are similar. Therefore, Assam continues to face high poverty, and its socio-economic development has stalled.

C. To continue the outcome of AIFRERMIP, the project will focus on (i) applying and demonstrating a comprehensive integrated risk-informed approach to build climate and disaster resilience; (ii) transferring knowledge and advanced technologies and practices for holistic natural resources management, asset management, and co-benefits optimization; and (iii) enhancing women's climate and disaster resilience and empowerment. Also, the project will leverage benefits from and collaborate with a World Bank investment aiming at improving integrated water resources management along selected tributaries of the Brahmaputra- River system in Assam.[3]

D. The project is aligned with the following impact: make Assam a disaster resilient state (encompassing substantial and inclusive disaster risk reduction; reduction in loss of lives and livelihoods; increased protection of property and assets; and enhanced capacity to cope with disasters).[4] The project will have the following outcome: climate resilient flood and riverbank erosion mitigation systems in the Brahmaputra River enhanced.

E. The project will combine structural and non-structural measures in four high-priority flood- and erosion prone areas to contribute to the broader stabilization of the river. The four high-priority subprojects characterized by a high risk of riverbank erosion, and valuable assets under threat, are: Dibrugarh (Dibrugarh and Tinsukia districts), Morigaon, Palasbari-Gumi/Guwahati West (Kamrup rural district) or PGP, and Goalpara. The project CRBIFRERMP aims at delivering on following outputs:

(i) Output 1: Climate resilient flood and riverbank erosion risk mitigation measures implemented and maintained in subproject areas.

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[1] ADB. 2010. Report and Recommendation of the President to the Board of Directors: Multitranche Financing Facility - India: Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program. Manila.

[2] Since the Great Assam Earthquake in 1950, the river has widened from about 6 kilometers (km) to 9 km along its 650 km course in Assam eroding about 5.5% of Assam cultivable area destroying roads, homesteads, crops, and flood defenses. Since 1954, around 427,000 hectares (ha) of land (equivalent to about 7% of Assam area) have been eroded at an average annual erosion rate of 8,000 ha. Between 2000 and 2018, 93 locations eroded along the main stem of the Brahmaputra River in Assam causing damages to a total length of more than 400 km. Also, 40% of Assam area is prone to flooding by the Brahmaputra River and its tributaries, which is 9.4% of the national flood prone area.

[3] The World Bank-financed Assam Integrated River Basin Management Program (AIRBMP) ($108 million loan) approval is anticipated in early 2023. It is the first phase of a $500 million multiphase programmatic approach.

[4] Assam State Disaster Management Authority. 2022. Assam State Disaster Management Plan 2022 Vol. I. (p. 14).

(ii) Output 2: Knowledge-based FRERM planning strengthened

(iii) Output 3: Vulnerable people's livelihoods and resilience improved.

F. This proposed hostel project in Kamrup Metropolitan district is clustered under PGP and is related to construction of a hostel for trainees next to Assam Water Center in Guwahati.

G. ADB requires consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB's Safeguards Policy Statement (SPS) 2009. As per the Government of India's environmental impact assessment (EIA) Notification of 2006, building projects greater than 50,000 m^2 of builtup area falls under Category B projects and require a prior Environmental Clearance (EC). Total area of the building is 1951.67 m^2 and hostels for educational institutes are exempted, thus no Prior EC from State Environmental Impact Assessment Authority (SEIAA) is required. The categorization of the subproject have been assessed using ADB rapid environmental assessment (REA) checklist. The potential negative impacts were identified in relation to preconstruction, construction and operation phases in this Initial Environmental Examination (IEE) .

H. Environmental assessment has been conducted for the hostel based on data made available by Flood and River Erosion Management Agency of Assam (FREMAA) and Water Resources Department (WRD). The environmental assessment shows that the hostel project is not likely to have any significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Potential environmental impacts are mostly site-specific and few of them are irreversible. In most cases simple mitigation measures are designed which are commonly used at construction sites and known to civil works contractors.

I. The hostel project, is classified as **Environmental Category B** as per the SPS 2009's classification system as no significant impacts are envisaged. Accordingly, this IEE assesses the environmental impacts and provides mitigation and monitoring measures to ensure that there are no significant impacts as a result of the project.

J. Negative Impacts are not anticipated for any protected area (PA). The nearest PA is Amchang Wildlife Sanctuary (WLS), with site being approximately 2.93 km away from the notified ecological sensitive zone (ESZ). Deepor Beel WLS, which is also a Ramsar site is approximately 11.9 km away from the propsed site. The ESZ of Deepor Beel WLS is yet to be notified and thus a 10 km radius from the boundary of the PAs shall be taken as ESZ. Since the site is approximately 11.9 km away from the WLS, it is also well outside the ESZ of the WLS. No permissions and clearances from the Chief Wildlife Warden (CWLW) and/or State Board of Wildlife for construction activities are required. There are no critically endangered, endangered or vulnerable species found in the subproject area.

K. The area of analysis (AOA) for screening critical habitat has been taken up for the entire subproject area, although impacts will be restricted to within the project area of influence (PAI). In addition to the protected areas and Important Bird Area (IBA) which support critical habitat, it is determined that there is no critical habitats by considering International Finance Corporation's (IFC) Performance Standard 6 thresholds. The Project Implementation Support Consultant (PISC) shall conduct biodiversity and ecology surveys/census and assessments during the project implementation.

L. There are no other environmental sensitive resources found in the project area, which are likely to be affected by the project. Construction camp will be located in the project site and destruction of the existing vegetation will be minimum.

M. The project site is devoid of standing trees and thus during the construction phase, no trees ato be cut. Ground vegetation that comprises mainly of grasses, climbers and shrubs shall be

cleared before the construction. Landscaping and plantation of native floral species shall be done post construction which shall have a positive impact on the aesthetics and environment.

N. The land belongs to Water Resources Department (WRD), Government of Assam and no private person occupies the land as either squatter or encroacher. Thus, no acquisition and resettlement impact are triggered.

O. The stakeholders were involved in developing the IEE through discussions on-site and consultations, after which views expressed were incorporated into the IEE and in the planning and development of the project. Apart from on-site public consultations, secondary stakeholder[5] meetings were held. The IEE will be made available at public locations and will be disclosed to a wider audience via the ADB and FREMAA websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism (GRM) is described within the IEE to ensure any public grievances are addressed quickly.

P. The institutional arrangement for implementing environmental management plan (EMP) has been established: the Project Management Unit (PMU) will take an overall responsibility to implement the EMP and to address other environmental issues associated with the project, if any. The PMU is supported by an environment specialist to ensure compliance with environmental safeguards. The PMU will be assisted by WRD and AADB as project implementation units (PIUs). WRD's PIU will be supported by two environment officers for implementing the environmental safeguard requirements. The monitoring system has also been developed. The contractor will appoint Environment, Health and Safety officer/focal person and will be required to submit a report on the implementation of the EMP on monthly basis while the PIU will also routinely carry out field monitoring. The PMU will be assisted also by the project implementation support consultant's team with an environmental specialist as member of the team. Annual reports on monitoring the implementation of the EMP and monitoring environmental quality will be submitted to ADB.

Q. It is expected that the proposed hostel will be filling up the present lacuna and provide quality accommodation to the trainees (officials and staff of Water Resource Department). This shall offer quality training ambience for the trainees and help them in getting gainful training to upgrade their skills related to water resources and flood risk management.

R. This IEE shall be updated by FREEMA (PMU) to reflect any changes in design, locations, interventions, amendments etc. and will be reviewed and approved by ADB. Where unanticipated environmental impacts become apparent during subproject implementation, this IEE will be updated and its EMP, or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

S. Overall, there are no significant negative environmental and socio-economic impacts associated with the proposed project that cannot be mitigated to negligible or acceptable levels. There is full local community acceptance of the project. All required mitigation measures and monitoring are documented in the EMP. The observations and conclusions from the IEE, the project appears to be acceptable for implementation, as designed according to Government of India (GoI) and ADB environmental and technical standards and policy requirements.

[5] Including forest & wildlife department, PCBA, and the executing and implementing agencies (FREMAA, WRD) etc.

I. INTRODUCTION

A. Project Background

1. The livelihoods of people in the state of Assam are affected by water-related disasters including floods and riverbank erosion especially due to the vast flat floodplain of the Brahmaputra River - one of the world's largest rivers. Climate change impacts exacerbate these disasters and are projected to worsen the floods and riverbank erosion while Assam already suffers from recurrent flooding and continual riverbank erosion from the Brahmaputra River. These are critical development inhibitors of the state as natural hazards and remoteness have led to long-term slower development than the national average, while population growth and density are similar. Therefore, Assam continues to face high poverty, and its socioeconomic development has been hindered.

2. Riverbank erosion is one of the most prominent causes of disasters in Assam due to highly dynamic morphology of the Brahmaputra River and its tributaries. Since the Great Assam Earthquake in 1950, the river has widened from about 6 kilometers (km) to 9 km along its 650 km course in Assam eroding about 5.5% of Assam cultivable area destroying roads, homesteads, crops, and flood embankments. Since 1954, around 427,000 hectares (ha) of land (equivalent to about 7% of Assam area) have been eroded at an average annual erosion rate of 8,000 ha. Between 2000 and 2018, 93 locations eroded along the main stem of the Brahmaputra River in Assam causing damages to a total length of more than 400 km. Riverbank erosion disproportionately affects the poor, who face significant social hardships, such as loss of homesteads, lands, and crops, and are often displaced to fringe lands or urban slums. Disaster risks increase as the population grows, and the high population density of the state hinders people moving away from disaster-prone areas.

3. Erosion damage also extends to public infrastructure, including roads and flood embankments, and the high occurrence of riverbank erosion hinders construction and rehabilitation of flood embankments. About 40% of the state (i.e., about 9.4% of the national flood prone area) is inundated on average annually during the monsoon by the Brahmaputra River and its tributaries, resulting in damages and loss of assets and crops. The threat of recurrent floods and riverbank erosion also discourages investment and leads to lower economic growth in the riparian areas. Effective flood and riverbank erosion risk management is therefore essential for economic growth, livelihood improvement, and poverty reduction in these locations. With a growing population as well as the expansion of settlements within the floodplain, future development will need to be carefully managed to protect the population from water-induced disasters. In addition, most of the length of the existing embankments system cannot be relied upon for protection from floods; during severe flood events, embankments are often overtopped or even breach which often leads to disaster. Furthermore, the growing population demands more reliable protection from riverbank erosion and flooding to safeguard their increasing assets and to sustain economic development.

4. Securing the livelihoods of the population living on floodplain needs to be addressed through public sector interventions aiming at: (i) mitigating the economic losses and social displacement caused by riverbank erosion, (ii) reducing the economic losses resulting from flooding, and (iii) providing a secure environment to facilitate an increase in agricultural and industrial production and to enhance related economic activities.

5. The multi tranche financing facility (MFF) between the Government of India and the Asian Development Bank (ADB) for the Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program (AIFRERMIP) was approved by ADB in 2010. The facility increased the reliability and effectiveness of flood and riverbank erosion risk management systems in priority reaches along three subprojects of the Brahmaputra River through structural and nonstructural interventions, policy strengthening, and institutional and knowledge bases. The second and final tranche of the MFF was physically completed on 18 October 2020. Over the past 20 years, ADB

has supported development and innovation of a cost-effective systematic river stabilization approach introduced in Assam in 2010 via AIFRERMIP, providing a first opportunity to increase the state's disaster resilience and paving the way for replicability.

6. Under the AIFRERMIP, Flood and River Erosion Management Agency of Assam (FREMAA) was established by the state government as the project's executing agency to demonstrate holistic and sustainable Flood and Riverbank Erosion Risk Management (FRERM) in partnership with ADB. The investment has demonstrably strengthened FREMAA through capacity building.

7. Following the request of the State Government of Assam for a follow-on project, in early 2022, the Department of Economic Affairs (DEA), Government of India (GoI) posted to ADB a follow-on investment for external assistance of $400 million under which urban, suburban, and productive rural and other strategic sites have been prioritized for protection by improving key flood and riverbank erosion risk management (FRERM) infrastructure, such as flood embankments, riverbank protection, and flood management structures, and by enhancing or introducing a range of nonstructural protective measures to development capacity at state and local communities level. The title of this new investment is Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project (CRBIFRERMP) in Assam.

8. The CRBIFRERMP proposed to be financed by ADB will focus on the main stem of the Brahmaputra River in Assam and follow a climate resilient, holistic, integrated, systematic, and reach-wise approach to managing riverbank erosion and the attendant flood risk, while the World Bank-financed Assam Integrated River Basin Management Program (AIRBMP) focuses on river basins of selected tributaries of the Brahmaputra River in Assam.

9. The project will combine structural and nonstructural measures in four high-priority flood- and erosion prone areas to contribute to the broader stabilization of the river. The four high-priority subprojects characterized by a high risk of riverbank erosion, and valuable assets under threat, are: Dibrugarh, Palashbari-Gumi/Guwahati West, Morigaon, and Goalpara. See map in Figure 1-1.

(i) **Output 1: Climate resilient flood and riverbank erosion risk mitigation measures implemented and maintained in subproject areas.** The project will combine structural and nonstructural measures in four subproject areas to stabilize their river reaches by applying an integrated river stabilization approach that was developed and refined under the earlier ADB-financed Jamuna–Meghna River Erosion Mitigation Project (JMREMP), AIFRERMIP, and the ongoing Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) in Bangladesh.[6] Specifically, this output will include: (i) constructing about 60 km of riverbank erosion protection and 14 km of adaptation/emergency works to stabilize the river and improve the river's navigability; (ii) placing about 32 km (194 screens) of pro-siltation measures such as porcupines to induce sediment deposition thereby reclaiming riverine land; and (iii) constructing/rehabilitating/widening about 4.4 km of climate resilient flood embankments including regulators, fish passes and drainage structures in critical areas to maintain river-floodplain interconnectivity to enhance biodiversity [7] (See Appendix 1 and 2 for details of the scope of works). As learned from prior investments, construction contracts will include provisions for five years of monitoring, adaptive maintenance, and emergency works from construction completion, to improve

[6] ADB. 2014. Report and Recommendation of the President to the Board of Directors: Multitranche Financing Facility to Bangladesh: Flood and Riverbank Erosion Risk Management Investment Program. Manila. Innovative features developed under JMREMP, AIFRERMIP, and FRERMIP, include sustainable low-cost sand-filled geotextile bag revetments placed underwater in combination with nature-based solutions will be expanded under the project.

[7] The new or rehabilitated embankments will be designed to accommodate: (i) multipurpose use, (ii) a 100-year flood return period water level, including sufficient base width and freeboard for climate impacts related increases in water levels.

sustainability. Nature-based solutions, such as reed plantations that promote sediment deposition and reduce rain cuts on slopes, will be pilot tested.

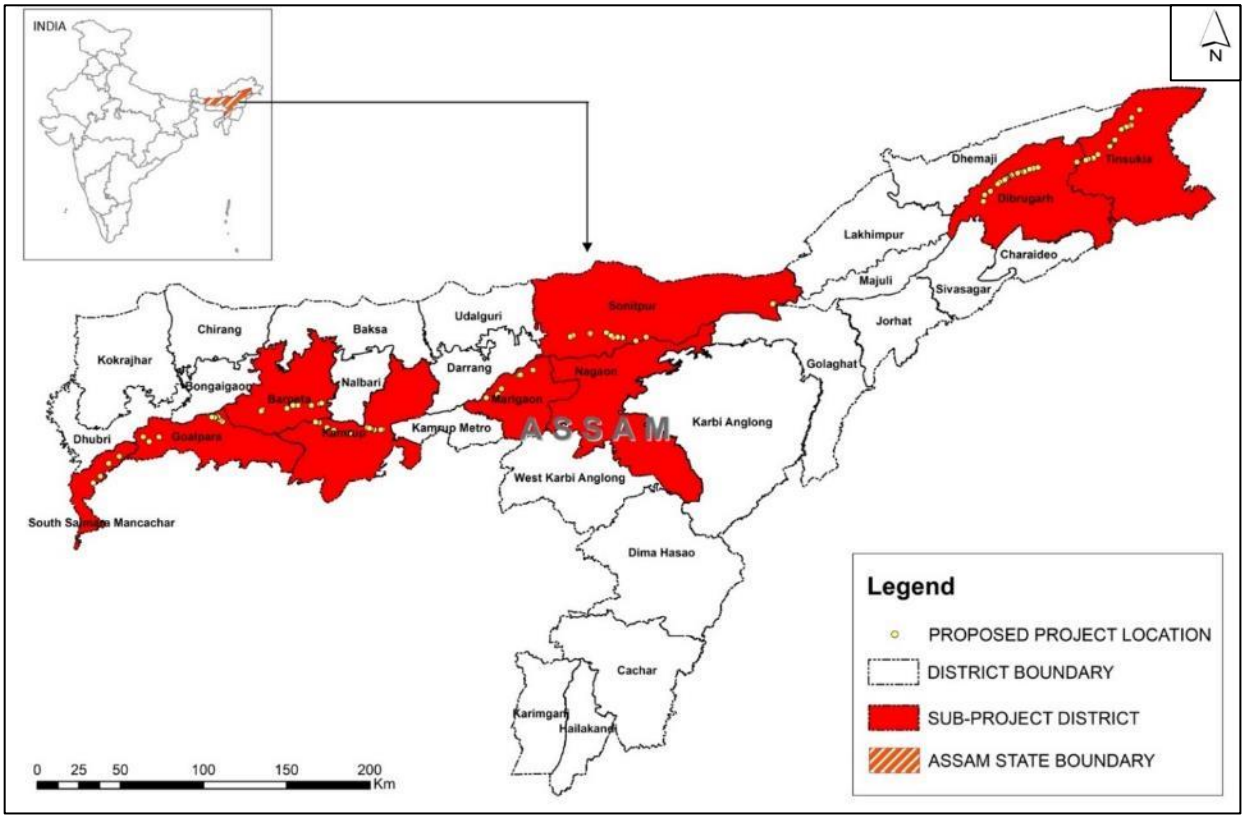
(ii) **Output 2: Knowledge-based FRERM planning strengthened.** This output will further develop key agencies' knowledge bases by improving various decision support tools initiated under AIFRERMIP and will strengthen the state's institutional capacity to deliver FRERM, thereby promoting disaster resilience of the state and affected communities. Specifically, Output 2 will: (i) strengthen flood forecasting and early warning systems in close collaboration with others; (ii) undertake flood mapping to identify people and infrastructure at risk of flooding and facilitate better land use planning and management on risk-sensitive land; (iii) improve erosion prediction and embankment breach models to prioritize maintenance; (iv) enhance asset management systems and conduct life-cycle reliability analyses to improve budget and maintenance decisions; (v) gather data through topographic and bathymetric surveys, flow and sediment measurements, and asset condition surveys; and (vii) strengthen existing guidelines for flood and riverbank protection design to address climate impacts and resilience, update river stabilization principles, and document the effectiveness of nature-based solutions. These outputs will also contribute to an update of the 2020 Flood and Erosion Management Plan.

(iii) **Output 3: Vulnerable people's livelihoods and resilience improved.** This output will directly improve the livelihoods and disaster resilience of poor and destitute people living on the flood embankments and *charlands* within the project areas and who are routinely severely affected by floods and riverbank erosion. It will specifically target women. Interventions will: (i) establish modern weaving centers, provide sewing machines, and train female headed households and female self-help groups to spin, weave, and market silk; (ii) increase vegetable production by providing climate resilient seeds, promoting improved agricultural practices, and extending marketing support; (iii) provide vocational training for unemployed youth; (iv) raise awareness on flood and riverbank erosion; and (v) strengthen disaster preparedness and emergency response (through also provision of equipment at district/regional level). Support for subsistence and small farmers will include: (i) assistance creating agriculture and fisheries businesses; (ii) identifying alternative income opportunities associated with the nature-based solutions in Output 1;[8] and (iii) improving rural markets. Further, the graduation approach will be piloted to complement the various state-led initiatives that strengthen beneficiaries' wellbeing by providing livelihood assistance through agriculture, livestock, fisheries, industries, and vocational training activities.[9] Beneficiaries will be producer collectives registered as Farmer Producer Companies (FPC) in the vicinity of the Brahmaputra River.

[8] New livelihood opportunities will arise from nature-based solutions along embankment slopes and reed plantations on charlands as well as from the revival of *beels* resulting in new fishing opportunities.

[9] The graduation approach combines cash transfers with an asset transfer, financial inclusion, tailored skills training, livelihood development, social inclusion, and life-skills coaching and psychosocial support. Cash transfers will be made to FPCs, not individuals.

Figure 1-1: Index Map of CRBIFRERMP Phase - I

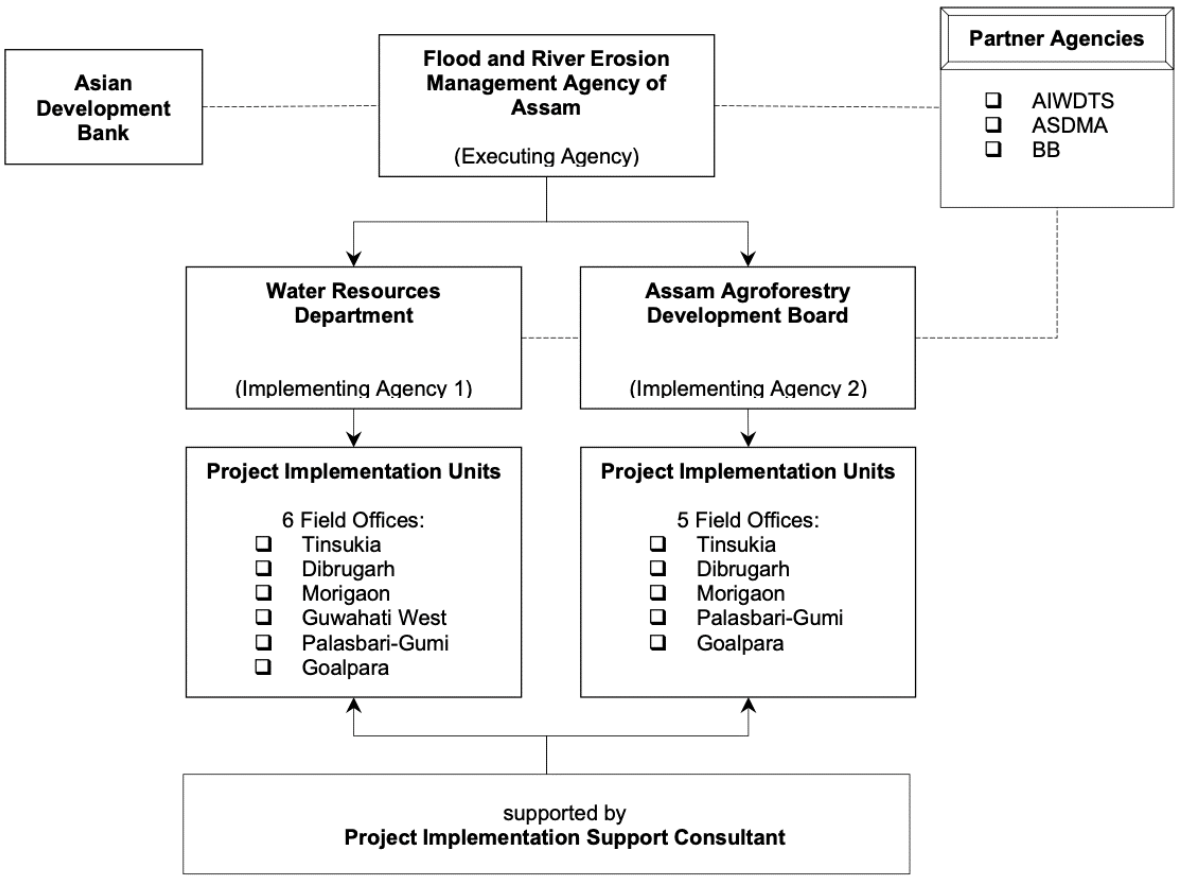


10. This IEE report is prepared to identify any potential impacts and outcome is preparation of an environmental management plan (EMP) to avoid and minimize the impacts.

B. Executing And Implementing Agencies

11. The project CRBIFRERMP shall be executed by the State of Assam acting through FREMAA as executing agency and acting as PMU. FREMAA, the executing agency, will oversee, monitor progress, lead the land acquisition process, ensure full compliance with environmental and social safeguards, and report the progress. WRD - PIU will be the key implementing agency of the project and will be responsible for the works (preparation of bidding documents, procurement, implementation, supervision). Assam Agroforestry Development Board (AADB) will be an implementing agency of the project and will be responsible for the nature-based solutions with the support of FREMAA for the procurement. A PISC shall support and provide assistance to PMU/PIU in execution and implementation of the project. The hostel shall be executed and implemented by FREEMA & WRD. The organizational structure of FREMAA is indicated in the Figure 1-2.

Figure 1-2: Organizational Structure for CRBIFRERMP

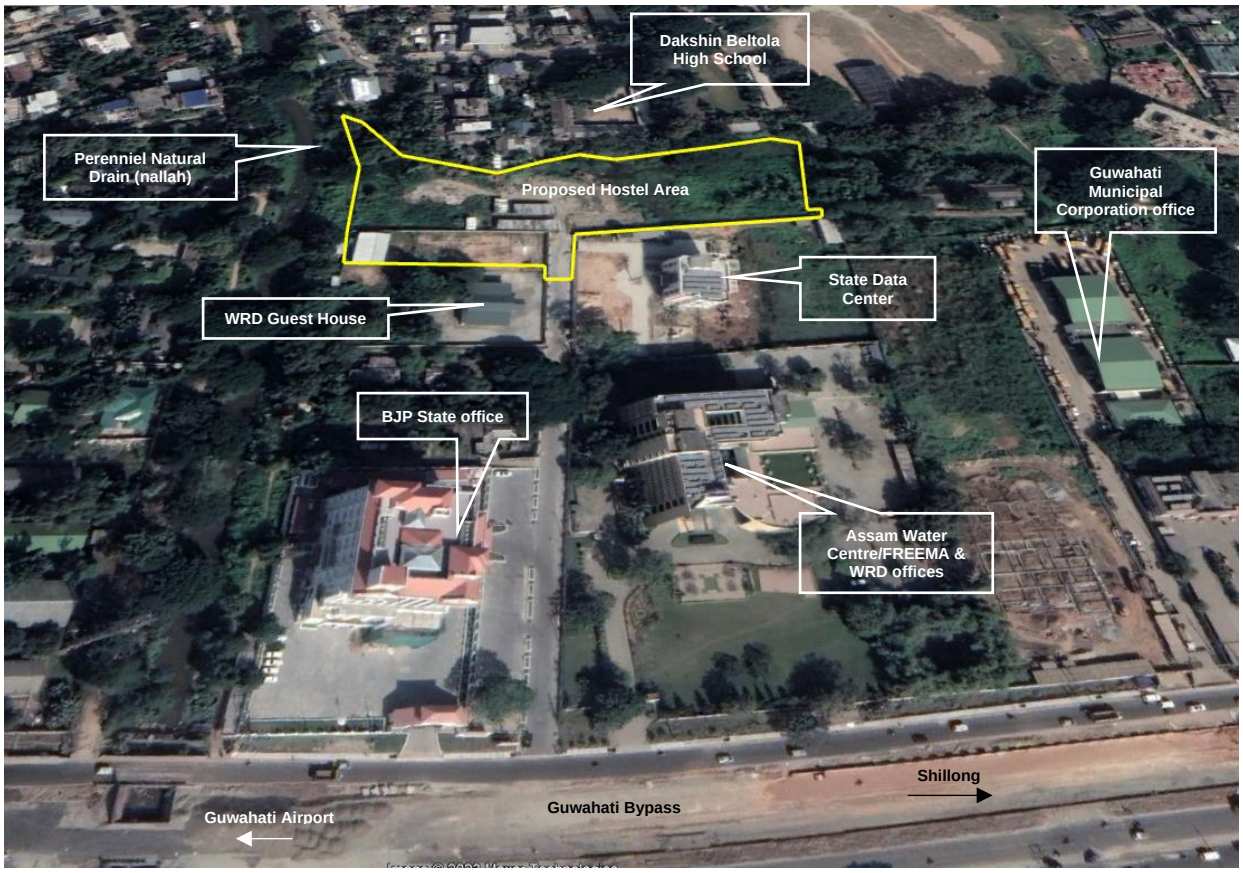


Source: ADB

C. Purpose of this IEE Report

12. This IEE is prepared for hostel. The hostel is for trainees who shall undertake various trainings under FREMAA and WRD. The site is located on land owned by the state government in the immediate vicinity of the Assam Water Center (FREMAA office) in Guwahati. The total area which has been earmarked for the hostel is 0.8 ha. The building shall be a three storied building (G+2) having a total super builtup area of 1951.67 m^2.

Figure 1-3: Location Map of the Hostel



Source: Google Earth as plotted by FREEMA and WRD, Assam

13. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguards Policy Statement (SPS) 2009. Accordingly, this initial environmental examination (IEE) has been conducted to assess the environmental impacts and provide mitigation and monitoring measures to ensure that impacts will be addressed because of the subprojects.

14. The potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this IEE has been prepared in accordance with ADB SPS requirements for environment Category B.

15. The implementation of the project will be governed by GoI and the state of Assam, and other applicable environmental acts, rules, regulations, and standards. Environmental safeguards requirements will be followed in accordance with the ADB SPS, 2009. During the design, construction, and operation, the project will apply pollution prevention and control technologies and practices consistent with ADB SPS 2009 and international good practice, as reflected in internationally recognized standards.

16. FREMAA either directly or through its consultant's shall update the IEE report if there are changes in the designs, components, interventions or project area in the future to adequately reflect the changes.

D. Report Structure

17. The report has been structured in compliance with ADB SPS, 2009 and contains the following ten (10) sections including the executive summary at the beginning of the report:

Executive Summary

I. Introduction

II. Description of the Project

III. Analysis of Alternative

IV. Policy, Legal, and Administrative Framework

V. Description of the Environment

VI. Anticipated Environmental Impacts and Mitigation Measures

VII. Public Consultation and Information Disclosure

VIII. Grievance Redress Mechanism

IX. Environmental Management Plan

X. Conclusion and Recommendations

II. DESCRIPTION OF THE PROJECT

18. Under the ADB financing, it is proposed to construct a 3-story framed structure building in Water Resources Department (WRD) land in Basistha, Guwahati City. The hostel is expected to accommodate staff and participants during trainings and events. The proposed hostel comprises of bedrooms, halls and kitchen (BHK), dining room, guest rooms, common room, first aid room and common spaces. The estimated cost of the project is ₹16,00,000,00 and is expected to be completed in 3 working seasons (36 months). During project implementation, an independent design consultant will be hired for final designing of the proposed hostel.

Figure 2-1a: Yellow dot on the map shows location of the porposed hostel

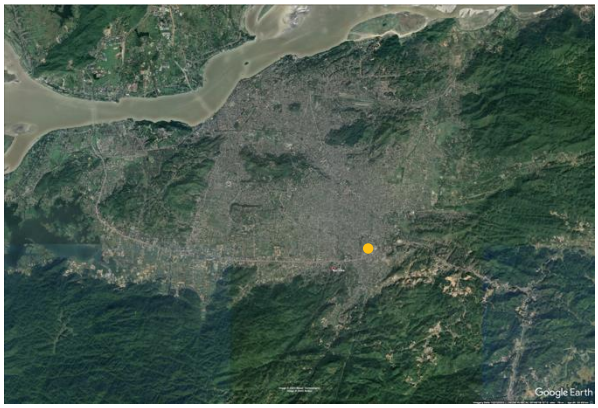


Figure 2-1b: Yellow box shows location of proposed hostel near NH-27 highway

19. Proposed hostel is within government property, which is close to the highway. As shown above, the location is at the southern area of urban sprawl in Guwahati City.

Figure 2-2a: Aerial view of the hostel site

Figure 2.2b: An overlay of the site plan for the WRD facilities

Salient Construction Requirements

20. As of project's processing stage, the final design of the hostel is not yet ready. WRD has yet to decide the engineering design of hostel. The following paragraphs shows only salient construction requirement of the hostel.

21. Earth works. Excavation by both mechanical use (such as hydraulic excavator) and manual means (see Figure 2-3 as reference). Moving of earth, rock and other materials will be done over areas exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including getting out and disposal of excavated earth lead upto 50 m and lift up to 1.5 m, as directed by Engineer-in charge.

Figure 2-3. Reference photograph of manual and mechanical earthworks[10]

22. Foundation. This will be reinforced concrete cement (RCC) for either raft or isolated footing foundation. This will be properly designed and decided by the structural consultant depending upon the soil feasibility report of the proposed site of the hostel.

23. Plinth. The base and support for the entire hostel structure will be built evenly over a large area. Depending on the outcome of the design study for the structure, the plinth will be raised up to the desired level.

24. Super-structure. Everything above ground structure will be RCC framed structure with RCC beams and columns as per the engineering design later-on. Brick-works of required thickness will be raised in cement mortar (1:6 mix) in panel walls.

25. Door and window. The doors, windows, ventilators frames/shutters and other features will be made of unplasticized polyvinyl chloride (UPVC) or aluminum coated frames in built-up section.

26. Roofing. RCC slab in M20 grade mix shall be laid as roofing for the hostel. Coba with bricks mats shall be installed at the roof to promote water proofing.

27. Flooring. 40 MM terrazzo flooring or vitrified tiles will be laid in rooms over a layer of thick cement concrete (1:2:4) laid over stone or brick concrete (1:4:8). All circulation passages will be given granite finish to give a smooth and lasting finish in consideration of heavy movement of public / guests.

28. Plastering. All inside and outside walls will be plastered with 15 mm to 20 mm thick plaster (1:6) mix. All ceiling will be finished with 10 mm thick cement sand plaster (1:3) mix. The lavatory block walls will be finished with ceramic tiles.

29. Painting and colour washing. All exposed steel will be painted with two coats of synthetic enamel paint over a primer coat of approved brand quality. The exterior surface of the building will be provided with the cement paint of approved brand and shade. All the interior walls of the rooms

[10] Source of photograph: Excavations and Trenching | OSHA Safety Manuals (safetymanualosha.com)

will be provided with colour wash /dry distempers as per the colour scheme.

30. Sanitary fittings. All the fittings in the lavatory block will be provided with the standard fittings and to be connected with the proper disposal system. The chrome platted fittings or other materials will be standard quality connected with cast iron and/or galvanized iron pipes of approved quality.

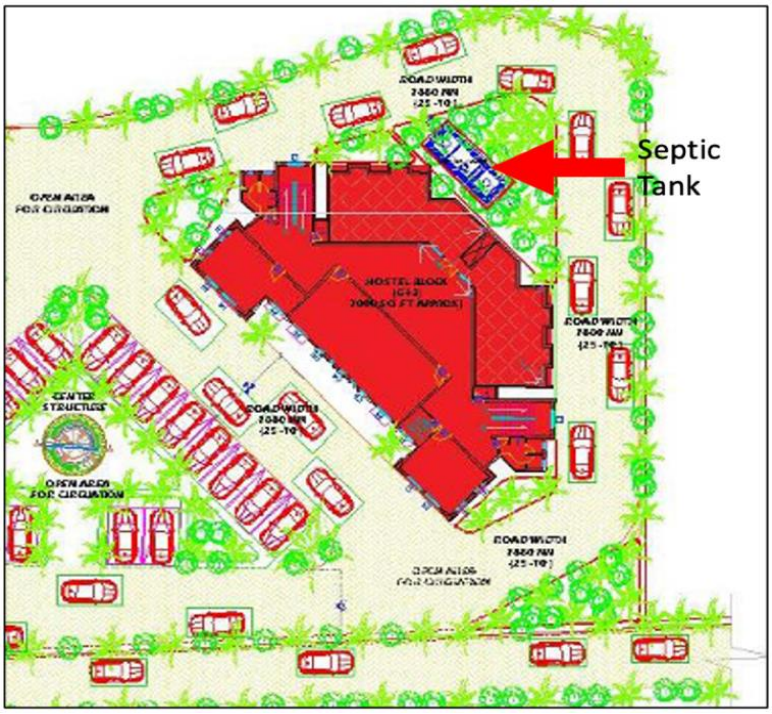
31. Electrification. All the rooms in the building will be provided with essential electric lighting system with the minimum points as per the requirements. All the electrical PVC or steel conduits pipes.

32. Power source. The source of electricity in the proposed building will be same as that of the Assam Water Centre (AWC) building, particularly Assam State power supply facilities. It is currently catering electricity supply needs across Assam. From Sadiya to Mancachal and from Jonai to Lowairpowa, it is supplying electricity to every corner of the state.

33. Water supply. The source of water will be ground water (same as that of AWC) as well as. As part of ADB financing, WRD is proposing for rain water harvesting system to reduce stress on the groundwater due to abstraction, and also an approach to adapt in climate change effects.

34. Sewage treatment. Septic tanks will be constructed remove contaminants from wastewater. This facility will produce affluent is suitable to discharge to the surrounding environment, thereby preventing water pollution from raw sewage discharges. Figure below shows the indicative location of the septic tank.

Figure 2-4. Indicative location of septic tank for the proposed hostel.



35. WRD will use the Guwahati Municipal Corporation (GMC) services for the waste collection at the proposed hostel. This is the same vendor collecting solid wastes from the AWC. GMC performs collection of house-to-house solid wastes from the households and commercial establishments. GMC is divided into 31 wards and there is one non-government organizations (NGO) for each assigned on collection. The NGOs use tricycles, thelas, hydraulic mounted trailer auto tippers, etc. for the collection of household and commercial establishment's wastes (see sample figure below).

Figure 2-5. Reference photgraph of a truck used for solid waste collection by GMC[11]

Status of Hostel Design

36. The proposed hostel has no final design as of the preparation of the IEE. WRD has only provided salient construction works and designs that will be done for the hostel at the target site. Due to this situation, this IEE will be updated by the PMU and PIU to indicate the final design of the hostel. The PISC will support PMU and PIU to update this IEE. The revised/updated IEE shall be reviewed by ADB and disclosed in ADB website. No demolition works are envisaged at present and the revised/updated IEE shall indicate the details, if demolition works are involved.

[11] Source of photograph: Chakraborty, A. (2023). A State-of-the-Art Report on Solid Waste Management of Guwahati City, Assam, India. In: Chatterjee, U., Antipova, A., Ghosh, S., Majumdar, S., Setiawati, M.D. (eds) Urban Environment and Smart Cities in Asian Countries. Human Dynamics in Smart Cities. Springer, Cham. https://doi.org/10.1007/978-3-031-25914-2_7

III. ANALYSIS OF ALTERNATIVES

A. Introduction

37. The analysis of alternative is an effective tool to examine the number of options (locational and technological) and establishing most environmentally favorable alternative which cause minimum environmental loss to the natural and social environment. However, since the investment is site specific, i.e., aims to construct a hostel building for providing accommodation to the trainees who shall come from all over the state for trainings related to water resources and flood protection, the scope for assessing alternatives to the project is limited.

B. Without Project Option

38. The Assam Water Center and the Assam Water Research and Management Institute (AWRMI)[12] are the centre of excellence of WRD, and is the repository for all existing data, knowledge and technology relevant to the waters of Brahmaputra River and its tributaries, carrying out studies and research to originate new knowledge and expertise to manage these water for the benefit and safety of the people of the region. The centre disseminates, explains and discusses these knowledge at technical levels as well as, the government and private sector, NGOs, academic institutions and civil society. It is also mandated to formulate policies, strategies and action plans, based on the most advanced available knowledge and data for the consideration of the government and public. The institute not only takes up Research and Development activities but also undertakes capacity building of in-service officers of Water Resources Sector in Assam on engineering, project management, life skills development, etc. are carried out. As on date as per data shared, the centre has trained more than 300 trainees from WRD & Irrigation Departments in 9 batches. It has also been conducting various seminars and workshops on water resources.

39. However, the centre doesn't have any space to provide accommodation to the trainees who are housed in various state guest houses and hotels during the course of the training programmes. This leads to a burden on the exchequer who has to reimburse the cost of lodging. Besides issues in creating dedicated in-campus course programmes which creates greater bonding among the trainees, easy and all time access to the data centre and library, the absence of dedicated hostel also creates commuting and other logistical issues to both the trainees and the department. The proposed hostel complex building shall have classrooms, computer room, examination hall, faculties room, office room, hostel rooms, dining hall, meeting rooms, canteen, caretaker room, VIP rooms and car parkings.

40. In the without project scenario, the WRD shall continue to bear the costs of lodging of its officers besides creating hurdles in smooth delivery of the courses and the officers/trainees will continue facing challenges. Hence without project scenario is undesirable.

41. The proposed area is presently being used by the next door Guwahati Municipal Corporation office for keeping derelict vehicles and has some shrubs and bushes. There are no trees in the proposed project area. In the 'without project' scenario, the present species composition of the vegetation shall remain unchanged leading to conitnuance of unhygienic environment.

C. With Project Option

42. In the 'with project' scenario, no change is expected in air, soil and water conditions in the long term scenario. The air pollution and noise levels are likely to increase during construction phase, but will be confined within the close vicinity of construction sites and will be temporary and

[12] AWMRI, Water Resources Department, Government of Assam. https://awrmis.assam.gov.in/about-us/what-we-do-1

short-term in nature. The impacts during construction and operation phase are not irreversible and can be readily mitigated.

43. The landscaping and plantation plan shall also plant native species of trees and plants which shall lead to aesthetics and greenery in the area.

D. Location Alternatives

44. The considerations for the site finalization were availability of government land, good connectivity and proximity to the Assam Water Center. The present site is owned by WRD, Government of Assam and is just behind the Data Center and the Assam Water Center. The nearest Protected Areas (PA) are the Deepor Beel WLS (approximately 11.9 km away from the proposed site) and Amchang WLS, with site being approximately 2.93 km away from the notified Ecological Sensitive Zone (ESZ) of the WLS. The ESZ of Deepor Beel WLS is yet to be notified and thus a 10 km radius from the boundary of the PAs shall be taken as ESZ. Since the site is approximately 11.9 km away from the WLS, it is also well outside the ESZ of the WLS. The proposed site doesn't have any standing trees and is not a forest area. There are no sites of cultural and heritage importance within the 300 m distance of boundary of the proposed site with the Basistha Temple being approximately 2.18 km away. Thus the site was considered to be the best from location perspective.

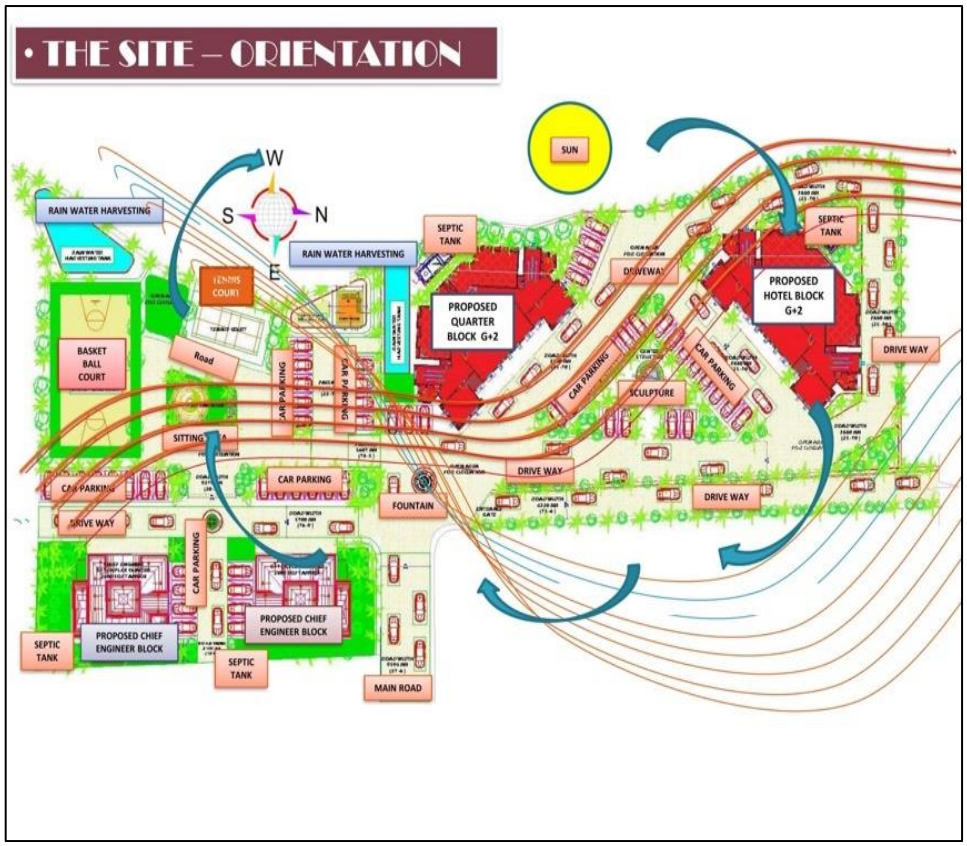
E. Material Usage and Sustainability considerations

45. In terms of design, materials (steel bars, cement and bricks) will be appropriately selected (as per approved design specification) considering that the area is within the seismic zone V classification. Preference shall be given to locally sourced low embodied construction materials and in natural form, lightweight to reduce dead load.

46. There will be no use of asbestos containing sheets or pipes. Further, to conserve natural resources, treated wastewater will be recycled through double plumbing piping system for flushing, air conditioning and irrigation of green areas. To reduce the carbon foot prints, the proposed hostel also plans to have energy efficient lighting system.

47. The project shall have a Green Building Design. The building shall have optimized light and heat gain/heat losses planned according to the movement of the sun in order to maximize the use of flighting (see figure below). It shall also be designd to use the prevalent wind direction for ventilation/cooling and reduce the dependency of artificial air cooler. The building plan shall optimize the site & spaces in order to have a optimum living conditions for residents utilizing natural lighting and ventilations etc.

Figure 3-1: Layout plan of different facilities including the proposed hostel according to movement of the sun.



48. **Conclusion.** It is clear from the above that without project scenario is undesirable. The proposed location of the hostel is conveniently located in the vicinity of the existing water centre and the with project option shall have only short-term and reversible environmental impacts. To make the project outcome and outputs sustainable, necessary measures shall be included in the project design. Thus the 'With Project' alternative is considered appropriate.

IV. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. ADB's Environmental Safeguard Policy and Requirement

50. ADB SPS requires that during the design, construction and operation of the project necessary compliance to all applicable laws and international conventions/treaties along with pollution prevention and control technologies and practices consistent with international good practice, are ensured.

51. Screening and Categorization with that of ADB SPS 2009. ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

(i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.

(ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects. An initial environmental examination (IEE) is required.

(iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

(iv) **Category FI**. A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

52. The environmental impacts of the Project has been identified and assessed as part of the planning and design process. An environmental assessment using ADB's Rapid Environmental Assessment Checklists **(Appendix 3)** were conducted, and results of the assessments shows that the subproject is unlikely to cause significant adverse impacts. Thus, this IEE has been prepared in accordance with ADB SPS's requirements for environment Category B projects.

53. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks. The EMP shall include the proposed mitigation measures, environmental monitoring and reporting requirements, emergency response procedures, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.

54. **Public Disclosure**. The IEE will be put in an accessible place (e.g., local government offices, libraries, community centers, etc.), and a summary translated into local language for the project affected people and other stakeholders. The following safeguard documents will be put up in ADB's website so that the affected people, other stakeholders, and the public can provide meaningful inputs into the project design and implementation:

(i) Final or updated IEE upon receipt; and

(ii) Environmental monitoring reports submitted by the Project Management Unit (PMU) during project implementation upon receipt

(i) **Consultation and Participation**. ADB SPS requires FREMAA & WRDA to conduct meaningful consultation[13] with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

55. **Grievance Redress Mechanism**. ADB SPS requires FREMAA to establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the subproject's performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject.

56. **Monitoring and Reporting**. FREMAA shall monitor measure and document the implementation progress of the EMP. If necessary, the borrower shall identify the necessary corrective actions, and reflect them in a corrective action plan. Borrower shall prepare and submit to ADB Annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. For subprojects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis until ADB issues a project completion report.

57. **Unanticipated Environmental Impacts**. Where unanticipated environmental impacts become apparent during subproject implementation, ADB SPS requires the FREMAA to update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

58. **Occupational Health and Safety.** ADB SPS requires the FREMAA and WRD to ensure that workers[14] are provided with a safe and healthy working environment, taking into account risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. All constructions shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work, including: (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

59. **Community Health and Safety**. ADB SPS requires identification and assessment of risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and shall establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts. FREEMA

[13] Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues

[14] Including non-employee workers engaged by the borrower/client through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

and WRD shall ensure to apply preventive and protective measures for both occupational and community health and safety consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. PMU shall also adhere to necessary protocols in response to infectious diseases such as the corona virus disease (COVID-19) consistent with the guidelines of relevant government healthcare agencies and the World Health Organization.

60. PMU shall ensure to apply preventive and protective measures consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines.

61. **Physical Cultural Resources**. FREEMA and WRD are responsible for siting and designing the project to avoid significant damage to physical cultural resources. ADB SPS requires that such resources likely to be affected by the subproject are identified, and qualified and experienced experts assess the subproject's potential impacts on these resources using field- based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

62. **Pollution Prevention and Control Technologies**. During the design, construction, and operation of the project, FREEMA and WRD shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines[15]. These standards contain performance levels and measures that are normally acceptable and applicable to the project infrastructures. When the government's regulations differ from these levels and measures, the project shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, PMU, will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

63. **Bidding and Contract Documents**. This IEE report, which contains the EMP, shall be included in bidding and contract documents and verified by PMU. The PMU shall also ensure that bidding and contract documents include specific provisions requiring contractors to (i) comply with all other conditions required by ADB, and including proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per EMP; and (iv) budget for SEMP implementation, among others as may be required. No works can commence prior to approval of SEMP. A copy of the EMP and/or approved SEMP will be kept on site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the EMP and/or SEMP constitutes a failure in compliance and shall require corrective actions.

64. **Conditions for Award of Contract and Commencement of Work**. PMU shall not award any works contract under the subproject until (i) relevant provisions from the EMP are incorporated into the works contract; (ii) PMU has obtained ADB's clearance of final IEE report; and (iii) other necessary permits from relevant government agencies have been obtained.

[15] World Bank Group. 2007. Environmental, Health, and Safety General Guidelines. Washington, D.C.; https://www.ifc.org-ehs-guidelines

B. Regulatory Requirements of the Government of India and Assam State

65. The construction and operation of the proposed hostel will be governed by Government of India and State Government of Assam and other applicable environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether applicable international, national, state or municipal or local. Key standards include those related to drinking water quality, air quality, effluent discharge, and protected areas. Compliance is required in all stages of the subprojects including design, construction, and operation and maintenance.

66. **Environmental assessment**. The Government of India EIA Notification of 2006 (replacing the EIA Notification of 1994) sets out the requirement for Environmental Assessment in India. This states that environmental clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

67. Building projects having greater than 50,000 m^2 of builtup area falls under Category B of the EIA notification and requires prior EC from the State Environmental Impact Assessment Authorities (SEIAA). However, hostels for educational institutes are exempted from obtaining prior EC. The total area of the building is 1951.67 m^2 and is way below the criteria. Thus, the proposed hostel doesn't falls falls under the ambit of the EIA Notification 2006, and therefore EIA Study or EC is not required for the subproject. However, any mining of sand and aggregates for use in cement concrete structures are under the ambit of EIA notification and shall require prior EC from SEIAA. WRD need to ensure source of sand and aggregates have applicable permits.

68. The Government of India has framed various laws and regulation for protection and conservation of natural environment. These legislations with applicability to this project are summarized below in Table 4-1.

69. The national and international environmental standards and guidelines for all relevant parameters are provided in Appendix 4.

70. As the project does not require forest land diversion and the project is not falling within any protected areas (National Parks, Tiger Reserve and Wildlife Sanctuaries) or defined Eco Sensitive Zone area, thus no clearance is required from Forest Department of Assam and from National Wildlife Board, MoEFCC, Government of India. The nearest PAs are the Deepor Beel WLS (approximately 11.9 km away from the propsed site) and Amchang WLS, with site being approximately 2.93 km away from the notified ESZ of the WLS. The ESZ of Deepor Beel WLS is yet to be notified and thus a 10 km radius from the boundary of the PAs shall be taken as ESZ. Since the site is approximately 11.9 km away from the WLS, it is also outside the ESZ of the WLS.

Table 4-1: Key Environmental Legislation

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
Environmental Protection Legislations					
National Environment Policy (NEP), 2006	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	Applicable for all the projects which have environmental impacts associated with its development and operation	No permit required. Permits are required as per various laws and rules framed under the act.	MoEFCC	-
The Environmental (Protection) Act, 1986 and The Environmental (Protection) Rules, 1987 & its amendments	All construction activities must comply with the legislation issued under this act and rules, the EIA process and implementation of the EMP will enable this. Construction activities must also comply with the environmental quality standards	• Umbrella act under which environmental rules, notifications, schedules and standards applicable to the proposed project are issued • Ecological Sensitive Zones	No specific permits but all environmental clearances, NOCs and permits are referred to the act.	MoEFCC, Assam Forest Dept, Central Pollution Control Board (CPCB) and Pollution Control Board, Assam (PCBA)	-

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
		are notified under the act			
EIA Notification of 14th September 2006 and amendment till date	Requires prior environmental clearance (EC) for new, modernization and expansion projects listed in schedule 1 of EIA Notification, 2006	• Applicable for Building projects having greater than 50,000 m^2 of builtup area as Category B projects. The total area of the building is 1951.67 m^2, and hostels for educational institutes are exempted • Applicable for mining of sand and aggregates for use in cement concrete structures	• Prior EC not required for the hostel building • Prior EC required for mining of sand and aggregates for use in cement concrete structures	MoEFCC/ SEIAA	Contractor (obtaining prior EC for mining of sand and aggregates) and FREMAA (monitoring)
Air (Prevention and Control of Pollution) Act, 1981, 1987 The Air (Prevention and Control of Pollution) Rules, 1982	An act to prevent and control Air pollution	Applicable. The applicability is due to emission from operation of construction equipment like batching plants, DG sets	Consent to Establish (CTE) & Consent to Operate (CTO) to be obtained and maintained for setting up batching plant, DG set as prior to its establishment and	PCBA	Contractor (obtaining CTE and CTO) and FREMAA (monitoring)

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
			operation from PCBA. Conditions to be complied		
Water Prevention and Control of Pollution) Act, 1974,1988 The Water (Prevention and Control of Pollution) Rules, 1975 The Water (Prevention and Control of Pollution) Cess Act, 1977 & amendment in 2003	An act to prevent and control water pollution.	Applicable. It is applicable for the project's having potential to generate effluent during any stage of the project. Effluents are expected to be generated during construction stage from construction camps	CTE and CTO for disposal of sewage and construction of septic tank/soak pit prior to start of establishment and operation from PCBA. Conditions to be complied	PCBA	Contractor (obtaining CTE and CTO) and FREMAA (monitoring)
Noise Pollution (Regulation and Control Act) 2000 and 2010 as amended	Ambient Noise Standards for different areas and zones	Applicable due to generation of noise during construction	No separate permits issued under this act. Permissions are covered for DG sets under CTE/CTO	PCBA	Contractor (obtaining CTE and CTO) and FREMAA (monitoring)
Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016	Protection to public against improper handling storage and disposal of hazardous waste. The rules prescribe the management requirement of hazardous wastes from its generation to final disposal.	Applicable. Project may generate hazardous wastes (like waste oil) during construction	Authorization for storage and handling of hazardous waste	PCBA	Contractor (obtaining permits from PCBA) and FREMAA (monitoring)
Manufacture, Storage, and Import of Hazardous Chemicals (MSIHC) Rules, 1989	Usage and storage of hazardous material	Applicable only for storage of highly inflammable liquids and gases like high-speed diesel (HSD) or liquified petroleum gas (LPG). Compliance to the	No specific permit is required, however precautions defined under the material safety datasheets should be followed for use of hazardous substances listed under the schedules	Chief Controller of Explosives	Contractor (compling with precautions and safety requirements) and FREMAA (monitoring)

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
		rules should be ensured	attached to this notification if any proposed to be used. Safety requirements should have to be complied if storage quantity exceeds the regulated threshold limit		
Construction and Demolition Waste Management Rules, 2016	To manage the construction and demolition waste	Applicable. Applies to all those wastes resulting from construction, repair & demolition of any civil structure of individual or organization who generates construction and demolition waste such as building material, rubble, debris. Segregation, management and disposal of wastes to be as per rules.	Approval required from local authorities, if waste generation is >20 tons in a day or 300 tons per project in month	Local Authorities.	Contractor (obtaining approvals) and FREMAA (monitoring) PMU.
Plastic waste Management Rules, 2016	To manage the plastic waste generated	Applicable. Plastic waste is unlikely to be generated in small quantities. Wastes will be generated from packaging materials during construction. Wastes to be segregated and disposed as per Solid Waste Management Rules, 2016.	No authorization to be obtained. Waste management and minimization to be done. Fee to be paid to local bodies, if applicable	Local bodies	Contractor (obtaining) and FREMAA (monitoring)

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
The Batteries (Management and Handling) Rules, 2001	To regulate the disposal and recycling of lead acid batteries	Applicable. Applicable for disposal of used lead acid battery if likely to be used in any equipment during construction stage.	No specific registration required. Compulsion to buy and sale through registered vendor only.	PCBA	Contractor (obtaining) and FREMAA (monitoring)
Forest Conservation and Wildlife Protection Legislation					
Indian Forest Act, 1927 The Forest (Conservation) Act, 1980 and amendments The Forest (conservation) Rules, 1981 and amendments	To protect forest by restricting conversion of forested areas into non-forested areas and deforestation	Not applicable. No forest land is being diverted nor tree cutting involved	Forest Clearance/Permission for tree cutting	Assam Forest Department and MoEFCC	-
Wildlife Protection Act, 1972, 1993 Biological Diversity Act, 2002	To protect wildlife through notifying NP and WLS and notified ESZ or in its absence 10 km buffer areas around the Protected Areas (PAs)	Not applicable. No diversion of NP and WLS area. Wildlife clearance. The nearest PAs are the Deepor Beel WLS (approximately 11.9 km away from the propsed site), and Amchang WLS with site being approximately 2.93 km away from the notified ESZ of the WLS. The ESZ of Deepor Beel WLS is yet to be notified and thus a 10 km radius	NOC for construction within notified ESZ/10 km in absence of notified ESZ	Chief Wildlife Warden, State Board of Wildlife and National Board of Wildlife	-

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
		from the boundary of the PAs shall be taken as ESZ. Since the site is approximately 11.9 km away from the WLS, it is also outside the ESZ of the WLS			
Safety and Other Related Legislations					
Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996	Requirement of preparation of on-site and off-site Disaster Management Plans for accident-prone areas.	Not Applicable. The project does not involve handling of any hazardous chemical during both construction and operation, phase which may lead to continuous, intermittent or repeated exposure to death, or injury.	No permits issued under this act	Central, State & District Crisis Group (headed by the Deputy Commissioner)	-
Public Liability and Insurance Act 1991	Protection from liability arising due to accidents from handling of hazardous chemicals.	Not Applicable. The project does not involve storage of any chemicals (i.e. HSD) beyond the threshold limit during construction and	No permits issued under this act. Owner of project should take out insurance policies providing for contracts of insurance so as he is insured against liability to give relief, before handling any such hazardous material	Labor Commissioner and Deputy Commissioner (DC)	-
Explosive Act 1884 & Explosive Rules, 2008	Safe transportation, storage and use of explosive material	Not Applicable. No explosive (as described in act & rules) are proposed to be used in the construction and operation stage of the project.	Permission for storage and usage of explosive	Chief Controller of Explosives	-

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
The Petroleum Act, 1934 The Petroleum Rules 2002	Use and storage of Petroleum products	Applicable as storage of HSD/LPG or any other petroleum product may be required for the project purpose	License to store petroleum beyond prescribed quantity.	Chief Controller of Explosives/DC	Contractor (obtaining license) and FREMAA (monitoring)
Central Motor Vehicle Act 1988 and amendments Central Motor Vehicle Rules, 1989 and amendments till date	To minimize the road accidents, penalizing the guilty, provision of compensation to victim and family and check vehicular air and noise pollution	Applicable, for all the contractor's vehicles at site during construction & operation phase	Driving licenses and pollution under control certificates are issued under this Act	Motor Vehicle Department (Licensing authority, registration authority & State Transport Authorities)	Contractor (obtaining licenses and certificates) and FREMAA (monitoring)
The Gas Cylinder Rules 2004	To regulate the storage of gas/possession of gas cylinder more than the exempted quantity	Applicable if contractor store more than the exempted quantity of gas cylinder	License to store gas cylinder more than the regulated quantity	Chief Controller of explosives	Contractor (obtaining license) and FREMAA (monitoring)
Ancient Monuments Preservation Act 1904 Ancient Monuments and Archaeological Sites and Remains Act, 1958 and Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010. Heritage Conservation and Preservation Act, 2010 Ancient Monuments and Archaeological Sites and Remains (Framing of Heritage Bye laws and Other Functions of	Areas within 100 meters (m) of the "protected monument/area" are designated as "prohibited area" and beyond that up to 200 m as "regulated area" respectively. No "construction" is permitted in the "prohibited area" and any construction activity in the "regulated area" requires prior permission of the Archaeological Survey of India (ASI)	Applicable only if any intervention is planned within 100m of archaeological protected sites. No archaeological sites are within the 100m of the project components	No objection certificate	Archaeological Dept GoI, Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH), Directorate of Archaeology, Assam	-

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
Competent Authority) Rules, 2011 National Monument Authority Rules, 2011					
Guidelines for evaluation of proposals/requests for ground water abstraction for drinking and domestic purposes in Notified areas and Industry/Infrastructure project proposals in non-notified areas, 2012	To regulate extraction of ground water for drinking and domestic purpose	Applicable if ground water is extracted for meeting drinking/ domestic water needs of contractor workers	No objection certificate	Centralground Water Authority/Board & MoEFCC	Contractor (obtaining no objection certificate) and FREMAA (monitoring)
Indian Standard Safety Code for Handling and Storage of Building Material (IS:7969-1975)	This standard lays down the safety requirement to be observed in handling and storage of building materials at building site and receiving depots.	Applicable	No permits required	-	Contractor (compliance) and FREMAA (monitoring)
Indian Standard Safety Code for Stacking and Storage of Construction Materials and Components at site (IS 4082-1996)	This standard provides general guidance regarding stacking and storage of construction materials and components at site. Section 4.2 and 4.26 provides guidance to storage of cement bags and oil paints at construction site respectively.	Applicable	No permits required	-	Contractor (compliance) and FREMAA (monitoring)
National Building Code of India 2016	A comprehensive building Code is a national instrument providing guidelines for regulating the building construction activities across the country. It serves as a Model Code	Applicable	NOCs to be obtained from fire department and building plans approved from the municipal corporations	Guwahati Metropolitan Development Authority (GMDA), Guwahati Municipal Corporation (GMC) & Fire & Emergency Services Department	Contractor (obtaining no objection certificate) and FREMAA (monitoring)

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
	for adoption by all agencies involved in building construction works, The Code mainly contains administrative regulations, development control rules and general building requirements; fire safety requirements; stipulations regarding materials, structural design and construction (including safety in construction); building and plumbing services; landscaping and outdoor display structures; approach to sustainability; and asset and facility management.				
Guwahati Building Construction (Regulation) Act 2010 Guwahati Building Construction (Regulation) Byelaws 2014	Building Plans along with drawings and mpas are to be submitted and permits obtained from the municipal corporation prior to start of construction of RCC buildings	Applicable	No objection certificate	Guwahati Metropolitan Development Authority & Guwahati Municipal Corporation	FREMAA
Assam Fire & Emergency Service Act, 1985 (as Amended in 2012) & Assam Fire Service Rules 1989 and other related Act & Rules and Bye Laws	Provides for inspections and issuance of NOC related to Fire safety measures specified for buildings	Applicable	No Objection Certificate	Director, Fire & Emergency Services	Contractor (obtaining no objection certificate) and FREMAA (monitoring)

Name	Key Requirement	Applicability	Type of permit and stage of applicability	Administrative Authority	Responsibility
Other Regulations					
• Workmen's Compensation Act 1923 • Contract Labour (Regulation and Abolition) Act, 1970 • Minimum Wages Act, 1948 • Payment of Wages Act, 1936 • Equal Remuneration Act, 1979 • Child Labour (Prohibition and Regulation) Act, 1986 • Inter-State Migrant Workmen's (regulation of Employment and Conditions of Services) Act, 1979 • The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 • The Factories Act, 1948 • Hazardous Wastes (Management and Handling) Rules, 1989 Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996					

Source: ADB TA Consultant

Table 4-2: International Conventions and Treaties

Law	Description	Requirement	Relevance to the project
Ramsar Convention, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	There is one Ramsar site (Deepor Beel) in Assam which is approximately 11.9 km from the project site. Not applicable.	No
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	India is a signatory of this convention which aims to control international commercial trade in endangered species	The site is in the middle of habitation area and even though there are reported presence of International Union for Conservation of (IUCN) Red listed species and migratory avian species in the Central Asian Flyway in the subproject area and thus, this is not applicable. Contractor to though create awareness amongst workers to desist from illegal wildlife activities including poaching, hunting & fishing by workers	No

Law	Description	Requirement	Relevance to the project
Montreal Protocol 1992	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydro chlorofluorocarbon carbons (HCFCs)	Not applicable in this subproject as no ODS are involved in construction works.	No
Basel Convention on Trans-boundary Movement of Hazardous Wastes, 1989	India is a signatory of this convention which aims to reduce trans-boundary movement and creation of hazardous wastes	Contractor to follow the provisions of Hazardous Waste Rules 2016 for storage, handling, transport and disposal of any hazardous waste emerged during construction works	Yes
Convention on Migratory Species of Wild Animals (CMS), 1979 (Bonn convention)	CMS, also known as Bonn convention, was adopted in 1979 and entered into force on 1 November 1983, which recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. Migratory species threatened with extinction are listed on Annexure 8 of the Convention. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.	The site is in the middle of habitation area and even though there are reported presence of IUCN Red listed species and migratory avian species in the Central Asian Flyway in the subproject area and thus, this is not applicable. Contractor to though create awareness amongst workers from illegal wildlife activities including poaching and hunting by workers	No

Source: ADB TA Consultant

V. DESCRIPTION OF THE ENVIRONMENT

A. Introduction

71. This section presents a brief description of the existing environment around the project site, including its physical resources, ecological resources, socio-economic development and social and cultural resources. Broad aspects on various environmental parameters such physical, biological, and socio-cultural and economic development parameters that are likely to be affected by the proposed project are presented.Secondary information was collected from relevant government agencies like the State Forest Department, State Environment Department and State Pollution Control Board, and Meteorological Department.

B. Geographical location

72. The subproject is in Kamrup Metropolitan District. The district was created in December, 2002 from Kamrup district. The Kamrup Metropolitan district is one of the most important districts of Assam having the State Capital Dispur within its jurisdiction. The district covers an area of 955 sq. km. In terms of area, the district occupies the 27th rank among the district of the state and is the smallest in terms of area. The district is bounded on the West and North by the Kamrup district and on the East by the Morigaon district. On the South, lies the state of Meghalaya. [16]

C. Project Area of Influence

73. For baseline establishment a project influence area (PAI, or study area) has been determined for the site; the subsequent sections provide an understanding of the PAI in relation to each environmental parameter and reasons for its selection.

- **Project Footprint/Direct Impact Area**: The project footprint is the area that may reasonably expected to be directly physically disturbed by activities or infrastructure during construction. This includes areas where project interventions are proposed.
- **Project Area of Influence or PAI**: The effects of physical activities or infrastructure during different phases on a particular environmental resource or sensitive receptor will have spatial and temporal dimensions. Some activities will impact resources or receptors in a larger radius than others, whilst some resources or receptors will be more sensitive to impacts. This has been considered in defining the PAI in relation to each environmental parameter. The PAI has been divided into core and buffer zones:
  - **Core Zone**: the core zone is defined as the radius extending from the project footprint area (direct impact area), which will be subject to the most impacts or the greatest magnitude of change during construction and operation period; and
  - **Buffer Zone**: the buffer zone is the remaining part of the PAI which may be subject to impacts but fewer in number or of lesser magnitude than the core zone.

Table 5-1: Project Area of Influence

Environment Parameter	Core	Buffer	Remarks
Biological	Project area	500m (.5km)	PAI of 500m radius was considered for undertaking the biological data collection. For running an Integrated Biodiversity

[16] District Census Handbook, Marigaon. Census of India 2011. Directorate Of Census Operations. Govt. of India. https://censusindia.gov.in/nada/index.php/catalog/225/download/550/DH_2011_1823_PART_B_DCHB_KAMRUP_METROPOLITAN.pdf and https://kamrupmetro.assam.gov.in/about-us/about-district

Environment Parameter	Core	Buffer	Remarks
			Tool (IBAT) report a 50km buffer was used to pick up on any wide-ranging species and nearest protected/key biodiversity areas. The IBAT report is appended in Appendix 5.
Physical	500m	1 km	PAI of 5 km radius was considered for undertaking physical environment data collection. For most parameters, 500m radius was considered as core zone for mapping of sensitive receptors. The spatial extents are representative of the extents of likely adverse impacts associated with the noise assessment
Socio-economic	500m	1 km	PAI of 5 km radius is considered for socio-economic context, with a core zone of 500m radius for mapping of individual sensitive receptors and consultations

IBAT = Integrated Biodiversity Assessment Tool, PAI = project area of influence
Source: ADB TA Consultant

D. Physical Environmental Setting

Land Use & Agricultural Practices

74. The land characteristic of the district is mostly flat plain except a few forested hilly areas. The district also includes a large number of riverine tracts and sandy river island in the Brahmaputra River. Agriculture is the main occupation of the people of the district. As per Statistical Handbook, Assam, total cropped area in Kamrup Metropolitan District is 29,541 Ha. The following Table 5-2 indicates the pattern of land use under various classification of land in Kamrup Metropolitan District:

Table 5-2: Land use Pattern in Kamrup Metropolitan District

Land Put to Different Uses	Area in Hectares
Total Geographical Area	87,150
Forest area	29,590
Land not available for cultivation	26,035
Land put to non-agriculture uses	21,636
Barren and un-cultural land	4,399
Other uncultivated land excluding fallow land	4,134
Permanent pastures and other grazing land	606
Land under misc., trees, groves etc. not included in net area	3,076
Cultivable waste land	452
Fallow other than current fallow	623
Current fallow	512
Net area sown	26,256
Area sown more than once	3,285

Source: Statistical Handbook 2022. Directorate of Economics and Statistics, Government of Assam

75. The project site being located in the middle of Guwahati City, human settlement and roads are the dominant land-use within 1 km of the study area.

Physiography, Topography, Drainage, Geology and Soils

76. Physiographically the study area can be divided into three units; i.e. the hilly region in the southeast, the alluvial plain in the central and south western part and the swampy areas along Brahmaputra plains. The distinguishable geomorphic units are as follows:

- Flood plain of river Brahmaputra and its tributaries.
- Younger alluvial plain which occupies major part of the area, having slightly higher

elevation than flood plain.

- Older alluvium/valley fill, gently sloping plain, having higher elevation than the younger alluvial plain.
- Piedmont, gently sloping plain along the foothills.
- Inselberg occurs as very small isolated hills.
- Denudational hills considering of granite, gneissic rocks

77. The different rock formation occurring in the project district has been subjected to v arious soil forming processes through agents of weathering and transportation during different geological ages.

78. **Drainage:** The natural drainage system of Guwahati consists of the Bharalu River (a tributary of the Brahmaputra) and its inter-linkages to the beels and to the Brahmaputra river. The Brahmaputra which marks the northern boundary of the town is one of the most astonishing rivers in the world. The city of Guwahati lacks overall proper drainage system. The drains present along roads are not capable enough to handle excessive flow of water during monsoon season. The entire Guwahati Metropolitan Area is divided into seven drainage basins, through which all the waste water of the city is drained into the river Brahmaputra either directly or through various drainage channels and reservoirs indirectly.

79. The Hostel site drained via Bahini channel adjacent to the west side of the boundary and linked to Brahmaputra River at a approximate distance of 10km. No flooding issues have been reported at the site because of spread of river water during monsoon. However, due to torrential rains in monsoon local depressions at site get waterlogged. This issue is being addressed in the design. All the structures of Hostel will be 2 feet above ground level. The site is not in the river land or flood plains.

80. **Geology and Geomorphology:** Geologically, the Guwahati City represents a Precambrian terrain that is an extension of the Shillong plateau. Physiographically, the area can be divided into three units-

- The hilly region in the south,
- The alluvial plains in central part and
- The western parts and the swamps along Brahmaputra flood plains.

81. Geologically, the Guwahati City is made up of the Precambrian gneissic complex, which is, directly overlain by Pleistocene-Holocene sediments. The hills are made up of the gneisses and granite bodies with quartzites, amphibolites and biotite schists; with the intermontane valleys are filled with Pleistocene- Holocene sediments. The rocks are affected by two dominant sets of joints, intruded by quartz veins, aplite and pegmatite. The Shillong Group of rocks occurs as inselbergs in alluvium and hill ranges in southern boundary of the district with Meghalaya. These rocks occupy about 1500 sq. km, area south out of Brahmaputra river and 100 sq.km (ten percent) in north bank. They constitute mainly of schists and gneisses of varied nature and composition. Migmatites, basic rocks, granites and veins of different composition are embedded in these schists and gneisses. The basement is overlain by a cover of Quaternary deposits of variable thickness composed of unconsolidated sand, silt and clay. Along many tracts occupied by paleo channels, the typical Brahmaputra sand with abundant biotite and mostly silt is encountered. Thin layers of residual clays, which are the weathered product of feldspar, are found intertwined with the alluvium at places.

82. Geomorphologically, Guwahati City is located in an area, where the Shillong Plateau and the Floodplains of the Brahmaputra confront each other. Landforms within the city are therefore

unique with dissected hills (originally part of the Shillong Plateau), plain areas and natural lakes (the beels), swamps and the mighty river Brahmaputra. Precambrian residual hills dotting all around interspersed with elongated low-lying plains. Broadly, the area is categorized into three geomorphic units.

- The denudo structural hills (residual hills),
- The alluvial plains and
- The marshy lands including the static water bodies (Water bodies with paleochannels)

83. **Topography:** The topography of proposed alignment is flat terrain. The site elevation ranges between 55 to 65 amsl. However, careful analysis of the topography reveals that the greater Guwahati master-plan area can be divided into six well-defined natural divisions. The old city lies in a horse - shoe shaped valley surrounded on the north by the Brahmaputra river and on the other three sides by low hills comprising Kharghuli andChunchali hills in the east (maximum height 216m), Japarigog (277m), Nakarashura hill (293m) and Fatasil hills (292m) on the south and the famous Kamakhya (Nilachal hill) on the west (Maximum height 303m).

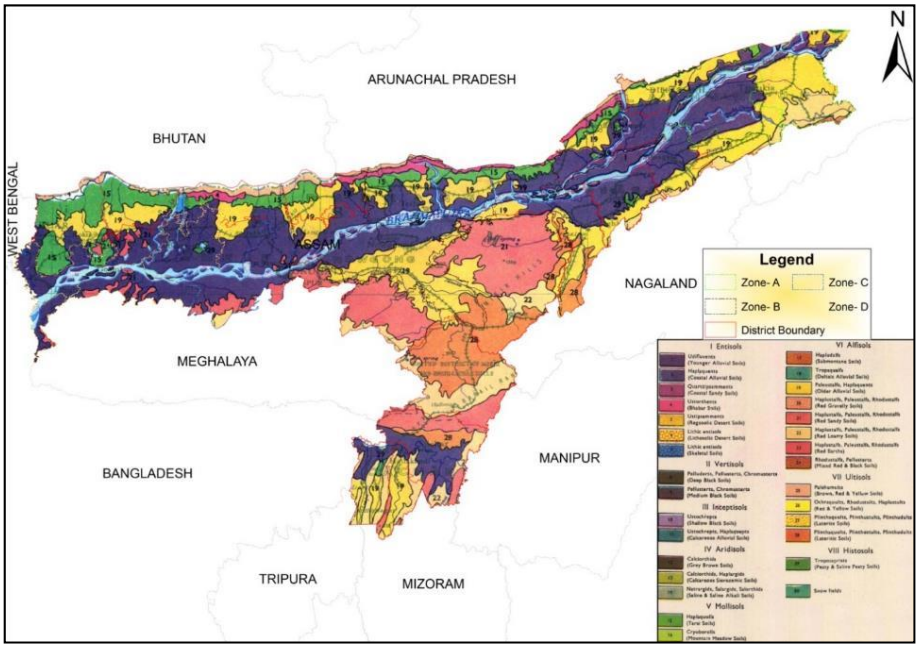
84. **Soil Type:** Different types of soil have formed in the state as a result of the state's diverse geological conditions, topographical features, climatic conditions, and vegetation types. The four major groups of soils in Assam are alluvial soils, piedmont soils, hill soils, and lateritic soils.

85. The fertile alluvial soils have a wide distribution across the Brahmaputra plain. The alluvial soils can further be divided into two main sub types-young alluvial and old alluvial soils. Modern alluvium deposits define the young alluvial soil. These soils are typically grey to molted grey in color. On the other hand, some areas of the districts of Kokrajhar, Barpeta, Nalbari, Kamrup, Darrang, Sonitpur, Lakhimpur, and Dhemaji have historic alluvial soils. The old alluvial soils often have very deep, fine - to coarse textured loams.

86. The northern, constrained region along the piedmont zone of the Himalayan foothills is where the piedmont soils are found. The soils are very deep and fine to coarse loamy in texture. The southern hill portions of the state are often where generally the hill soils are found. These soils have a fine to coarse loamy texture and a deep, dark greyish-brown color. In the NC Hills (Dima Hasao) district and in some areas of the southern Karbi Plateau, lateritic soils are widely distributed. These soils have heavy loams and a fine, dark texture.

87. The soils in the district comprises various proportions of sand, silt, clay and organic material in the district are grouped into three broad categories – a) newer alluvial soil, b) valley fill/older alluvial soil and c) soils over forest and hilly terrain.

Figure 5-1: Soil Region Map of Assam



Source: National Atlas of India

Table 5-3: Soil Test Report within Project Area

Sl. No.	Parameters	Units	Value
1	Color	-	Brownish
2	pH	-	
3	Conductivity	Micro mhos/cm	
4	Bulk Density	gm/cm3	1.14
5	Porosity	%	42.60
6	Water Holding Capacity	%	33.80
7	Texture	-	Sandy –Loam
8	Sand	%	22
9	Silt	%	17
10	Clay	%	29
11	Gravel	%	32
12	Organic Matter	%	1.9
13	Calcium as Ca	%	0.43
14	Magnesium as Mg	%	0.20
15	Sodium	%	0.66
16	Potassium	%	0.15
17	Sulphur	%	0.08
18	Nitrogen	%	0.21
19	Phosphorus	%	0.16
20	CEC	Meq/100 gm	27.9
21	Copper	mg/kg	2.3
22	Chromium	mg/kg	ND
23	Zinc	mg/kg	4.4
24	Lead	mg/kg	0.50

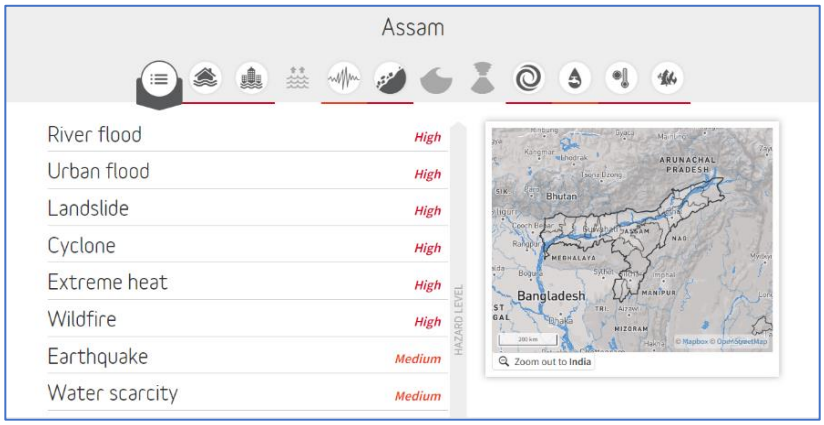
Source: Environmental Impact Assessment Report for Installation of 2 Mounded Bullets at Guwahati Refinery, 2017

88. **Hazard Profile:** As per data generated from Thinkhazard![17] The likelihood of different natural

[17] Think Hazard. 2020. https://thinkhazard.org/en/report/1487-india-assam/EQ

hazards in the state of Assam is depicted in the figure 5-2. The likelihood of natural hazards in the state of Assam is high for floods, cyclones, extreme heat and landslides.

Figure 5-2: Likelihood of Different Natural Hazards in Assam



Source: *ThinkHazard!*

89. In recent past there has been an increase in the number of natural disasters. The growing incidents of natural disasters are highly correlated to the increasing vulnerability of households and communities in developing countries. Floods and Earthquakes are the two major hazards which pose a serious threat to the state of Assam and the Kamrup Metropolitan District.

90. **Floods and Flooding Behavior:** Assam possesses a high risk of flooding due to a number of factors, including its location in an area with heavy rainfall and its proximity to the Himalayas, which makes it vulnerable to flash floods, landslides, and other floods in addition to river overflows. Deforestation in river catchments and subsequent soil erosion may also cause sedimentation in rivers, reducing the ability of the land to absorb rainwater and causing additional runoff and flooding. The risk of flooding in Assam is increasing due to climate change, which is one of the factors causing more extreme weather events, including as flooding and periods of excessive rainfall.

91. Assam is prone to floods due to rise in river water levels in Brahmaputra River and its tributaries. It appears that, the Assam state is vulnerable to flood during the monsoon season more than twice every year. The monsoon season, which normally lasts from June to September, is when rain falls most frequently. During this time, the state frequently experiences floods. The list of recent flood events from 1998 and the duration of floods which were mapped by National Remote Sensing Centre (NRSC), Indian Space Research Organization (ISRO), Department of Space, and Government of India using satellite data is listed in Table 5-4.

Table 5-4: Major flood events in Assam state

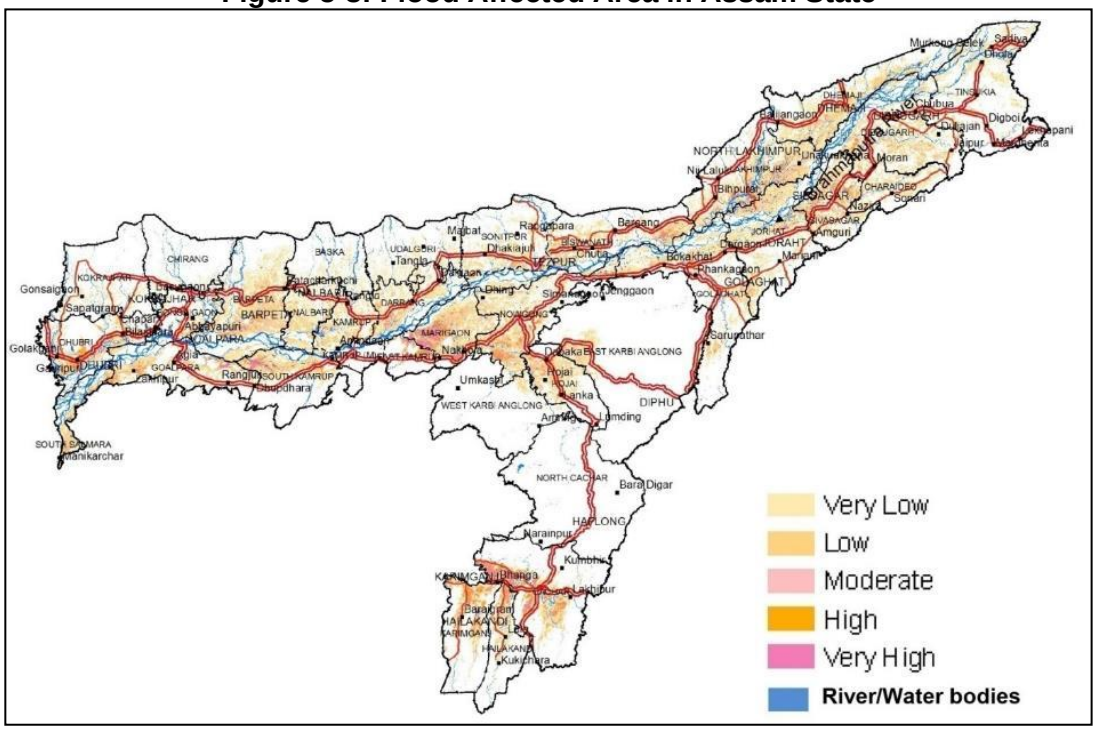
Sl. No	Year	Description of the flood event	Districts Affected
1	1998	Floods occurred in Assam during June	6
2	2003	Floods have affected in two spells during 16th & 23rd June	21
3	2004	Floods occurred in 4 spells during 20-21st April, 28th Jun- 6th Jul, 10th Jul-5th Aug, 10-13th Oct	9
4	2005	Floods occurred in during 20-21st April, 28th Jun- 6th Jul, 10th Jul-5th August, 10-13th Oct	20
5	2006	Floods occurred in 3 spells during 2nd-16th Jun, 26th June, 26th - 28th July	24
6	2007	Floods occurred in 2 spells during 21-26th Jun, 14th Jul- 4th Oct	21
7	2008	Floods occurred in 2 spells during 9-23rd Jul, 2nd Aug -14th Sep	21
8	2009	Floods occurred during 1st Jul - 28th Aug. In addition, Matmora embankment	21

Sl. No	Year	Description of the flood event	Districts Affected
		breach in Lakhimpur district	
9	2010	Floods occurred during in 19th Jun - 31st Jul, 17th Aug - 23rd Sep	24
10	2011	Floods occurred during in 29th Jun - 18th August	16
11	2012	Floods occurred during in 6th Jun - 7th Oct	28
12	2013	Floods occurred during 1-10th Jul, 9-14th Aug, 9-12th Sep	27
13	2014	Floods occurred during 16th - 29th Aug, 22nd - 29th Sep	27
14	2016	Floods occurred during 24-26th April, 5-29th July	20
15	2017	Floods occurred during 3rd Jun - 22nd Jul	36
16	2018	Floods occurred during 8th Jun - 13th Sep	37
17	2019	Floods occurred during 10th Jul - 2nd Aug	34
18	2021	Floods occurred during 7th Jun - 6th Sep 2021	33
19	2022	Floods occurred during 18th May - 26th May and 16th June - 17th July 2022	35

Source: Flood Affected Area Atlas of India (1998-2022) - Satellite based Study, NRSC & ISRO in association with NDMA, GoI, March 2023 [18]

92. The cumulative flood impacted region map of Assam State has been generated using multi-date satellite derived spatial flood inundation maps between 1998 and 2002 by National Remote Sensing Centre (NRSC), Indian Space Research Organization (ISRO), Department of Space, Government of India, in Association with National Disaster Management Authority Ministry of Home Affairs, Government of India. Cumulative flood affected area is estimated as 24.64 lakh ha affecting 35 districts of the State. Figure 5-3 depict a map of the flood hazard and the Table 5-3 provides the details of the flood affected areas in the project district.

Figure 5-3: Flood Affected Area in Assam State



Source: Flood Hazard Zonation Atlas for Assam State (1998-2015) – A Geospatial Approach, September 2016.

[18] https://ndem.nrsc.gov.in/documents/downloads/Flood%20Affected%20Area%20%20Atlas%20of%20India%20-Satellite%20based%20study.pdf

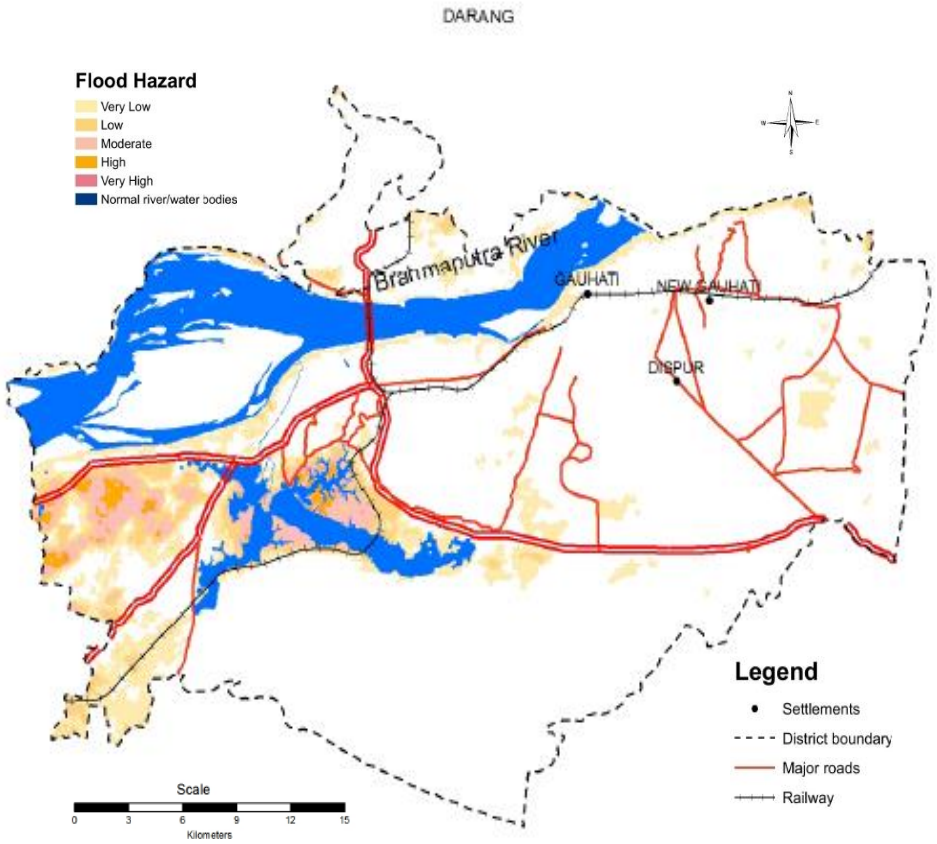
Table 5-5: Flood Affected Areas in the Subproject Districts

Sl. No.	District	Flood Affected Area (Ha)
1	Kamrup Metropolitan	6,680
Total in Assam		**2,464,958**

Source: Flood Hazard Zonation Atlas for Assam State (1998-2015) – A Geospatial Approach, September 2016.

93. **Flood hazards zones during 1998-2015:** A geospatial approach to study the Flood hazard of the state of Assam was conducted by National Remote Sensing Centre, Indian Space Research Organization and Dept of Space, Govt. of India in association with Assam State Disaster Management Authority of Assam to categories the frequently flood affected areas in the state. In this approach, 18 years (1998-2015) of satellite data from Indian and foreign satellites was used in identifying the flood hazard zones and the flood hazard is categorized into 5 classes, i.e., very high, high, moderate, low and very low based on the frequency of inundation. Further, a flood hazard ranking index, which represents the worst flood affected districts in Assam, is calculated based on the hazard severity, percentage of flood inundation area and intra-annual flood wave index. The atlas is ground verified by the Government of Assam. It is observed that out of 34 districts in Assam, 17 districts are worst flood affected and about 2.2 million hectares in Assam is affected by floods at least once during last 18 years. The flood hazard statistics of Morigaon the subproject area is presented in the Table 5-6.

Figure 5-4: Flood Hazard Map (1998-2007) in Kamrup Metropolitan District



Source: Flood Hazard Zonation Atlas for Assam State (1998-2015) – A Geospatial Approach, September 2016

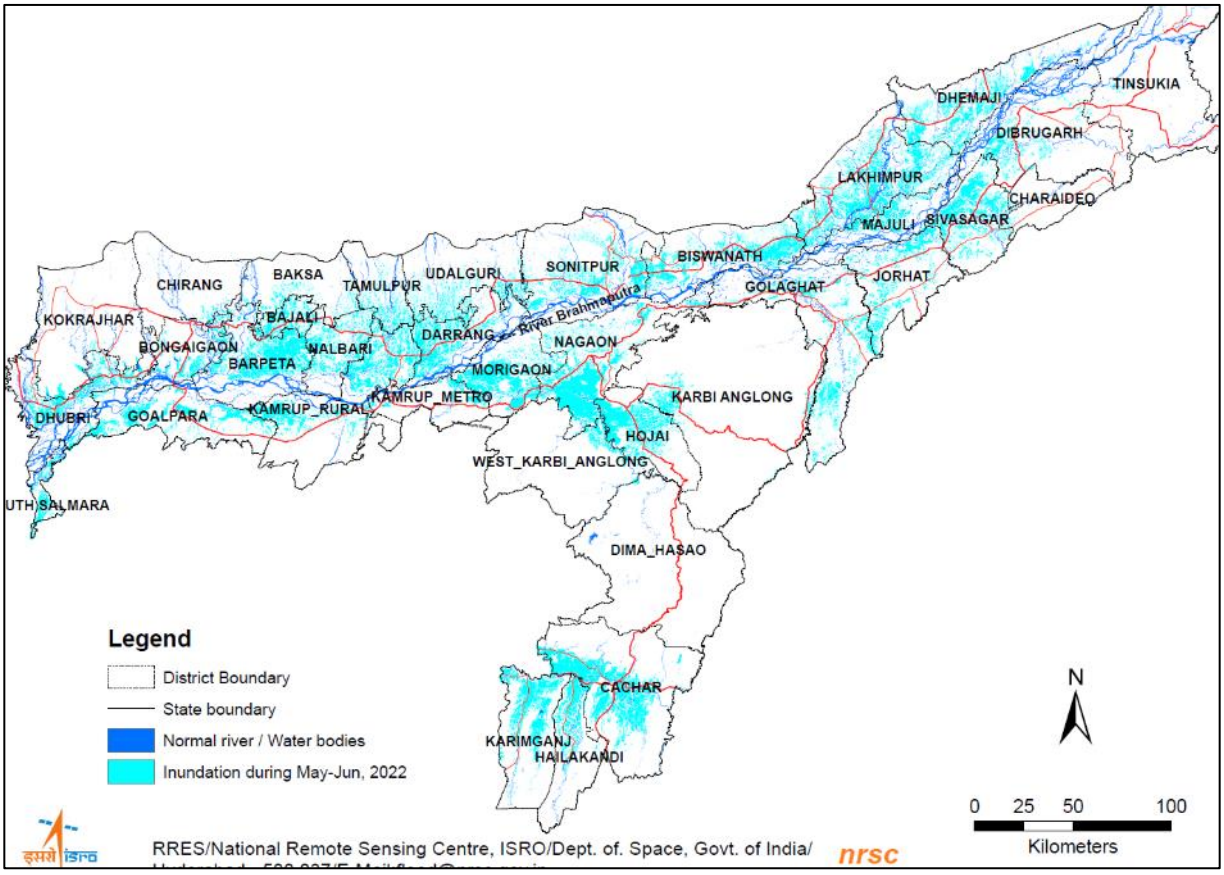
Table 5-6: Flood Hazards Statistics – Morigaon District

Hazard Code Severity	Flood Hazard	Area (Hectares)
1	Very Low	3,957
2	Low	1,235
3	Moderate	1,261
4	High	222
5	Very High	5

Source: Flood Hazard Zonation Atlas for Assam State (1998-2015) – A Geospatial Approach, September 2016.

94. **Flood inundation areas of Assam 2022:** Satellite based analysis has been carried out continuously by NRSC during May-June 2022 and flood inundation occurring in larger areas were mapped and monitored across Assam state. It is observed that the total area under flood inundation is observed to be ~ 10.37 Lakh Ha. District wise area Inundated area during first wave of floods pre-monsoon in 3rd week of May 2022 and the second wave of floods started during 16-28th June, 2022 which has affected 34 districts in Assam state presented in below in Table 5-7, spread over 35 districts as shown Figure 5-5.

Figure 5-5: Flood Inundated areas in Assam State during May-June 2022



Source: Satellite based Analysis - Flood Mapping & Monitoring in Assam State, Disaster Management Support Group, National remote Sensing Centre (NRSC), Indian Space Research Organization (ISRO), Dept.

of Space, Govt. of India Balanagar, Hyderabad-37 Telangana State, India, August 2022

Table 5-7: Area of Project Districts affected during the flood inundation in May-June 2022

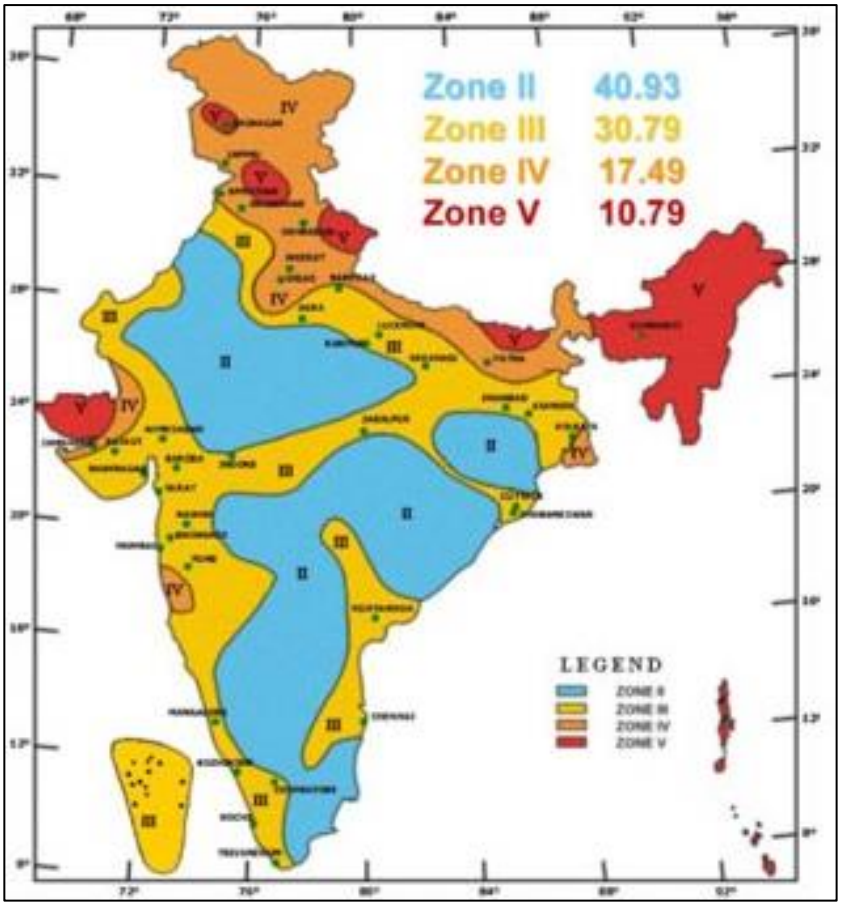
Sl. No.	District	Area Inundated (ha)
1	Kamrup Metropolitan	8,600
Total in Assam		**10,37,985**

Source: Satellite based Analysis - Flood Mapping & Monitoring in Assam State, Disaster Management Support Group, National remote Sensing Centre (NRSC), Indian Space Research Organization (ISRO), Dept. of Space, Govt. of India Balanagar, Hyderabad-37 Telangana State, India, August 2022

95. **Seismic Hazard:** High seismic activity is a feature of northeast India and the areas surrounding it. The eastern Himalayas, the Indo-Myanmar arc, the Mishmi Massif, the Shillong Plateau and surrounding areas, the Tripura folded belt, the Assam intermountain depression, and the northern part of the Bengal basin are all included in this region, which spans the northern portion of the Assam-Arakan geological province.

96. According to Figure 5-6 seismic hazard zonation map of India, the entire northeast of the country is located in zone V, the most vulnerable area in the nation. Recent research has shown that adjacent locations are affected differently by earthquake shaking. The conditions at the site are closely related to the shaking's intensity.

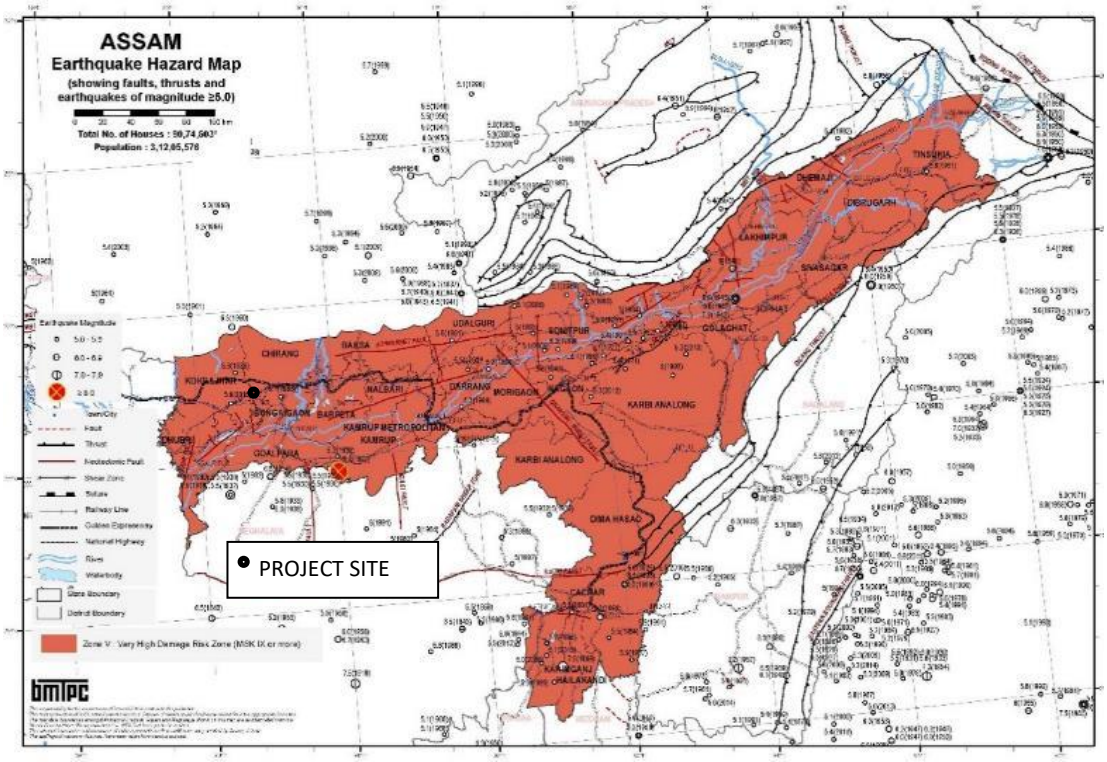
Figure 5-6: Seismic Zonation Map of India - 2002



Source: National Institute of Disaster Management (NIDM). https://nidm.gov.in/safety_earthquake.asp

97. According to Global Seismic Hazard Assessment Program (GSHAP) data, the state of Assam falls in a region of moderate to high seismic hazard. As per the 2002 Bureau of Indian Standards (BIS) map, Assam also falls in V (Zone I is low Risk and Zone V is high Risk). Historically, parts of this state have experienced seismic activity in the M6, which means strong as per US Geological Survey.

Figure 5-7: Earthquake Hazard Map of Assam



Source: https://www.bmtpc.org/DataFiles/CMS/file/VAI2019/eq-assam.html

98. As per the data from Think hazard, the earthquake hazard in Assam and Morigaon District is classified as medium according to the information that is currently available. This means that there is a 10% chance of potentially-damaging earthquake in Assam in the next 50 years.

99. Even though the majority of northeast India is susceptible to earthquakes, their magnitudes typically range from 5 to 8 or higher. Low-magnitude earthquakes with a Richter scale value of less than 5 are widely distributed in the area. However, the majority of earthquakes with a magnitude of greater than 5 have been recorded in the lower Brahmaputra Valley. Earthquakes measuring between 5 and 6 on the Richter scale have primarily been felt in Assam's northern, western, southern, and eastern rims. The Brahmaputra Valley saw the majority of the earthquakes, which typically had Richter scale magnitudes between 6 and 7, on a regular basis. The areas with the highest densities of powerful earthquakes, with magnitudes ranging from 7 to 8, have been found to be central and lower Brahmaputra Valley.

Table 5-8: Major Earthquakes in Assam

Place	Year	Magnitude
Cachar,	Assam January 10, 1869	Mw > 7.0
Shillong plateau	June 12, 1897	Mw 8.1 - 8.7
Sibsagar	August 31, 1906	Ms 7.0
SW Assam	September 9, 1923	Ms 7.1

Place	Year	Magnitude
Dhubri	July 2, 1930	Ms 7.1
Assam	January 27, 1931	Ms 7.6
N-E Assam	October 23, 1943	Ms 7.2
Upper Assam	July 29, 1949	Ms 7.6
Upper Assam	August 15, 1950	Mw 8.6-8.7

Source: Seismic Microzonation Atlas of Guwahati Region, Department of Science & Technology Government of India, 2007. https://asdma.assam.gov.in/sites/default/files/Seismic_Microzonation.pdf

Climate

100. The climate of the area has been classified as sub-tropical humid climate with heavy rainfall, hot summer and high humidity. Three seasons are witnessed in Guwahati. From February to March weatheris dry. In the month of March north-east winds carry sand and dust. In April and May local rains along with thunderstorms are a common feature. The minimum and maximum temperature varies from 10^0 to 37^0C during this period. From June to October, there is prevalence of south-west monsoon with heavy rainfall. Temperature varies from 22 to 32^0C inthis season. Average annual rainfall is 1637.3 mm in the region with about 90 rainy days. About 90 % of rain occurs between April and September and July and August being the rainiest months.

101. Historical meteorological data was obtained from nearest IMD station located at Bhorjar. The predominant wind direction is from East and North-East direction during winter season. Details provided in Table 5.9.

Table 5-9: Long Term Meteorological Data of Bhorjar (30 years average)

Month	Temperature (ºC) daily		Relative Humidity (%)		Rainfall (mm)	Predominant Wind Direction	Pressure (hPa)	Wind Speed
	Max	Min	Max	Min		(From)		km/hr
January	23.7	10.2	86	70	8.9	E, NE	1011.3	2.4
February	26.1	11.7	74	53	18.0	E, NE	1008.8	3.3
March	30.0	15.7	65	47	50.7	E, NE	1006.1	4.7
April	30.9	19.8	73	60	160.1	E, NE	1003.4	5.8
May	31.0	22.4	79	70	229.5	E, NE	1000.5	5.0
June	31.7	24.8	83	78	316.5	E, NE	996.1	4.3
July	31.7	25.4	85	80	356.6	E, NE	995.9	3.8
August	32.1	25.4	83	80	246.4	E, NE	997.2	3.8
September	31.5	24.5	83	81	180.2	E, NE	1001.2	3.3
October	30.2	21.7	83	80	82.8	E, NE	1006.1	3.1
November	27.4	16.6	84	79	23.3	E, NE	1009.7	2.7
December	24.5	11.6	87	78	7.1	E, NE	1011.6	2.2
Annual Total or Mean	**29.2**	**19.1**	**80**	**71**	**1680.1**	**E,NE**	**1004.0**	**3.7**

Source: IMD

102. **Relative Humidity**: April, May and June are driest with average relative humidity ranges between 60 - 83%. The maximum humidity during monsoon season is 85%.

103. **Temperature:** December, January and February constitute winter months with daily mean minimum temperature around 10.2ºC and daily mean maximum temperature around 23.7ºC. May

and June is the hottest month with daily mean maximum temperature at 39.2°C and daily mean minimum temperature at 23.7°C.

104. **Rainfall:** The annual total rainfall is 1680.1 mm. The annual normal rainfall of the district as compiled from IMD data is 2125.4 mm with 96.5 rainy days.

105. **Wind Speed & Direction:** The mean wind speed ranges from 2.2 to 5.8 kmph. The predominant wind direction is from East and North-East direction in most of the year except monsoon season where wind blows from east and west direction.

Water Environment

106. **Surface Water.** The State of Assam in general and the Brahmaputra Valley in particular, is endowed with vast water resources potential. The Brahmaputra River and the 33 major tributaries joining it in Assam including the main trans-Himalayan tributaries of Subansiri, Jia Bharali, and Manas carry about 30% of the country's total water resources potential. Surface water bodies covering about 8,251 km2 account for 10.5% of the total geographical area of the State. Of these, the river systems including waterlogged areas occupy 6,503 km^2. The annual surface water availability is over 53 million ha m. Besides, there are 3,513 wetlands in the Brahmaputra valley covering 1012.3 km areas in Assam. Groundwater is also plentifully available at shallow depth in the valley and the utilizable ground water resources estimated at over 2 million ha m.

107. The project site is located in Brahmaputra river catchment. There is no major surface water source close to the site. The site has not been flooded due to Brahmaputra River flow. However, during monsoon, there is water logging in low-lying portions of site.

108. The surface water quality data of local stream close to project site is not available. The contractor after mobilization will collect sample from stream adjacent to site to establish baseline. Since Brahmaputra is the only river of significance in the project region so water quality data of this river was obtained from past EIA study. This river in future will be source of drinking water supply in Guwahati City. Currently ground water is the drinking water source. The aerial distance of this river from site is about 10 km in monsoon season. The river water quality of Brahjmaputra from secondary source is given below in Table 5-10 It is clear from this table that heavy metals like copper, lead, mercury, cadmium and chromium were below their respective detection limits in the river water. Brahmaputra River generally conforms to Class-B & C of the CPCB, which means the water is suitable for outdoor bathing and as drinking water source after conventional treatment and disinfection.

Table 5-10: Brahmaputra River Water quality in Project Region

Sl. No.	Parameters	Unit	Value	Permissible CPCB Criteria	
				Class B (Suitable for outer Bathing)	Class C (Drinking Water source after conventional treatment and disinfection)
1	pH	-	7.4	6.5 to 8.5	6 to 9
2	Conductivity	Micromhos/cm	288	Not Stipulated	Not Stipulated
3	Dissolved Oxygen	mg/l	6.7	5 or more	4 or more
4	BOD (3 Days 270C)	mg/l	3	3 or less	3 or less
5	Total Coliforms	MPN/100 ml	640	500 or less	5000 or less
6	Total Dissolved Solids	mg/l	168	Not Stipulated	Not Stipulated
7	Oil and Grease	mg/l	1.4	Not Stipulated	Not Stipulated
8	Cyanide as (CN)	mg/l	<0.005	Not Stipulated	Not Stipulated

Sl. No.	Parameters	Unit	Value	Permissible CPCB Criteria	
				Class B (Suitable for outer Bathing)	Class C (Drinking Water source after conventional treatment and disinfection)
9	Phenol	mg/l	<0.001	Not Stipulated	Not Stipulated
10	Total Hardness (as CaCO3)	mg/l	99	Not Stipulated	Not Stipulated
11	Chloride (as Cl)	mg/l	25	Not Stipulated	Not Stipulated
12	Sulphate (as SO4)	mg/l	3	Not Stipulated	Not Stipulated
13	Nitrate (as NO3)	mg/l	1.6	Not Stipulated	Not Stipulated
14	Fluoride (as F)	mg/l	0.2	Not Stipulated	Not Stipulated
15	Calcium (as Ca)	mg/l	28	Not Stipulated	Not Stipulated
16	Magnesium (as Mg)	mg/l	7	Not Stipulated	Not Stipulated
17	Copper (as Cu)	mg/l	<0.05	Not Stipulated	Not Stipulated
18	Iron (as Fe)	mg/l	0.40	Not Stipulated	Not Stipulated
19	Manganese (as Mn)	mg/l	<0.05	Not Stipulated	Not Stipulated
20	Zinc	mg/l	0.06	Not Stipulated	Not Stipulated
21	Boron (as B)	mg/l	<0.02	Not Stipulated	Not Stipulated
22	Arsenic (as As)	mg/l	<0.002	Not Stipulated	Not Stipulated
23	Mercury (as Hg)	mg/l	<0.001	Not Stipulated	Not Stipulated
24	Lead (as Pb)	mg/l	<0.05	Not Stipulated	Not Stipulated
25	Cadmium (as Cd)	mg/l	<0.01	Not Stipulated	Not Stipulated
26	Alkalinity (as CaCO3)	mg/l	128	Not Stipulated	Not Stipulated
27	Hexavalent Chromium as Cr+6	mg/l	<0.05	Not Stipulated	Not Stipulated

Source: Source: Environmental Impact Assessment Report for Installation of 2 Mounded Bullets at Guwahati Refinery, Year 2017

109. **Ground Water.** The entire Brahmaputra Valley especially its floodplain zone underlain by unconsolidated alluvial materials is a vast reservoir of groundwater. The dynamic resource of groundwater in the Brahmaputra valley is estimated to be of the order of 2.79 million ha m. In the floodplain zone the depth of water is shallow, normally within 5 m below ground level. During the post monsoon period, in almost the entire flood plain area of the Brahmaputra Valley, the water table lies within 2 m below the ground surface, caused mainly by the impact of monsoon rains and recharge to the groundwater aquifers.

110. The area consists of two broad hydrogeological units – 1) Pre-Cambrian consolidated rocks and 2) Quaternary alluvium consisting of unconsolidated sediments (Plate-2). Pre-Cambrian consolidated rocks are confined to hilly areas and inselbergs, where ground water occurs in shallow weathered zone and this can be developed through open wells. The joints and fractures developed due to tectonic activities form potential water bearing zones and suitable for development through construction of bore wells.

111. The contractor after mobilization will collect ground water sample (from the existing hand pumps close to site) in pre- construction phase with an aim to establish baseline for ground water quality. The Central Ground Water Board (CGWB) in North Eastern Region Office has conducted some ground water survey and studies in Kamrup Metro district and published in ‘Ground Water Information Booklet- Darrang District’ in the year 2013. As per their study ground water of district is fresh and potable for both domestic and irrigation purposes.

112. However, due to slightly higher content of iron in some sporadic patches of the area and fluoride content exceeding permissible limit in some pockets in and around Guwahati City, water needs to be treated before being used for drinking purpose.

113. Based on 2013 data of CGWB the depth of water level during pre-monsoon months, in Kamrup Metro district ranged from 2 to 5 m below ground level (bgl) and 1 to 2 m in post monsoon months. Ground water development is at low key at present and estimated to be 644 MCM only against the vast annual dynamic resources of 1482 MCM. After allocation for domestic and industrial requirement of 105 MCM for a population estimated in 2025, the net annual dynamic resources of 790 MCM are still available for development.

Air Quality

114. The project site is located in the Guwahati City near the NH-27. The surrounding area is mixture of residential, commercial and government institutes. There are environmental sensitive receptors near the location such as Dakhion Beltola High school adjacent to the boundary of proposed site along with government colony and other residential areas near to the site. In between the proposed location and NH-27, there are government offices including the FREMAA & WRD Office at Assam Water Centre. A bridge is under construction along with extension of existing NH-27 from 4 lane to 6 lane. Baseline Ambient Air quality has been taken from the CPCB monitoring station located at Bornihat. Baseline ambient air quality monitoring will be carried out by the contractor in pre-construction phase immediately after mobilization.

115. It has been observed from the secondary air quality data collected from the CPCB that the $PM_{2.5}$ and PM_{10} parameters are very high than the permissible limit. The area is located in the prime location of Guwahati City with very heavy traffic and various ongoing construction projects including upgradation of NH-27 from 4-lane to 6-lane along with few major over-bridges. These factors lead to the high value of $PM_{2.5}$ & PM_{10} in the project area.

Table 5-11: Ambient Air Quality Monitoring Locations and Result

Date of Monitoring	Ambient Air Quality Monitoring Parameters ($\mu g/m^3$)				
	PM_{10}	**$PM_{2.5}$**	**SO_2**	**CO**	**NO_2**
January 2023	273.85	463.61	55.45	0.88	33.72
February 2023	220.93	410.27	53.09	0.67	39.36
March 2023	182.46	385.46	60.83	0.68	39.49
April 2023	163.98	335.17	59.31	1.69	37.05
National Ambient Air Quality Standard for Industrial, Residential, Rural & other Areas	**100**	**60**	**80**	**4 (1 hourly)**	**80**
WHO Ambient Air Quality Guidelines (Interim Target 1)	**150**	**75**	**125**	**-**	**200 (guideline)**

Note: Averaging Time: 24 hourly data averaged for each month Station Name: Central Academy for SFS, Byrnihat, PCBA
Source: Pollution Control Board Assam Central Pollution Control Board

Noise Environment

116. Noise levels data is also high for the project area as per the secondary source. To havesite specific ambient noise levels data, monitoring will be conducted by the contractor prior tostart of construction works with the aim of establishing baseline conditions.

Table 5-12: Ambient Noise Monitoring Location & Result

Location	Sensitive Receptors	Noise Monitoring Result	
		Leq (Day), dB(A)	Leq. (night), dB(A)
Basistha Chariali	Commercial	61.3	48.3
Near Dakhin Beltola High School	Residential & Silent	56.6	45.8
Lalmati	Commercial	52.4	42.4
National Standards (CPCB) [19]	Silent Area	50	40
	Residential Area	55	45
	Commercial area	65	55
	Industrial Area	75	70
World Bank - Noise Level Guidelines [20] (Day time (07:00 – 22:00); Night Time (22:00 – 07:00))	Residential, Institutional and Educational	55	45
	Industrial and Commercial	70	70

Source: FREEMA, May 2023

117. Based on the above table, it is clear that the background ambient noise level falls within the permissible limit for day and night time of residential area Category of CPCB.

Key Physical Aspects

118. Summary of the key physical aspects in the PAI are given in Table 5-13.

Table 5-13: Summary of Key Physical Environmental setting in PAI

Particulars	Key Features in PAI
Elevation and Topography	• The topography of proposed alignment is flat terrain. The site elevation ranges between 55 to 65 amsl
Land Use and Land Cover – Study Area	• Physiography is characterized primarily by plains with hills in the south and Brahmaputra flood plains in the north and west • LU is completely human settlement
Microclimatic condition	• The climate in the district is moderate during the winter and in summer, it is hot • The maximum temperature is 39.2 degree Celsius during July and August, a minimum temperature falls up to 10 degrees Celsius in the month of January
Geological and Climatic Risks	• Seismic hazards: Zone-V. Medium Damage Risk Zone in PAI • Surface Water Flooding – High Medium Risk • Landslides – Low Risk area • Storms and cyclones – very low risk area
General environmental conditions – soils, air quality, noise, water	• Parameters are within CPCB standards in general

Source: ADB TA Consultant

[19] Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended by the Noise Pollution (Regulation and Control) (Amendment) Rules, 2000 vide S.O. 1046(E), dated 22.11.2000 and by the Noise Pollution (Regulation and Control) (Amendment) Rules, 2002 vide S.O. 1088(E), dated 11.10.2002, under the Environment (Protection) Act, 1986.

[20] Environmental, Health, and Safety General EHS Guidelines. World Bank Group. 2007. https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=nPtguVM

E. Biological Setting

Protected Areas (PA)

119. The State of Assam is a constituent unit of the Eastern Himalayan Biodiversity Region; one of the two biodiversity "Hot Spots" in the country. The climatic condition and wide variety in physical features witnessed in Assam have resulted in a diversity of ecological habitats such as forests, grasslands, wetlands, which harbor and sustain wide ranging floral and faunal species placing.

120. The State of Assam has 5 National Parks (NP), 17 Wildlife Sanctuaries (WLS) and 1 Ramsar wetland site which is also a WLS. There is 21 Key Biodiversity Areas (KBA) and Important Bird Areas (IBA) in the state[21] [22]. The details are as follows:

Table 5-14: Summary of Protected Areas in Assam

Sl. No.	Name	National Status [23, 24]	IUCN Protected Area Level/ Ramsar Criteria	IBA Criteria [25, 26]	KBA	Critical Habitat Triggers
1	Dibru-Saikhowa NP	NP	Not categorized yet but considered as Category II as per IUCN criteria	A1, A2	Yes	Supports CR/EN species
2	Kaziranga NP	NP	Category II (NP) & X (World Heritage Site) as per IUCN criteria [27]	A1, A2, A4i, A4iii	Yes	Fulfils IUCN Category II PA criterion
3	Manas NP	NP	Category IV (habitat or species management area) as per IUCN	A1, A2	Yes	Supports CR/EN species
4	Nameri NP	NP	Category IV as per IUCN	A1, A2	Yes	Supports CR/EN & endemic species
5	Orang NP	NP	Category IV as per IUCN	A1, A4ii	Yes	Supports CR/EN and migratory species
6	Amchang WLS	WLS	Not categorized yet but considered as Category IV as per	A1	Yes	Supports CR/EN species

[21] Key Biodiversity Areas (KBA) are sites contributing significantly to the global persistence of biodiversity in terrestrial, freshwater and marine ecosystems. Sites qualify as global KBAs if they meet one or more of 11 criteria, clustered into five categories: threatened biodiversity; geographically restricted biodiversity; ecological integrity; biological processes; and, irreplaceability. KBAs comprise an "umbrella" set of internationally recognized priority sites for biodiversity that includes Important Bird Areas (IBAs) and Alliance for Zero Extinction (AZE) sites. IBAs are priority sites for bird conservation because they regularly hold significant populations of one or more globally or regionally threatened, endemic or congregatory bird species, or highly representative bird assemblages.

[22] WII ENVIS, Govt. of India. 2017. http://wiienvis.nic.in/Database/Key_Biodiversity_Areas_8647.aspx

[23] WII ENVIS, Govt. of India. 2023. http://wiienvis.nic.in/Database/wls_8230.aspx

[24] Assam State Biodiversity Board, Govt. of Assam. https://asbb.assam.gov.in/information-services/protected-area-network

[25] BirdLife International (2022) Country profile: India (http://datazone.birdlife.org/country/india)

[26] Rahmani, A.R., Islam, M.Z. and Kasambe, R.M. (2016) Important Bird and Biodiversity Areas in India: Priority Sites for Conservation (Revised and updated). Bombay Natural History Society, Indian Bird Conservation Network, Royal Society for the Protection of Birds and BirdLife International (U.K.). Pp. 1992 + xii

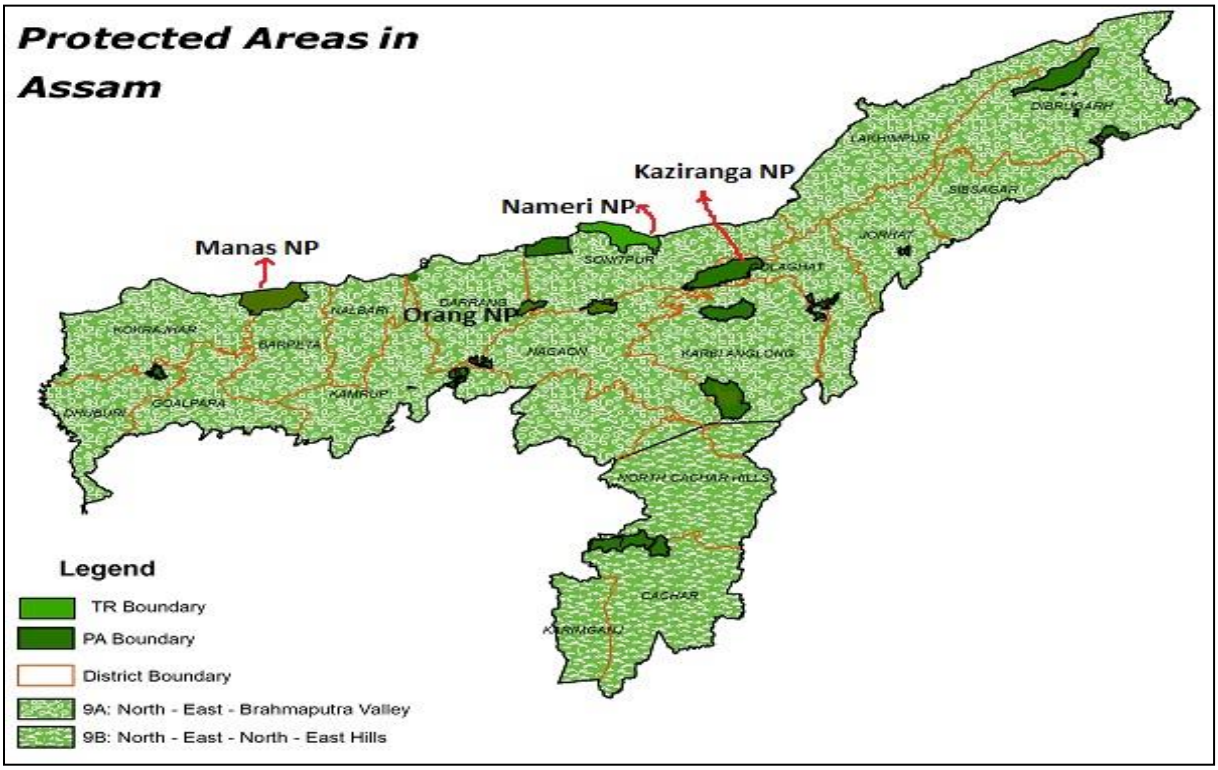
[27] IUCN. 1990. IUCN Directory of South Asian Protected Areas. IUCN, Gland, Switzerland and Cambridge, U.K. xxiv + 294 pp. https://wedocs.unep.org/bitstream/handle/20.500.11822/8084/IUCN_directory_South_Asian_Protected_Areas.pdf?sequence=3&isAllowed=y

Sl. No.	Name	National Status [23, 24]	IUCN Protected Area Level/ Ramsar Criteria	IBA Criteria [25, 26]	KBA	Critical Habitat Triggers
			IUCN			
7	Barail WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1, A2, A3	Yes, as part of Barail Range	Supports CR/EN & endemic species
8	Barnadi WLS	WLS	Category IV as per IUCN	A1	Yes	-
9	Bherjan-Borajan-Podumoni WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1	Yes	-
10	Burachapori WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1, A2	Yes	-
11	Chakrashila WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1, A4i, A4iii	Yes	-
12	Deepor Beel	Ramsar Site	Ramsar Site per criterion 1, 2, 4, 7 & 8. Category IV as per IUCN	A1, A4iii	Yes	Ramsar site. It is a wetland that provides key ecosystem services/fish breeding ground
13	East Karbi Anglong WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1	Yes	-
14	Garampani WLS	WLS	Category IV as per IUCN	A1	Yes	-
15	Hollongapar-Gibbon WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1	Yes	Supports CR/EN & endemic species
16	Laokhowa WLS	WLS	Category IV as per IUCN	A1, A2	Yes	Supports CR/EN & endemic species
17	Marat Longri WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1	Yes	-
18	Nambor Doigrung WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1	Yes	-
19	Nambor WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1	Yes	-
20	Pabitora WLS	WLS	Category IV as per	A1, A2,	Yes	Supports CR/EN &

Sl. No.	Name	National Status [23, 24]	IUCN Protected Area Level/ Ramsar Criteria	IBA Criteria [25, 26]	KBA	Critical Habitat Triggers
			IUCN	A4iii		migratory species
21	Pani-Dihing WLS	WLS	Not categorized yet but considered as Category IV as per IUCN	A1, A4iii	Yes	-
22	Sonai-Rupai WLS	WLS	Category IV as per IUCN	A1	Yes	Supports CR/EN species

CR = Critically Endangered, EN = Endangered, IBA = important bird area, KBA = Key Biodiversity Areas, IUCN = International Union for Conservation of Nature
Source: ADB TA Consultant

Figure 5-8: Map Showing Protected Areas in Assam



Source: Wildlife Institute of India.
http://wiienvis.nic.in/WriteReadData/UserFiles/image/PAs_Map_Database/images/assam_envis1.jpg

Areas of Eco-sensitivity, Protected Area or Restricted Area

121. There is 1 notified protected area (Amchang WLS) within 10 km of the project intervention areas as provided in Table 5-15. Deepor Beel WLS is approximately 11.9 km away from the propsed site. The ESZ of Amchang WLS has been notified and the project site is approximately 2.93 km away from the notified ESZ. The ESZ of Deepor Beel WLS is yet to be notified and thus a 10 km radius from the boundary of the PAs shall be taken as ESZ. Since the site is approximately 11.9 km away from the WLS, it is also outside the ESZ of the WLS. Thus, no permissions/NOC etc. from CWLW/SBWL/NBWL is required. The Assam Plains is reported to be an Endemic Bird Area (EBA)

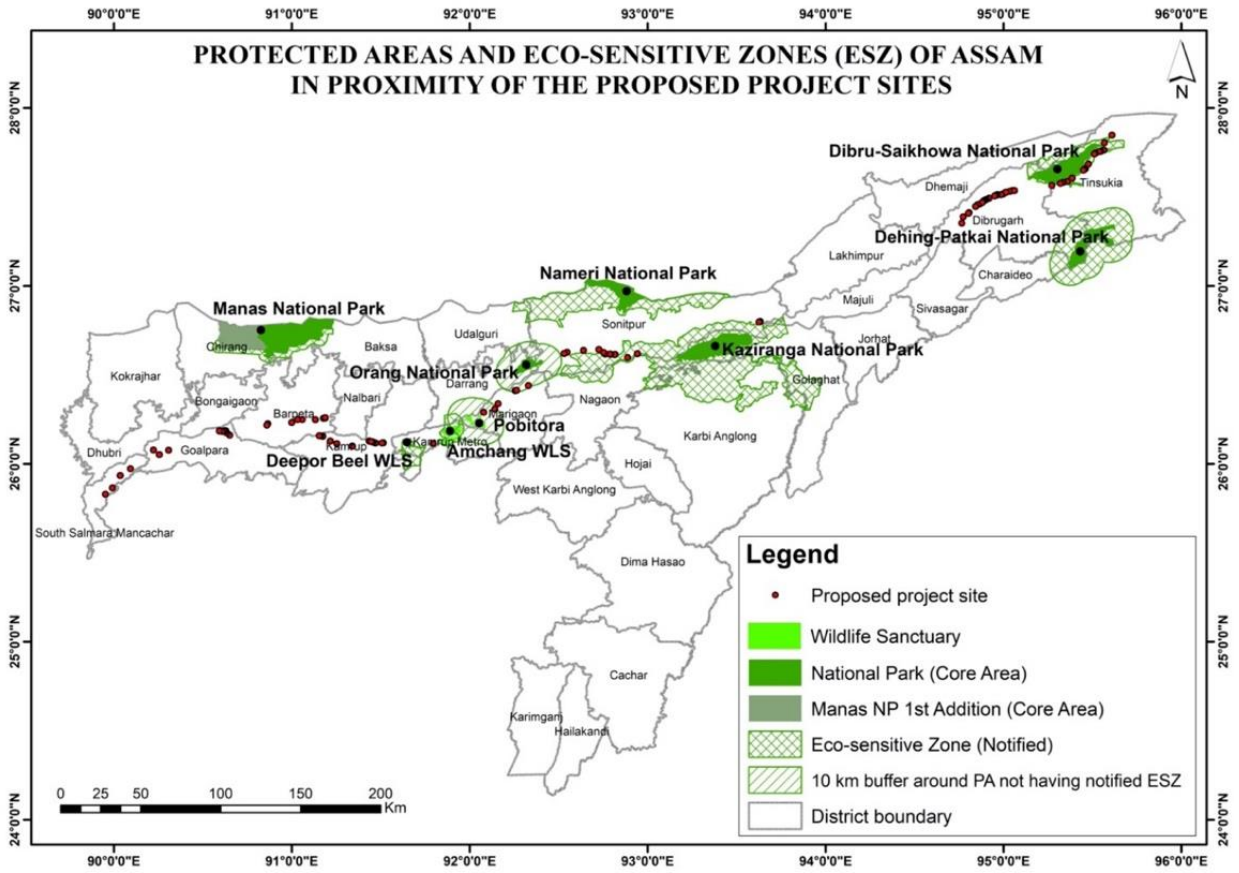
[28] as per Birdlife International. The subproject area falls under the EBA.

Table 5-15: Protected Areas and KBAs within 10km of the Project Area

PA (Name & Distance - within)			KBA (Name & Distance - within)		
1-5 km	**5-10 km**	**>10 km**	**1-5 km**	**5-10 km**	**>10 km**
Amchang WLS (Actual ESZ is 2.93 km away, as per kml shared by CWLW's office)	-	Deepor Beel WLS is approximately 11.9 km away from the propsed site as per kml shared by CWLW's office	Amchang WLS (Actual ESZ is 2.93 km away, as per kml shared by CWLW's office)	-	Deepor Beel WLS is approximately 11.9 km away from the propsed site as per kml shared by CWLW's office

Source: IBAT Proximity Report. Generated under licence 5840-45344 from the Integrated Biodiversity Assessment Tool on 14 April 2023 (GMT). www.ibat-alliance.org & Assam WL department

Figure 5-9: Map Showing Protected Areas & ESZs in Proximity To Project Sites



Source: Office of the Chief Wildlife Warden Assam through FREMAA and WRD, Assam

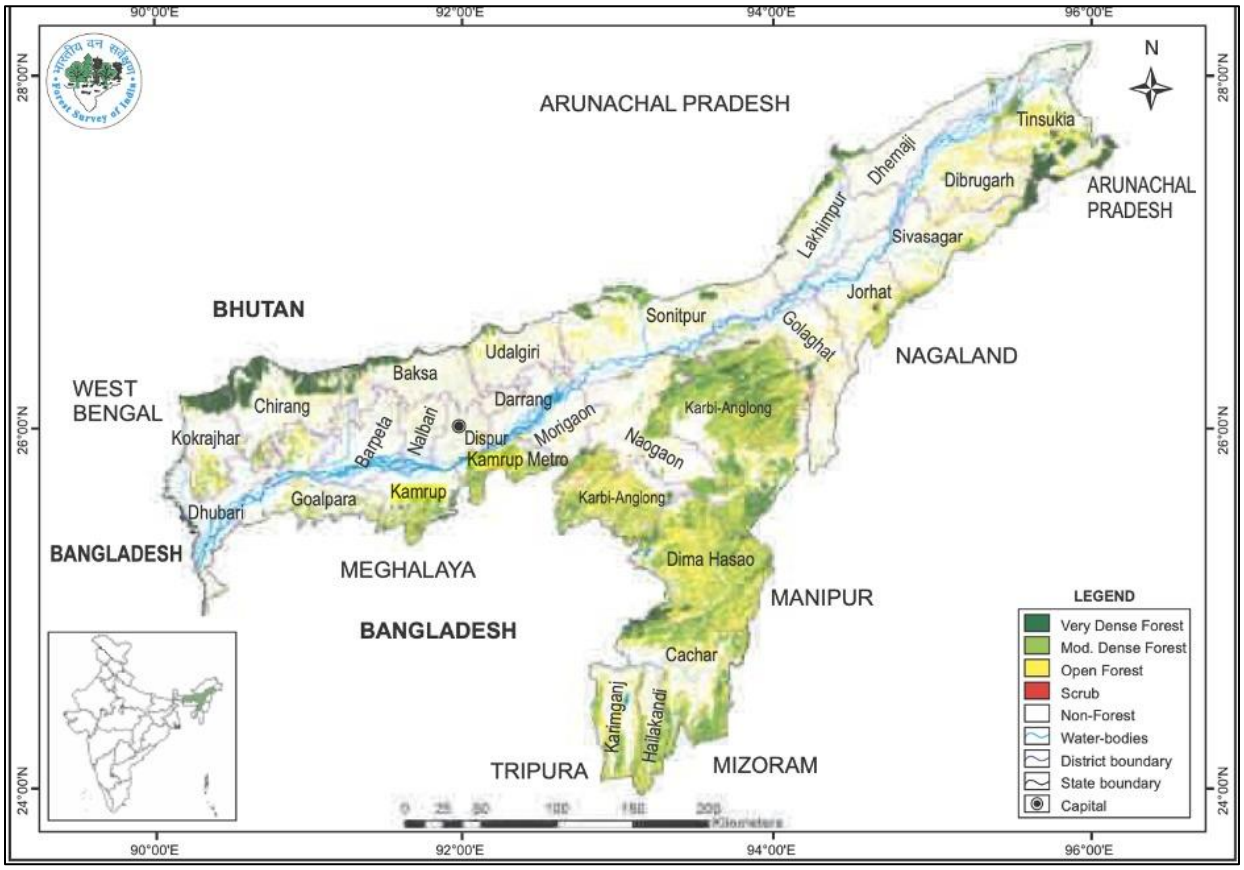
Forests

122. The total recorded forest area (RFA) in the State is 26,836 sq km., which is 34.21 % of the total geographical area of Assam. Out of the total RFA, 17,864 sq. km is reserve forest and 8,972

[28] BirdLife International (2023) Endemic Bird Areas factsheet: Assam plains. Downloaded from http://datazone.birdlife.org/eba/search on 24/05/2023. BirdLife Data Zone

sq. km is unclassed forests. The forest cover of the State is 28,311.51 sq. km., which is 36.09 % of total geographical area excluding the 227.94 sq. km. of scrub forest area. The very dense forest area is 3016.67 sq. km., moderate dense forest is 9991.02 sq. km. and open forest is 15,303.82 sq. km.

Figure 5-10: Forest Cover Map of Assam



Source: India State of Forest Report, 2021, Forest Survey of India

123. The forest in Assam can be described into following types/sub-types[29]:-

- Tropical Wet Evergreen Forests
- Tropical Semi Evergreen Forests
- Tropical Moist Deciduous Forests
- Sub-tropical Broadleaf Hill Forests
- Sub-tropical Pine Forests
- Littoral and Swamp Forests
- Grassland and Savannahs

[29] https://environmentandforest.assam.gov.in/information-services/biodiversity-of-assam-0

Table 5-16: Statement of Forest Land in Project Districts

District/State	Geographical Area km²	Forest Area	
		Total km²	% Total Forest Area in State
Kamrup Metropolitan	3105	966.70	31.13
Assam	**78,438**	**38,311.51**	**36.09**

Source: India State of Forest Report, 2021, Forest Survey of India

124. The forest in this region comprises of Tropical Moist Deciduous type forests. This forest is further divided into Sal forest and mixed deciduous forest. In these forests, Sal grows in association with Ajar (*Lagerstoemia* species), Makri Sal (*Schima wallichii*), Haldu (*Adina cordifolia*), Sam (*Artocarpus* sp.), Bor (*Ficus* sp.), Uraim (*Bischofia javanica*), Gomari (*Gmelina arborea*), Teeta champa (*Michelia champa*), Poma (*Toona ciliata*).

Wetlands

125. In Assam, approximately 7% of total land surface is covered by wetlands, but in Kamrup District the percentage is lower. In Kamrup District 5.71% of land surface is covered by Wetlands. Therefore, wetland plays a pivotal role in the land use planning and economy of the district. Total wetland area in the district is 43655 ha that includes 228 small wetlands (<2.25 ha). River/stream occupies 68.29% of wetlands. The other major wetland type is Lake/pond (14.25%) and Waterlogged (15.51%). There are 74 Lake/pond (locally called as Beels) with 6220 ha area. The other wetland types are: Ox-bow lakes (0.62%) and Riverine (0.71%). Important wetlands/beels in the district is Deepor Beel which is also a RAMSAR site and a WLS.

Table 5-17: Area Estimates of Wetlands in Kamrup District[30]

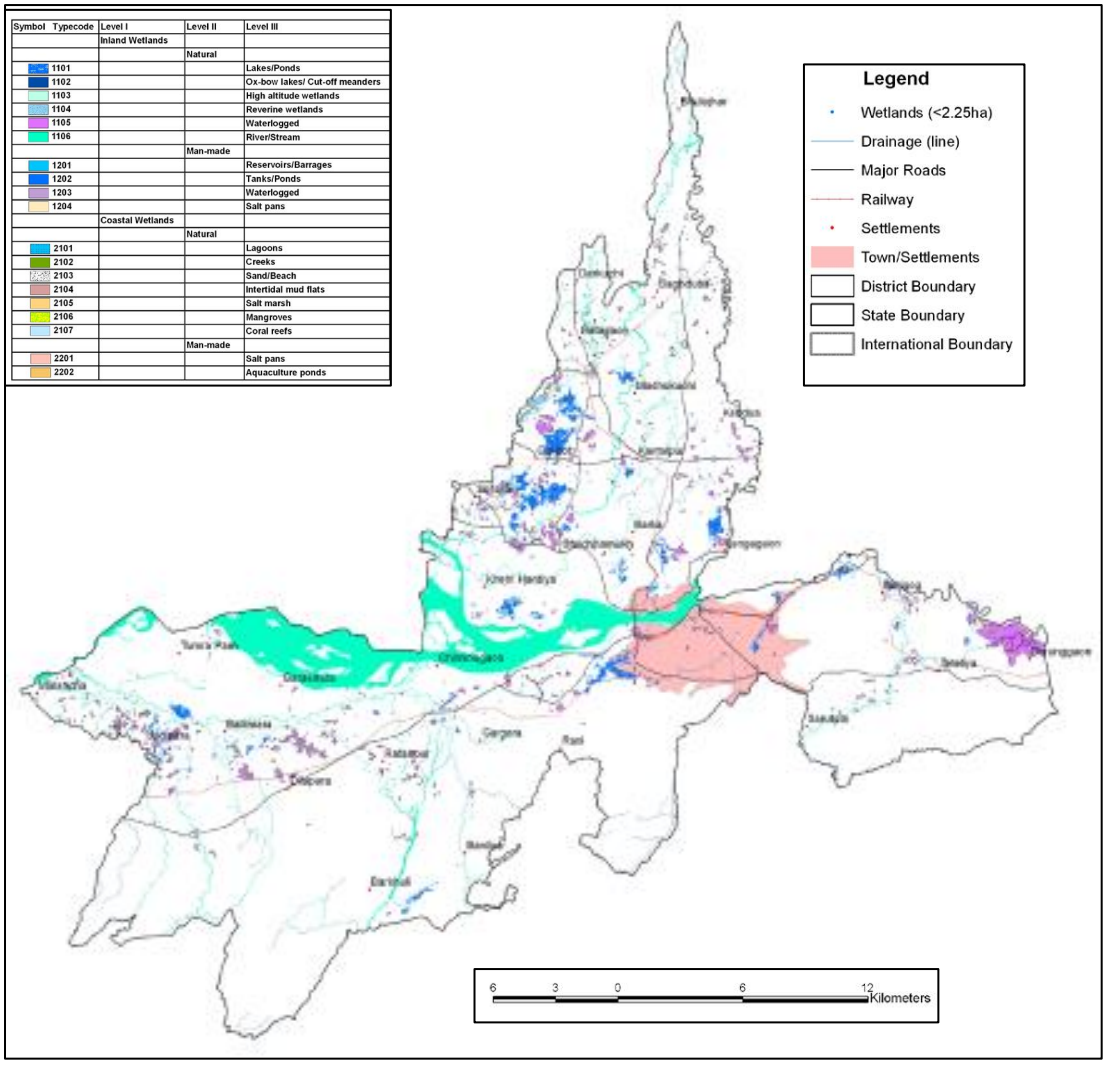
Wetland Category	No. of Wetlands	Total Wetland Area (Ha.)	Percentage of wetland area	Open Water (Ha.)	
				Post-monsoon Area	Pre-monsoon Area
Inland Wetlands - Natural					
Lakes/Ponds	74	6620	14.25	4082	1369
Ox-bow lakes/Cut-off meanders	36	271	0.62	209	114
High altitude wetlands	-	-	-	-	-
Riverine wetlands	11	310	0.71	225	56
Waterlogged	441	6769	15.51	6036	2361
River/Stream	41	29813	68.29	14512	14512
Inland Wetlands - Man-made					
Reservoirs/Barrages	-	-	-	-	-
Tanks/Ponds	11	44	0.10	42	31
Waterlogged	-	-	-	-	-
Total - Inland	**614**	**43427**	**68.39**	**25106**	**18443**
Wetlands (<2.25 ha), mainly Tanks	228	228	0.52	-	-

[30] Data is for the undivided Kamrup district which includes both Kamrup Rural and Kamrup Metropolitan Districts

Wetland Category	No. of Wetlands	Total Wetland Area (Ha.)	Percentage of wetland area	Open Water (Ha.)	
				Post-monsoon Area	Pre-monsoon Area
Total	**842**	**43655**	**68.92**	**25106**	**18443**

Source: National Wetland Atlas: Assam, SAC/RESA/AFEG/NWIA/ATLAS/18/2010, Space Applications Centre (ISRO), Ahmedabad, India, 174p.

Figure 5-11: Wetland Map of Kamrup



Source: National Wetland Atlas: Assam, SAC/RESA/AFEG/NWIA/ATLAS/18/2010, Space Applications Centre (ISRO), Ahmedabad, India, 174p.

Wetlands around Project Sites

126. The only perennial wetland available near the project area is Deepor Beel which is approximately 11.9 km away.

Ecology in Project Area

127. Favourable geographical location, diversified topography and ideal climatic conditions have made Assam very rich in biodiversity. The vegetation of Assam is primarily of tropical type covering areas of evergreen, semi-evergreen, grasslands, deciduous forests, grasslands and riverside forests. Some important tree species found in Assam are Hoooong (*Dipterocarpus macrocarpus*), Gurjan (*Dipterocarpus tubinatus*), Mekai (*Shorea assamica*), Kurta (*Palaquium polyanthum*), Nahar (*Mesua ferrea*), Sia-nahar (*Keyea assamica*), Sissoo (*Dalbergia sissoo*), Khair (*Acacia catechu*) etc.

Flora

128. Based on the biogeographic classification Zoning Map, the project site falls in Zone 9 – North East and on the biases of Biogeographic province map of India, the project sites fall in 9A- North - East (Brahmaputra Valley). Based on the Division Map of Assam, the project sites fall in central assam division which is characterized by moist deciduous forests. These forests are further described as Sal forests and mixed deciduous forests. In Sal forest, Sal trees grows in association with *Lagerstroemia* spp. (Jarul, Ajar), *Schima Wallichii* (Ghugra), *Stereospermum personatum* (Paruli), *Adina cordifolia* (Haldu), *Artocarpus chama* (Sam), *Ficus* spp. (Bor, Dimoru, Dhupbor, Bot, Athabor, tengabor, Lotadioru, Khongaldimoru), *Bischofia javanica* (Uriam), *Gmelina arbore*a (Gomari), *Michelia champaca* (Teeta champa), *Terminalia* spp. (Hilikha, Bhomora, Bohera). *Toona ciliate* (Poma) etc. Other trees reported in the area are *Adina cordifolia* (Haldu), *Albizia* spp. (Siris, Kolasiris, Koroi, Sau) *Alstonia scholaris* (Satiana), *Artocarpus chama* (Sam), *Careya arborea* (Kumbhi), *Dalbergia* spp. (Sissoo, Medelua), *Ficus* spp. (Bot, Bor, Dimoru), *Lagerstroemia* spp. (Jarul, Ajar), Mallotu species (Senduri), Joral, Dudhlot, etc.

129. The Working plan of forest department Research publications lists a total of 180 floral species found in the project district out of which there are 7 climbers, 10 ferns, 6 grasses, 55 herbs, 5 orchids, 32 shrubs and 65 trees species. The ground cover flora within the project site are shrubs, herbs and grasses. *Delonix regia* (Gulmohar), *Cocus nucifera* (coconut), *Areca catechu* (beetel nut) and *Accacia* spp. trees were noted in the near vicinity of the project site besides *Ricinus communis* (castor), *Cynodon dactylon* and *Saccharum spontaneum*.

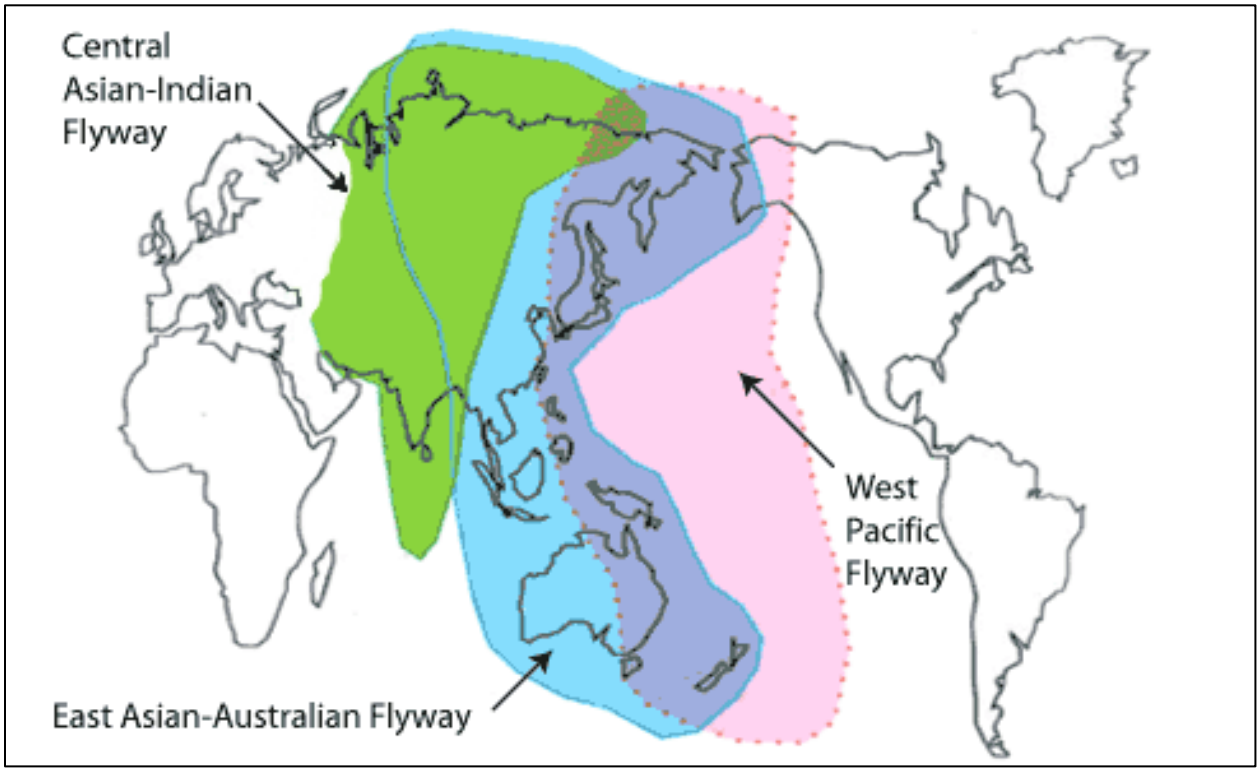
Fauna

130. The Forest Department Working Plan also notes the presence of 6 species of amphibians, and 14 species of reptiles, 54 species of birds and 27 species of mammals (both terrestrial and fresh water) in the project district. No critical endangered/endangered/vulnerable faunal species were reported at the core and buffer area of the project site.

Migratory Route of Fauna

131. There is no mammalian wildlife migratory route in the subproject area. The entire Assam falls under Central Asian Flyway & East Asian – Australian flyways. Thus, there are many migratory bird species that migrates through the project areas. However, the project site doesn't support any roosting and breeding areas for any migratory bird species

Figure 5-12: Asian Migratory Bird Flyways



Source: Wikipedia. https://en.wikipedia.org/wiki/East_Asian%E2%80%93Australasian_Flyway - /media/File:Central_Asian_Flyway_Map.png

IBAT Screening Assessment

132. As per information made available from IBAT [31], there are 97 IUCN red listed species within 50 km radius of the project area. These includes 12 CR (6 avian, 5 reptilian and 1 mammalian species), 35 EN (2 floral, 1 Arthropoda, 9 reptilian, 2 Pisces, 9 avian and 12 mammalian species) and 50 VU species (2 floral, 1 Arthropoda, 7 reptilian, 6 Pisces, 17 avian and 17 mammalian species). As per the IBAT screening, 1 KBA - Amchang Hills WLS are within 10 km radius of the subproject area.

Table 5-18: Summary of Endangered Species in Project Area from IBAT Report

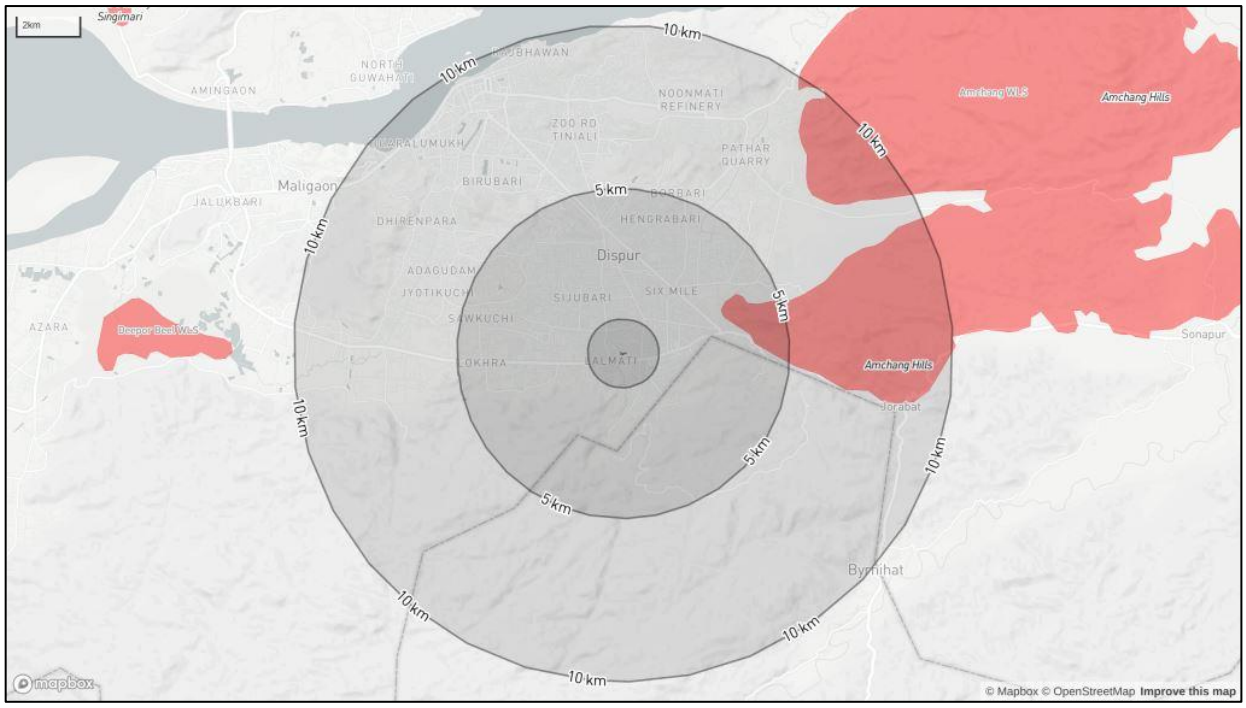
Scientific Name	Common Name	Category	Availability in the Buffer Zone			
			1km	5km	10km	50km
Tectona grandis	Teak	EN	Yes	Yes	Yes	Yes
Trillium tschonoskii	Tschonoski's Wakerobin	EN	No	No	No	Yes
Arachnochium kulsiense	-	EN	No	No	No	Yes
Tor putitora	-	EN	No	No	Yes	Yes
Pillaia indica	-	EN	No	No	No	Yes
Cuora amboinensis	Southeast Asian Box Turtle	EN	No	No	Yes	Yes

[31] IBAT Proximity Report. Generated under licence 5840-42046 from the Integrated Biodiversity Assessment Tool on 14 April 2023 (GMT). www.ibat-alliance.org

Cuora mouhotii	Keeled Box Turtle	EN	No	No	No	Yes
Geoclemys hamiltonii	Spotted Pond Turtle	EN	No	No	Yes	Yes
Hardella thurjii	Crowned River Turtle	EN	No	No	No	Yes
Melanochelys tricarinata	Tricarinate Hill Turtle	EN	No	No	Yes	Yes
Morenia petersi	Indian Eyed Turtle	EN	No	No	No	Yes
Nilssonia gangetica	Indian Softshell Turtle	EN	No	No	No	Yes
Nilssonia hurum	Indian Peacock Softshell Turtle	EN	No	No	No	Yes
Varanus flavescens	Yellow Monitor	EN	No	No	No	Yes
Aquila nipalensis	Steppe Eagle	EN	No	No	Yes	Yes
Asarcornis scutulata	White-winged Duck	EN	No	No	No	Yes
Haliaeetus leucoryphus	Pallas's Fish-eagle	EN	No	No	No	Yes
Laticilla cinerascens	Swamp Grass-babbler	EN	No	No	No	Yes
Leptoptilos dubius	Greater Adjutant	EN	No	No	No	Yes
Perdicula manipurensis	Manipur Bush-quail	EN	No	No	No	Yes
Ploceus megarhynchus	Finn's Weaver	EN	No	No	No	Yes
Rynchops albicollis	Indian Skimmer	EN	No	No	No	Yes
Sterna acuticauda	Black-bellied Tern	EN	No	No	No	Yes
Axis porcinus	Hog Deer	EN	No	No	No	Yes
Caprolagus hispidus	Hispid Hare	EN	No	No	No	Yes
Cuon alpinus	Dhole	EN	No	No	No	Yes
Elephas maximus	Asian Elephant	EN	No	No	Yes	Yes
Hadromys humei	Hume’s Rat	EN	No	No	No	Yes
Hoolock hoolock	Western Hoolock Gibbon	EN	No	No	No	Yes
Manis crassicaudata	Indian Pangolin	EN	No	No	No	Yes
Nycticebus bengalensis	Bengal Slow Loris	EN	No	No	No	Yes
Platanista gangetica	Ganges River Dolphin	EN	No	No	Yes	Yes
Panthera tigris	Tiger	EN	No	No	No	Yes
Trachypithecus pileatus ssp. pileatus	Blond-bellied Langur	EN	No	No	No	Yes
Trachypithecus pileatus ssp. tenebricus	Tenebrous Capped Langur	EN	No	No	No	Yes

Source: ADB TA Consultant

Figure 5-13: IBAT Screening Map of Key Biodiversity Areas in Project Area



Source: IBAT Proximity Report. Generated under licence 5840-453444 from the Integrated Biodiversity Assessment Tool on 26 June 2023 (GMT). www.ibat-alliance.org

Critical Habitat (CH) Assessment

133. The Area of Analysis (AoA) for assessing critical habitat has been taken up for the entire subproject area, although impacts will be restricted to within the PAI. In addition to the protected areas, KBAs and IBAs which support critical habitat as per Table 5-19, considering IFC Performance Standard 6 thresholds for triggers, it is determined that no critical habitat is supported in the project area as this is within a heavily modified habitat within Guwahati City. The PISC shall also be conducting a biodiversity and ecological survey in the vicinity of the proposed hostel during the project implementation period. The PISC and PMU shall subsequently include the results to update IEE, and submitted to ADB for necessary actions for disclosure.

Table 5-19: Summary of Critical Habitat Assessment

Critical Habitat Criteria	Thresholds Adopted	Trigger / Presence	Rationale
Areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species	(a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units). (b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable	No	CR, EN and VU species may be present, concentrations are unlikely to meet the thresholds for critical habitats

Critical Habitat Criteria	Thresholds Adopted	Trigger / Presence	Rationale
	(VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a). (c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species		
Areas having special significance for endemic or restricted-range species	Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species.	No	Project area outside ESZ of Amchang WLS (ESZ is 2.93 km from the project site) and Deeport beel WLS, which is also a Ramsar site approximately 11.9 km away from the propsed hostel
Sites that are critical for the survival of migratory species Areas supporting globally significant concentrations or numbers of individuals of congregatory species	(a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle. (b) Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.	No	-
Areas with unique assemblages of species or that are associated with key evolutionary processes or provide key ecosystem services	-	No	-
Areas having biodiversity of significant social, economic, or cultural importance to local communities	-	No	-

CR = Critically Endangered, EN = Endangered, IUCN = International Union for Conservation of Nature, PAI = project area of influence, VU = vulnerable
Source: ADB TA Consultant

Key Biological Aspects

134. Summary of the key biological aspects in the PAI are given in Table 5-20.

Table 5-20: Summary of Biological Setting of the PAI

Particular	Key Features in PAI
Habitat type	• Modified habitat
Protected Areas in 10 km	• ESZ of Amchang WLS is at a distance of 2.93 km from the project site • Deeport beel WLS, which is also a RAMSAR site approximately 11.9 km away from the propsed site. The ESZ of Deeport Beel WLS is yet to be notified and thus a 10 km radius from the boundary of the PAs shall be taken as ESZ
Key biodiversity area and IBA in 10km	• ESZ of Amchang WLS is at a distance of 2.93 km from the project site • Deeport beel WLS and Ramsar site (approximately 11.9 km away from the propsed site)
Forest land	• None within project area
Wetlands	• None within project area
Surface water bodies	• Perenial nallah on the western side approximately 15m away
Trees to be lost	• No trees present in the project site
Critical habitat	• None

ESZ = ecologically sensitive zone, IBA = important bird area, KBA = Key Biodiversity Areas, NP = National Park, PAI = project area of influence, WLS = wildlife sanctuary
Source: ADB TA Consultant

F. Socio-Economic Settings

135. The proposed Proposed hostel is located in the Kamrup Metropolitan District. The Present Assam was referred to as Kamrup in many of the ancient Indian literature. It was also known as pragjyotishpur due to the astrology (Jyotish Shashtra) practices that prevailed in this part of the country during that time. However, "Kamrup" became a more predominant name in the later part of the history as it is stated that the God of love (Kamdev) was burnt to ashes by Lord Shiva for trying to disturb his meditation.

Administrative Set-up

136. The population of Assam consist of tribal ethnic groups (Bodo, Karbi, Rabha, Mishing, Dimasa), and linguistic groups such as Assamese, Bengali, Hindi speakers and Nepali. The population of the Brahmaputra Valley is 27,580,977 according to the 2011 census report [32]. Assamese is the official language of the Brahmaputra Valley and is spoken by 15.1 million people comprising 55.65% of the valley population. Bengali is spoken by 6.09 million people representing 22.1% of the valley, Hindi is spoken by 2.1 million comprising 7.61% of the region, Bodo is spoken by 1.41 million comprising 5.13% of the valley's population and 2.88 million people speak various indigenous tribal languages of Assam, such as Santali, Karbi, Lalung, Hmar, Deori, Rabha, Mishing, Koch, Rajbangshi, Sadri, Garo, Dimasa, Gondi, Savara, Gorkha, Halam, Rengma, Ao and Motak.

137. Kamrup Metropolitan District consists of only one sub-division, i.e. Guwahati having six Revenue Circles viz.: i) Azara having 21 villages, ii) North Guwahati (Pt) having 5 Villages, iii) Sonapur having 142 Villages, iv) Chandrapur having 43 Villages, v) Guwahati is entirely urban and vi) Dispur comprises of parts of Guwahati as well as rural part having 5 Village. The district has 4

[32] The Census of India is yet to publish the provisional and final reports for the census in 2022. Thus the official census records of 2011 were relied upon

Community Development Blocks and comprises of 216 Villages and 12 Towns (2 are Statutory Towns and 10 are Census Towns).

Demographics

138. According to the 2011 census [33] Kamrup Metropolitan District has a population of 12,53,938 of which 6,47,585 are males and 6,06,353 females. The population density of the district is 1313 persons per sq. km. As per 2011 census, 82.7% population of Kamrup Metropolitan District lives in urban area. The total Kamrup Metropolitan District population living in urban areas is 10,37,011. In Kamrup Metropolitan District, sex ratio is 936 females per 1000 males. Average literacy rate of the district in 2011 were 88.71%, male and female literacy were 92.13and 85.07%, respectively. Total literate in Kamrup Metrpolitan District were 1,001,191 of which male and female were 537,227 and 463,964 respectively. Scheduled Castes and Scheduled Tribes make up 8.12% and 5.99% of the population, respectively.

Table 5-21: Demographic Details of Kamrup Metropolitan District

Sl. No.	Parameters	Total	Male	Females	Rural	Urban
1	Population	12,53,938	6,47,585	6,06,353	2,16,927	10,37,011
2	No. of Agriculture labourers	8,259	5,843	2,416	5,783	2,476
3	No. of Cultivators	20,677	17,606	3,071	17,714	2,963
4	Household industry workers	7,973	5,355	2,618	2,106	5,867
5	Working population	3,75,613	1,15,319	4,13,154	62,916	3,12,697
6	Main working population	4,13,154	3,34,724	78,430	64,318	3,48,836
7	Marginal workers	9,357	5,376	3,981	4,013	5,344
8	Non-working population	7,63,006	2,71,972	4,91,034	1,29,159	6,33,847

Source: Census of India Report, 2011

Household

139. The district has 2,93,112 households out of which 45,484 are rural and 2,47,628 in urban areas.

Employment

140. There are many employment opportunities in both private and government sectors in the district as Guwahati is the capital of the state and is also the largest city in the North Eastern part of the country.

Indigenous Peoples/Scheduled Tribe (ST) in Assam

Assam Tribal Area Autonomous District Council Area

141. The proposed project does not fall in any Autonomous District Council Area constituted under the 6th Schedule of the Constitution of India.[34]

Demography

[33] Office of the Registrar General & Census Commissioner, India. Ministry of Home Affairs, Govt. of India. https://censusindia.gov.in/census.website/data/data-visualizations/PopulationSearch_PCA_Indicators

[34] Autonomous District Councils are autonomous bodies constituted under the 6th Schedule of the constitution which within the administrative boundaries of the state with powers to make laws, rules and regulations in certain areas and powers to levy taxes

142. The Scheduled Tribe population in the project district is about 75,121 which is about 5.99% of the total population. The total population of schedule caste (SC) persons in the Morigaon District are 1,01,789 which is about 8.12% of the total population.

Table 5-22: ST and SC Population

Sl. No.	State/ District	Total Population	ST Population	% of ST Population	SC Population	% of SC Population
1	Kamrup Metropolitan	12,53,938	75,121	5.99	1,01,789	8.12
2	Assam	3,12,05,576	38,84,371	12.45	22,31,321	7.15
3	India	1,21,08,54,977	10,45,45,716	8.63	20,13,78,372	16.63

Source: Census of India Report 2011

143. Boro, Borokachari, Kachari, Sonwal, Rabha & Lalung & Garo are the major tribes in the project district.

Industry

144. Kamrup Metro district is pioneer in the industrial establishment with capital city Guwahati located in the district. There are many major industries in the district in oil and gas sectors including Refinery of Indian Oil Corporation Ltd., LPG Bottling Plants, cements, FMCG etc.

Basic Amenities and Infrastructure

Health facilities

145. Kamrup Metropolitan district is hub of medical facilities with Guwahati as its centre. Most of the advanced health care facilities in government and private sectors are located in the Guwahati City. Guwahati Medical College Hospital, Health City, Metro Hospital, Hayat Hospital, Agile Hospital are within the 5km distance from the Guest Proposed hostel.

Education facilities

146. In Kamrup Metropolitan district is pioneer in the education facilities in the entire north-east India. Many major education institute including Gauhati University, Cotton University, Down Town University and many colleges are located in the district. The IIT, Guwahati is also located in the bordering district of Kamrup.

Transportation

147. The Hostel site is located in the Guwahati City. The city is well connected with other part of Assam, West Bengal and other states of northeastern region of the country through various national highways and state highways. The capital city of Assam has three railway station inside the city at Paltan Bazar (Guwahati Railway Station), Maligaon (Kamakhya Railway Station) and Narengi Railway Station. The Guwahati railway station is at 15km distance from the project site. The Guwahati Airport is located at a distance of 30km form the Guest Hostel. No clearance or permission fromAirport Authority of India (AAI) is needed for the construction of the proposed hostel.

Common Property Resources

148. There are no heritage sites notified by Archaeological Survey of India (ASI) within 300m distance from the site. Similarly, no common property resources such as public wells, water tanks, playgrounds, common grassing grounds or pastures, market areas within the proposed location of Hostel.

Physical Cultural Settings

149. There are a number of physical cultural resources in the district including Kamakhya Temple, Umananda temple, Basishta Temple (around 2.180 km ariel distance from the site) etc.

Key Socioeconomic Aspects

150. Summary of the key physical aspects in the PAI are given in Table 5-23.

Table 5-23: Key Socio-economic Features in PAI

Particulars	Key Features in PAI
Indigenous People and backward class	8.12 % SC and 5.99% SC population
Economic Landownership and individual properties	No residential, commercial and other properties shall be directly impacted
Nearest Town	Guwahati City
Road Access	NH 27 (Guwahati Bypass)
Human use of surface and groundwater	Guwahati Municipal Corporation supply, bore wells

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

151. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

152. Screening of potential environmental impacts are categorized into three categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts and mitigation is devised for any negative impacts.

(i) **Pre-Construction impact**s include anticipated those during construction works but planning is required for proposed mitigation measures before start of construction works such as taking consents from various departments, planning for construction and workers camps, deployment of safety officer, arrangement of required barricades and caution boards etc.

   a. **Location impacts** include those associated with site selection and loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site

   b. **Design impacts** arise from investment program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services

(ii) **Construction impacts** are caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production

(iii) **Operation and maintenance (O&M) impacts** are from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues

153. Screening of environmental impacts has been based on the impact magnitude (i.e. negligible, moderate and severe – in the order of increasing degree) and impact duration (i.e. temporary and permanent).

154. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS 2009 require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence.

155. The ADB rapid environmental assessment checklists have been used to screen the project for environmental impacts and to determine the scope of the IEE.

156. In the case of this project: (i) most of the individual elements involve straight forward construction and operation, so impacts are mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements. The project property is held by the WRD, Government of Assam and access to the project location is through an access road through the WRD property/public road and hence, land acquisition and encroachment on private property is avoided.

Pre-Construction Impacts

157. The proposed project activities involve construction of hostel building and ancillary structures in Guwahati.

Protected Areas

158. The nearest PA is Amchang WLS, with site being approximately 2.93 km away from the notified ESZ of the WLS. Deepor Beel WLS is approximately 11.9 km away from the propsed site. Thus, no permissions and clearances from the CWLW and or State Board of Wildlife for construction activities are required. No negative impacts on the protected areas are foreseen.

159. The site is also not a forest area and there is no requirement for forest clearances for the project.

Location Impacts

160. The Hostel site is located on unencumbered land owned by WRD, Government of Assam. The construction works will be on the delineated plot as per drawings and building plans as approved by the authorities including GMDA, GMC and Fire & Emergency Services, Government of Assam. There are quarters for WRD staff and one high school adjacent to the plot boundary of Hostel. The Hostel site is not in the immediate vicinity of national highway or state highway. The distance of National Highway-27 (connecting via Guwahati) is about 300m, some air and noise pollution impacts on Hostel are anticipated on account of vehicular traffic. The NH-27 near the site is under construction for widening from 4-lane to 6-lane by the National Highways Authority of India. The Hostel site is located within seismic zone V and earthquakes of major magnitude may damage boundary wall and buildings of Hostel. However, the building plan shall take into account the seismological requiements and shall be approved by the GMDA, GMC and Fire & Emergency Services, Government of Assam.

161. No impact during the design and preconstruction period is envisaged

Environmental, Social and Culturally Sensitive Resources

162. There is a school adjacent to the plot boundary. However, no impacts from the implementation of the project are envisaged during the design and preconstruction period, thus mitigation measures are not required. There are no heritage sites notified by ASI or State Archaeological Department within the delineated site or in the immediate surroundings (300 m distance) and thus no impacts shall be there.

Tree Cutting

163. The project site doesn't have any standing trees with girth size more than 30 cm and thus there are no requirements of tree felling for the hostel, there are no issues pertaining to tree cutting. There is presence of shrubs and other vegetations which shall be cleared. Thus, there are no impacts during the design and pre-construction phase of project and no measures are proposed.

Site selection of construction work camps, stockpile areas, storage areas, and disposal areas

164. The contractor to be appointed for the works shall identify exact locations for worker/labor camps, areas for stockpiling and storage of construction materials, these shall be within the project site. CTE and CTOs, and drinking water permissions shall obtained before the start of actual works.

165. The contractors shall also identify disposal areas for solid wastes generated in the project. The contractor shall utilize the services of GMC for collection and disposal of municipal and domestic solid wastes generated in the project. The contractor shall be required to maintain all necessary records for disposal of wastes.

166. Monitoring of ground water, surface water, soil, ambient air and noise shall be done during the preconstruction period to set up a baseline data.

Site selection of sources of materials

167. The materials required for the subproject are:

- Concrete -
  - Cement: Contractor to procure cement bags from WRD/FREMAA/Engineer[35] approved sources and maintain necessary documents
  - Aggregates: To be procured from approved sources and copies of EC, mining permissions and Crusher's CTO to be submitted to the Engineer mandatorily. In case, the contractor wishes to operate his own crusher/aggregate mine, he shall obtain all necessary permissions and clearances (EC, mining permissions and Crusher's CTE and CTO) before start of works
  - River sand: To be procured from approved sources and copies of EC, mining to be submitted to the Engineer mandatorily before start of works
- Water – The contractor shall obtain permissions from the relevant authorities for use of ground water for construction works. The water quality to be tested as per guidelines of the Engineer to ensure that it can be utilized for concrete mixing
- Steel for all works shall be procured from Engineer approved sources

Impacts during Construction Phase and Operation Phase

Land Use Change due to Project Activities

168. **Impacts.** There shall have minor change in land use as presently the land is in vacant and some loss of ground vegetation cover.

169. **Mitigation Measures.** Construction camps shall be located on a part of the project site itself area. All requisite facilities (drinking water supply, sanitation, domestic solid waste collection and disposal, fuel supply) shall be provided at these camps. Vegetation clearance shall be limited to the extent possible.

Land use change due to construction material sourcing (Quarrying)

170. **Impacts.** All aggregate materials will be procured from market/approved stone quarry sources compliant with the environmental regulations of India. The environmental aspects and control of pollution due to quarrying operation of these approved quarries are controlled and monitored by Pollution Control Board Assam (PCBA). Thus, adverse impacts as a result of quarrying operations are not envisaged in the proposed project.

171. **Mitigation Measures**. Aggregates required the works shall be procured from quarries approved by SPCB. Air and noise emissions from quarry shall be well within the prescribed limits. Setting up of stone crushers, if required, shall be done only after obtaining consent from SPCB and taking adequate measures for air pollution control. While finalizing the site, proper land use assessment shall be done.

[35] Engineer is the designated authority as per the Works contract between FREMAA/WRD and the contractor, who shall decide and approve all technical, financial, legal and safeguard documents, issues and changes

Soil Environment

Soil Contamination

172. **Impacts.** Soil may get contaminated around construction site, machine maintenance area, construction camp etc. No impacts of contamination of soil is envisaged during operation period except from accidental spillage in the parking area.

173. **Mitigation Measures**. The construction vehicle shall be fueled or repaired/serviced at the approved garages and refuel pump stations outside the site. Oil spill kits should be available at the site to minimize the damage to soil quality in case of spillage. Depending on the nature and magnitude of spill, appropriate land remediation measures shall be employed by the concerned authorities during operation period.

Solid Waste

174. **Impacts.** Some waste will be generated due to excavated earth material and waste from construction. Debris and excavated earth material can be reused subject to the approval of the Engineer during the construction.

175. Since institutional training and residential arrangement will be undertaken at the proposed hostel, there will not be any adverse environmental impact during operation. There may be generation of some waste on account of maintenance and operation of the proposed hostel. There will be generation of different types of solid wastes (municipal waste from residential areas, e-waste from computer facilities and discarded lead acid batteries). These wastes will require handling, transport, and disposal as per regulatory requirements of their respective categories to avoid environmental impacts.

176. **Mitigation Measures**. Waste generated during construction will be disposed of as Construction and Demolition Waste Management Rules, 2016 and to the satisfaction of the Engineer. The disposal locations for waste will be finalized in consultation with local civic authorities and in compliance with construction and demolition waste management rules 2016. The clean-up and restoration operations will be implemented by the contractor prior to demobilization. The contractor will clear all temporary structures and dispose of all garbage from project site including the unused vehicles dumped by GMC. The non-usable, non-saleable, non-hazardous construction waste shall be disposed-off through the GMC. Usable or saleable waste shall not be disposed off to landfill. All efforts shall be made to prevent soil contaminations. The wastes will comprise of broken pieces of bricks, surplus earth, discarded and/or spilled construction materials, shuttering materials etc. It shall be mandatory for the contractor to ensure proper disposal of the construction waste at the disposal site as designated by the FREMAA and WRD and/or landfills operated by GMC.

177. During operation phase, the solid waste generated at Proposed hostel will be segregated and Its disposal will be integrated with Guwahati City local waste disposal. The contractor will be responsible for collecting the waste for possible reuse and recycling.

Water Quality

178. **Impacts**. The major source of surface water pollution during project construction phase will be sewage and wastewater generated from labor camps as well as workshop areas.The contractor is expected to hire the local unskilled and semiskilled laborers, while the bulk of the skilled laborers are expected to be migrant. For the outside laborers the contractor will establish a labor camp and it is expected that 50-100 laborers shall stay in the construction/labor camps. Central Public Health & Environmental Engineering Organization (CPHEEO) recommends a maximum of 135 LPD (0.135

KLPD)[36] of water for domestic use. It can be safely assumed that about 80% of the water supplied will be generated as sewage. Thus, total quantum of sewage generated is expected to be of the order of 108 LPD (0.108 KLPD). However, it may pollute land and other nearby water bodies if discharged untreated.

179. As significant quantity of groundwater is not likely to be extracted as part of this project, any appreciable quantitative impact on ground water because of the construction activities is also ruled out. Borewell shall be used after obtaining necessary permissions from the authorities. The contractor will also arrange for water through authorized water tankers Impact on ground water quality is not likely due to the project activities as the wastewater generated from the project will be trapped for treatment before it is discharged/percolated from the project site.

180. The water requirements for the Proposed hostel during the operation phase will be met from ground water. The water requirement has been estimated around 400 KLD. Necessary permission from Ground Water Authorities will be obtained. Though the requirement is not significant, but continuous withdrawal will have impact on ground water table in the surroundings of institution.

181. **Mitigation Measures**. Ground and surface water quality shall be tested by the contractor at periodic intervals as per the Environmental Monitoring Plan (EMoP). Septic tanks shall be provided to treat the domestic sewage. Provision of mobile toilets also shall be considered with the provision of channeling the sewage to septic tank in a closed loop system. Discharge of untreated domestic sewage to the to the natural drain in the vicinity will not be permitted. During operation period, the hostel shall have fully functional toilet blocks connected to sewerage network of the proposed hostel as sewage treatment plant has been planned.

182. The waste generated (mainly sludge) will be disposed of after appropriate treatment in low lying areas in the campus.

183. The impact of extraction of ground water during operation phase shall be taken care through design of ground water recharge features (rainwater harvesting structures) in the campus. Based on raw water characteristics, necessary treatment will be provided. The treatment for raw water will include screening, reduction of total suspended solids (TSS) and hardness and disinfection to meet drinking water standards specified in IS:10500 by the Bureau of Indian Standards.

Air Quality

184. **Impacts**. The ambient air quality of the area is good and the levels of $PM_{2.5}$, PM_{10}, CO, SO_2 and NO_2 are under the limits as per National Ambient Air Quality Standard (NAAQS) for air pollutants. While various construction activities will increase the ambient air quality, but the level is likely to remain within the prescribed standards.

185. During the construction phase, there will be two main sources of air emissions, i.e., mobile sources and stationary sources. Mobile sources are mostly vehicles involved in construction activities, whereas emissions from stationary sources include construction equipment and machinery, batching plants, diesel generator sets, excavation/grading activities etc. In addition to these, fugitive emissions will also form a major proportion of air pollution in the form of particulate matter from storage and handling of construction material.

186. Fugitive dust sources associated with construction phase include vehicular traffic generating fugitive dust and aggregate handling. However, transportation of construction materials will be confined to a few trips per day depending upon extent of construction activity. Therefore, impact at this stage will be temporary and restricted to the close vicinity of the Hostel construction site only.

[36] Government of India, Ministry of Housing and Urban Affairs, Central Public Health & Environmental Engineering Organisation (CPHEEO). 1999. Manual on Water Supply and Treatment. https://cpheeo.gov.in/upload/uploadfiles/files/3_40.pdf

187. The emission of particulate matter during the construction phase will be generated from the activities like clearing and grubbing, earthworks, movement of stone aggregates, road dust emissions etc. In addition to that emissions from various construction machinery fueled by diesel and from mobile source will be in the form of PM_{10}, VOC, CO, NO_X and SO_2. The emissions from stationary and mobile diesel engines with respect to their working/movement are presented in table below:

Table 6-1: Exhaust Emissions for Stationary and Mobile Machinery

Source	PM_{10}	VOC	CO	NO_X	SO_2
Diesel Exhaust emissions (idle)	0.043 g/min	0.208 g/min	1.57 g/min	0.917 g/min	18.8 g/l
Diesel Exhaust emissions (idle)	0.4 g/mile	3.18 g/mile	18.82 g/mile	8.5 g/mile	18.8 g/l

Source: ADB. India: AIFRERMIP Project 2, IEE Report (Palasbari Subproject - Palasbari and Gumi Reach, Kamrup District). May 2018

188. During operation phase, the traffic movement will be insignificant. A diesel generator (1500 kVA capacity) will be required, but it will be operated only during power cuts. The generator will be of the silent type and will comply with the levels stipulated by CPCB.

189. **Mitigation Measures**. The following mitigation measures will also be taken to mitigate the dust entrainment and fugitive emissions from the various sources:

- Batching plant shall ideally be located away from the project site. However, in case the plant is set up in the site, then it shall be away from the school boundary in the downwind direction and be fitted with the air pollution control devices. The emission should meet Pollution Control Board standards. Permanent screens of tin sheets or similar materials having a height of at least 1m higher than the top of the batching plant shall be used to cover the entire boundary on the side of the school and residential properties
- For procurement of the material from the market/third parties the contractors shall submit the compliance certificates (i.e., valid CTO of crusher, EC of mines and other permits) the approved third parties to the Engineer by the contractor before commencing the procurement of material
- Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered. Water may be sprayed on earthworks, on a regular basis to arrest dust
- Regular maintenance of machinery and equipment will be carried out
- Ambient air quality monitoring shall be carried out during construction phase as per the Environmental Monitoring Plan (EMoP) through NABL accredited/MoEFCC recognized laboratories and the test reports shared with the Engineer and reported in the periodic Environmental Monitoring Reports (EMR). If monitored parameters are above the prescribed limits, suitable control measures must be taken. The contractor will submit emission monitoring results as a compliance with environmental monitoring plan
- Care shall be taken to keep all material storages adequately covered and contained so that they are not exposed to situations, where winds on site could lead to dust/particulate emissions
- All vehicles and construction equipment operating for the contractor, FREMAA, and WRD will obtain and maintain pollution under controls (PUC) certificates

Noise

190. **Impacts.** During construction phase, noise will be generated from various activities such as clearing and grubbing, excavation, earthworks, borrow works, etc. The general noise levels during construction phase such as due to working of heavy earth moving equipment and machineries

installation may sometimes go up to 100 dB(A) or more at the work sites. As per the proposed plan and given the nature of the work, manual labor is likely to be preferred with limited use of machinery.

191. Considering expected noise levels during construction phase, it has been assumed that all these equipment generate noise from a common point. As per studies conducted for AIFRERMIP Tranche 2, an increase in noise levels due to operation of various construction equipment is expected to increase the noise level from 100.3 dB (A) at a distance of 1 m to 52.4 dB (A) at a distance of 250 m from the sources. The increase in noise levels due to operation of various equipment is presented in table below.

Table 6-2: Increase in Noise Levels due to Operation of various Construction Equipment

Distance (m)	Ambient Noise Levels dB (A)	Increase in Noise Level dB (A)	Increase in Ambient Noise Level dB (A)
1	51.0	100.3	49.3
10		80.3	29.3
50		66.3	15.3
100		60.3	9.3
150		56.8	5.8
200		54.3	3.3
250		52.4	1.4

Source: ADB. India: AIFRERMIP Project 2, IEE Report (Palasbari Subproject - Palasbari and Gumi Reach, Kamrup District). May 2018. https://www.adb.org/projects/documents/ind-38412-033-iee-0

192. In addition to the above, there will be significant increase in vehicular movement for transportation of construction material and thus an increase in noise level is expected. However, the increase in noise levels will be localized, temporary in nature and mostly will be during daytime only. The increase in noise levels will be felt up to a distance of 100-150 m only. This noise will be intermittent in nature, and will last only during the construction phase.

193. No impacts are envisaged during the operation period.

194. **Mitigation Measures**. Following noise control measures shall be adopted, and included in the civil work contracts:

- Transportation of construction materials will be confined to daytime before or after school hours, depending upon extent of construction activity
- A well raised (1.8 m height above ground level) boundary wall will be ready before start of intensive construction activities of Proposed hostel. This will also act as noise barrier. In case the noise is not mitigated, appropriate noise barriers especially near the school shall be placed. The noise barrier material shall be approved by the Environmental Specialist of the Engineer
- Construction activities shall be prohibited between 9.00 pm and 6.00 am near residential areas throughout the subproject stretch
- Appropriate PPE devices like ear plugs or ear muffs will be provided to the workers operating in the vicinity of high noise generating machines
- Construction equipment and machinery shall be fitted with silencers and regularly maintained
- Regular noise monitoring measurements shall be carried out as per the EMoP
- Use of manual labor where ever feasible over machines shall be encouraged

Ecology

195. **Impacts**. There would be no major impact on terrestrial flora except clearing of ground vegetation. No cutting of trees is required. There is no diversion of forest land or presence of any PA in the subproject project area. Since the site is entirely covered by human habitat on all sides, no conflict with wild animals is envisaged.

196. **Mitigation Measures**. In case of chance encounter with animals like snakes, the wildlife rescue team shall be intimated. Workers shall be provided awareness trainings on how encounters with animals. Landscaping and plantation of native trees during the post construction period shall increase the aesthetic beauty of the site.

Land Acquisition and Resettlement

168. **Impacts.** The land belongs to WRD, Government of Assam and there are no private persons occupying the land as either squatter or encroacher. Thus, there is no impacts on land acquisition and resettlement and no measures are proposed

Accidents and Safety

169. **Impacts.** The risks associated with the proposed project are minimal. Improper stockpiling of construction materials could obstruct movement of locals accessing the WRD residential colony, if stored outside delineated site boundary in open area. At the time of construction, inconvenience to locals is not anticipated as site is accessible through an existing motorable road and away from habitation. Traffic on the connecting road to the Guest Hostel site from NH-27 is almost insignificant.

170. **Mitigation Measures**. The construction zones and the camps shall be barricaded and proper fences provided. Adequate lighting and signage (including road signages) to be provided at the construction site to aware the locals of the dangers. All signage shall be in multiple language (Assamese, Hindi/Bengali besides English, if Engineer desires).

171. The workers shall be provided with necessary personal protective equipment and a first aid unit including adequate supply of dressing materials, transport means, nursing staff and an attending doctor, shall be available at each construction site. Regular health checkup camps to be organized at a frequency defined in EMP. Mandatory health checkups of laborers to be done during joining and periodically during the construction phase.

172. Due consideration will be given for proper materials storage within the construction site. Stockpiles (sand, subgrade and earth) will be covered (with covered bricks or polythene sheet) to protect from dust and erosion.

173. A Traffic Management plan shall be prepared by the contractor and approved by Engineer before the start of work

174. During operation, the design of the proposed hostel building shall include structural and seismic safety measures required by India's latest building codes (in seismic zone V). The Proposed hostel will be equipped with fire-fighting systems with portable fire extinguishers and smoke detectors. The staircase will have adequate width to allow for people to exit the campus buildings during any fire-related or other eventuality. Building design and toilet facilities will be barrier-free for physically challenged persons.

175. For operation phase, onsite emergency plan will be prepared by the PIU with support from PMU. For natural calamities, the Disaster Management Plan prepared by GoA for Kamrup Metro district will be followed. The GoA has prepared district wise Disaster Management Plans as per provisions of Disaster Management Act 2005 of Government of India. During natural calamities, the trainees and staff will be safely evicted as per the disaster management plan.

Impact on cultural properties

197. There are no cultural properties in the near vicinity of the proposed hostel site. The proposed hostel construction and development will not have any impact on any religious structure or any other structure of historical and /or cultural significance.

Establishment and Operation of Construction Camps and Workers Facilities

176. **Impacts.** It is likely that the contract may employ some skilled workers from outside project area, and therefore may provide temporary workers accommodation during the construction phase. Proper provision and maintenance of facilities is necessary for proper living conditions and avoid health, environment and safety issues. Workers camps may also have adverse impacts on surrounding communities. Operation of construction camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures.

177. **Mitigation Measures.** Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit- in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation[37] which include: provision of safe housing having well-ventilated and well-lit accommodation, availability of electricity, plumbing, potable water supply, gender segregated sanitation facilities, adequate fire protection. Accommodation shall be in the range from 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface) per worker, a minimum ceiling height of 2.10 meters; a reasonable number of workers are allowed to share the same room – (standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation. The permission for labor employment (registration with local labor office) should be obtained (under the Inter State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979). Dust bins, hand sanitizer and hand washing facilities will be provided in adequate numbers at camp site. The EMP lays down some measures to address likely adverse impacts associated with the labor camps.

178. Proper beds with mosquito nets, potable drinking water, separate toilets for men & women connected to the septic tanks and soak pits, separate kitchen and dining facilities, Condom boxes/vending machines to be mandatorily provided in the labor camps. Laborers shall not be sleeping on the ground. Spraying of insecticides, carbolic acids etc. shall be done regularly (at least once a week). First aid boxes as per Factory Act and first aiders to be provided in the construction sites and labor camps.

Social conflict

179. **Impacts.** Most of the unskilled and semi-skilled workers will be from the local areas with some skilled migrant workers for which contractor may establish a labor camp. They may conflict in culture and lifestyle and compete with local laborers over some job opportunities and may also create potential health issues such as HIV/AIDS. No social conflicts during operation period is envisaged as the area shall be gated and interactions with locals shall be minimal.

180. **Mitigation Measures**. The contractor shall ensure that all migrant laborers are housed in the labor camps. Preference shall be given to locals for employment as unskilled and semi-skilled workers. All migrant workers will undergo workshop/briefings to sensitize them on local culture and lifestyle awareness. Appropriate measures for addressing potential health issues such as human

[37] https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) shall be taken as stipulated in the EMP.

Occupational Health and Safety Plan due to COVID 19 Pandemic

181. Impacts. Though the effect of COVID 19 pandemic has subsided in the India but the threat remains as the pandemic like situation occurs in some countries globally. In case of recurrence of the COVID 19 pandemic in India the local community members involved in project activities may be at a heightened risk of virus exposure.

182. **Mitigation Measures.** Ensure that the project related staff at all levels are appropriately vaccinated. Ensure project staff, consultants, contractors, and workers have in their mobile devices the Aarogya Setu App, which is a mobile application developed and recommended by the government to proactively reach out to and inform the users of the app regarding risks, best practices and relevant advisories pertaining to the containment of COVID-19. In case of the recurrent outbreak of the pandemic mandatory isolation of the personnel or workers, either asymptomatic or showing symptoms, who have had direct contact with anyone tested positive for COVID-19. The isolation procedures issued by the government shall be followed along with proper disposal of used PPE following guidelines and procedures issued by the government.

B. Summary of Impacts

183. Almost all the impacts are occurred during the construction period and the physical intervention associated with the civil works are not significant, instead the environmental impacts are temporary and site specific. With implementation of proposed mitigation measures, most of the impacts will be minimized, and no residual and cumulative impact is expected.

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

198. The active participation of stakeholders including local community, NGOs/CBOs, and the media in all stages of project preparation and implementation is essential for successful implementation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure are a must as per the ADB policy.

199. Most of the main stakeholders have already been identified and their representatives consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders in the subproject are local residents, shopkeepers, and business people who reside and work near the propsed project site of the hostel. The secondary stakeholders are the government and utility agencies responsible for provision of services in project area, GMC, GMDA, Fire & Emergency Services, PCBA, Forest and Wildlife Department, etc., NGOs and CBOs working in the area. Both primary and secondary stakeholders were consulted during the preparation of this IEE.[38]

200. Two set of public consultation held to communicate about the proposed Guest Hostel in May 2023. One pre-informed public consultation was held at the 1st Floor of Assam Water Centre, Conference Hall, FREMAA Office with prior public notice to all the residents/WRD employee staying near the project site. Another consultation was held with the teaching staff of the academic institute adjacent to the proposed location for Guest Hostel.

201. Stakeholder's consultations were also held on in between February - April 2023 with the Forest & Wildlife department, Pollution Control Board Assam, Chief Wildlife Warden and Member Secretary of Assam Biodiversity Board.

B. Public Consultation

202. ADB's SPS requires that FREMAA carry out consultations with concerned stakeholders and facilitate their informed participation. Meaningful consultation goes beyond information disclosure. It involves two-way communication between FREMAA and the affected communities and stakeholders, and active participation of affected communities and stakeholders in project design and implementation. Consultations includes presentations on environmental impacts, benefits, mitigation measures and project interventions

203. The public consultation and disclosure program are a continuous process throughout the project implementation, including project planning, design and construction.

Consultation during Project Preparation

204. Institutional consultations were conducted with the relevant governmental departments such as, Forest and Wildlife Department, PCBA.The hostel design and plans have been formulated in consultation with WRD & FREMAA.

205. The stakeholders were informed about the hostel project components and subsequent implementation in their area and their views were obtained.

[38] including community in general, forest & wildlife department, PCBA, the executing and implementing agencies (FREMAA & WRD) etc.

206. **Focus-group discussions** with stakeholders were conducted to learn their views and concerns over the proposed subproject. Main issues discussed are:

(i) Brief introduction about the project components
(ii) Possible environmental impacts due to the project activity
(iii) Local disturbances due to project construction work
(iv) Pollution level during construction period specially dust and noise pollution. Teachers requested to regulate the construction activities during the school time with restriction on operation of heavy machines during school hours and regular water sprinkling to control dust
(v) Health and hygiene
(vi) Safety of nearby residents during construction phase
(vii) Solid waste disposal system
(viii) Access road to the present government residences/quarters of the employees of the PIU (Water Resource Department) through the proposed hostel

207. In line with the ADB's requirements, consultations were conducted with key stakeholders and community people pertaining to environmental and social considerations. These consultations helped in identifying felt needs/concerns and apprehensions of the communities related to the subproject and their priorities.

208. Public consultation meetings were held at some of the subproject component locations and the Table 7-1 provides a summary of the locations, and participants in the consultation meetings. A total of 18 participants were present in the consultation meetings out of which 88.89% were female participants. Details public consultation are provided in Appendix 6.

209. Consultations were also held with various institutional stakeholders at their offices. Table 7-2 provides the details of the consultations, the issues and the suggestions provided by the stakeholders. Since the consultations are an ongoing procedure, the column related to issues, suggestions and request shall be updated on the progress of various requests and suggestions that may be received through official channels.

Table 7-1: Summary of Public Consultation Held for Subproject

Sl. No.	Date	Location	Total number of participants	Total number of female participants
1	8th May 2023	Assam Water Centre	16	14
2	19th May 2023	Dakhin Beltola High School	2	2

Source: FREEMA & WRD

Table 7-2: Consultations held with Institutional Stakeholders

Sl. No.	Name	Designation	Date	Issues, Suggestions and Requests
1	Mr. MD Adhikary	Sr. Env. Scientist, Head, Water Section, Pollution Control Board Assam	4th April 2023	• The Sr. Env. Scientist was briefed about the project in details including project locations and interventions • He apprised that the water quality of the Brahmaputra River is satisfactory • He intimated that PCBA monitors the quality of the river every month at 11 different locations starting from upstream at Dibrugrah to downstream at Dhubri • Since April 2023, PCBA has added 2 more locations at upstream (Dholasodia

Sl. No.	Name	Designation	Date	Issues, Suggestions and Requests
				at Tinsukia district) and downstream (Morinoi, Goalpara District) to monitor the water quality • Also intimated that turbidity had increased in the Brahmaputra River till Tinsukia section. However, the river water quality is normal.
2	Mr. Biren Baishya	GIS Expert, Assam State Disaster Management Authority	24th April, 2023	• Apprised the project, project locations and interventions proposed • Advised, to follow the Flood Hazards Atlas for Assam State (1998-2015), A geospatial Approach. This is the latest published study and the next study on Assam flood is under process and will be published on 2024
3	Sandeep Kumar, IFS	Chief Wildlife Warden and Member Secretary, Assam Biodiversity Board	25th April 2023	• The Chief Wildlife Warden was apprised about the project interventions in the subproject districts, and the warden welcomed the project • FREMAA requested to share kmz/kml files of all notified protected areas (PAs) in the project districts • FREMAA requested to share the flora and fauna in the project districts especially outside the PAs and preferably along the Brahmaputra River • The Chief Wildlife Warden requested for an official letter for flora and fauna data to initiate sharing of information. Also requested to apprise the procedure for obtaining necessary permissions for works if project sites are within 10km of PA (where ESZ are notified) • FREMAA requested for suggestions, if any for conservations of IUCN Red listed species (CR, EN & VU) and scheduled species. Warden will revert, and on learning about the project interventions, was optimistic that no negative impacts are envisaged on biodiversity

Source: FREMAA, WRD & ADB TA Consultant

210. The consultations primarily highlighted the proposed project, perceived negative impacts and mitigation measures, and public participation during implementation. Community members largely spoke about the inconveniences that they may face if access roads are closed to the residents of the WRD staff quarters and dust and noise during the construction period

211. FREMAA explained the likely issues during construction and the proposed EMP to manage the negative impacts. Prior information to people will be provided if necessary. FREMAA informed no road closures are anticipated due to this work. The people expressed satisfaction towards the project. The mitigation measures are included in the EMP.

Consultation during construction

212. Prior to start of construction, FREMAA and WRD with the assistance of Project Implementation Support Consultant (PISC) will conduct information dissemination sessions and conduct focus group meetings to discuss and plan construction work with stakeholders to reduce disturbance and other impacts.

213. A constant communication will be established with the nearby communities to redress the environmental issues likely to surface during construction phases and regarding the grievance redress mechanism. FREMAA/WRD and PISC will organize public meetings and will appraise the stakeholders about the progress on the implementation of EMP.

Information Disclosure

214. Executive summary of the IEE will be translated in local language - Assamese and made available at the offices of FREMAA, WRD and displayed on their notice boards. Hard copies of the IEE will be accessible to citizens to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE (in English) and executive summary (in Assamese) will be placed in the official website of the FREMAA after approval of the IEE by the Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

215. Public information campaigns to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress and future. Prior to start of construction, the PMU/PIU will issue notification on the start date of implementation in local newspapers. A board showing the details of the project will be displayed at the construction site for the information of general public.

216. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

217. Project related information shall be disclosed through public consultation and making relevant documents available in public locations. PMU and PIUs shall provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected person and other stakeholders. For illiterate people, other suitable communication methods, like audio visual methods will be used.

218. At minimum, the following documents shall be made available at the offices of project agencies - FREMAA, WRD, PMU, PIU and block level offices for public reference, and shall also be uploaded on respective websites.

1. Executive summary of the IEE (in Assamese);
2. Draft IEE Report (in English);
3. Final IEE Report (in English);
4. Updated/amended IEE, whenever updated/amended (in English);
5. Corrective action plans prepared during project implementation (English);
6. Annual Environmental Monitoring Reports (English)

219. A concise executive summary of project (in Assamese) and final IEE report, providing all necessary details of proposals, implementation arrangements, environmental impacts and mitigation and monitoring measures, and grievance redress mechanism, shall be made available to the stakeholders at consultation meetings. This should also provide contact information of project agency. This summary shall also be displayed at the notice boards of PMU, PIU and other public

places. During project implementation, relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders. The above documents shall be submitted to ADB for disclosure on ADB website.

C. Adaptive Mechanism

220. In case of recurrence of COVID-19, pandemic adaptive mechanisms will be used to address limitations on environmental safeguard activities and consultations due to any government restrictions and COVID-19 risks. Surveys and data collection will be conducted through online platforms, brochures, questionnaires, and other forms of media as applicable to provide information and receive feedback from the people, beneficiaries, government agencies and other stakeholders.

VIII. GRIEVANCE REDRESS MECHANISMS

A. Need for Project Specific GRM

221. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate and facilitate the resolution of displaced people's concerns, complaints and grievances about the social and environmental performance at the level of the Project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The project-specific GRM is not intended to bypass the government's own redress process, rather it is intended to address displaced people's concerns and complaints promptly, making it readily accessible to all segments of the displaced people and is scaled to the risks and impacts of the project. The complainant may access the formal legal system at any time.

222. During plan preparation, information regarding GRM will be disclosed as part of the public consultation process. Grievances related to the implementation of the project will be acknowledged, evaluated, and responded to the complainant with corrective action proposed. The outcome shall also form part of the annual monitoring report that will be submitted to ADB.

223. The GRM will work within existing legal and cultural frameworks, providing an additional opportunity to resolve grievances at the local and subproject level. The key objectives of the GRM are:

- Educate stakeholders on the GRM
- Receive and record the grievances
- Resolve and close the grievances
- Escalate unsolved grievances to concerned authority
- Notify/update the stakeholders of the solutions

224. The types of grievances the stakeholders may file for all the project components include, but are not limited to:

- Non-payment, or inadequate compensation and/or due R&R assistances;
- Wrong measurement of land parcel
- Construction related impacts – damages to structures; dust damaging crops/trees
- Health and safety risks;
- Negative impacts on the environment;
- Negative impacts on communities
- Physical harm and nuisance from construction or operational activities;
- Impacts arising from migrant labor on local communities
- Exclusion from beneficiary lists
- Lack of information and opportunities for participation

225. Presently, FREMAA and WRD are also addressing grievances raised through the Centralized Public Grievance Redress and Monitoring System (CPGRAMS), which is an online portal implemented by the Govt. of India and hosted by National Informatics Centre (NIC). The Chief Minister of Assam can be contacted for any help at phone numbers 0361-2262222/ 2237043, Fax Number 0361-2262069 and email cm@assam.gov.in.

226. In the previous ADB (Tranche-II) Project, Grievance Redressal Committee (GRC) was established at three levels, one at the project (Division/PIU) level, another at the district level, and the third at Executing Agency (or PMU) level, to receive, evaluate and facilitate the resolution of

affected person concerns, complaints, and grievances. The same three tier GRM process will be adopted under this Project.

227. The GRM system and the committees to be formed at various levels would be intended to address stakeholders' grievances and dissatisfaction about actual or perceived impacts and to find a satisfactory solution. The GRM will function throughout the project cycle for use by stakeholders to address concerns and complaints promptly and transparently. The Project specific GRM is not binding and the affected persons can approach the Judiciary any time if they wish to do so. Taking grievances to Judiciary will be avoided as far possible and the resettlement plan-implementing agency will make utmost efforts and reconciliation at the level of GRC.

B. Division/PIU Level GRC

228. The concerned Project Implementation Unit (PIU)/Water Resources Division (WRD) will nominate 1 (one) official to oversee the implementation of RP and to provide response to the grievances raised by the community and affected persons. The GRC at Division/PIU Level will be constituted with the following members:

Table 8-1: GRC Members at Division/PIU Level

Sl. No.	Members	Designation
1.	Executive Engineer (WRD) - concerned Division	Chairperson
2.	Assistant Executive Engineer (WRD) - concerned Division	Member-Secretary
3.	Nominated official from RP implementing NGO	Member
4.	Gaon Bura (Village Head) of the concerned village	Member
5.	Two Community Members (Female)	Members

Source: FREEMA

C. District Level GRC

229. The second level GRC will be constituted at each Project District headed by the Deputy Commissioner. The GRC at district level will be constituted with the following members:

Table 8-2: GRC Members at District Level

Sl. No.	Members	Designation
1.	Deputy Commissioner of the District or his reperesentative	Chairperson
2.	Additional Deputy Commissioner (LA)	Member-Secretary
3.	Revenue Circle Officer(s) - concerned Revenue Circles	Member
4.	Executive Engineer (WRD) - concerned Division	Member
5.	Nominated official from RP implementing NGO	Member
6.	Members of the Panchayat/ULB	Member
7.	One Representative of the Affected Person	Members

Source: FREEMA

230. There shall be not more than 7 (seven) members in the committee. There shall be minimum one-third women representation in the committee.

D. PMU Level GRC

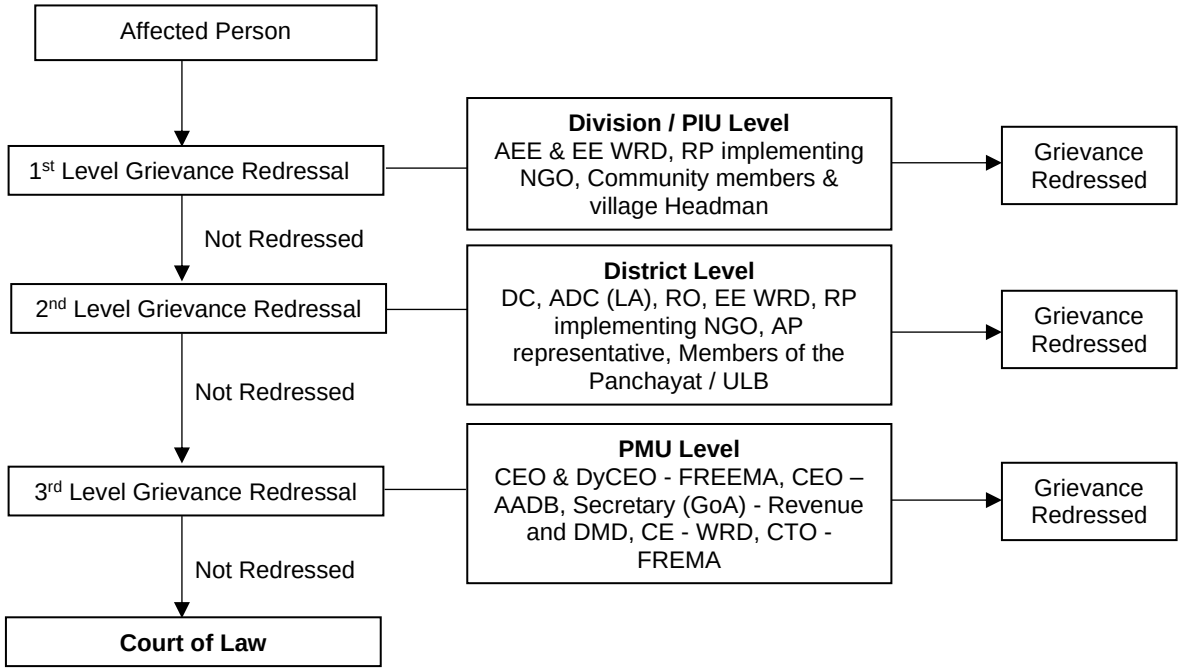
231. The PMU level GRC will function as an appellate authority and ensure that the stakeholders have access to legitimate, reliable, transparent, and efficient institutional mechanisms that are responsive to their complaints. The unresolved grievances accelerated to the PMU level GRC including grievances received through the previously mentioned platforms such as CPGRAMS are forwarded to WRD, which will in turn be placed before the PMU level committee for redressal.

Table 8-3: GRC Members at PMU Level

Sl. No.	Members	Designation
1.	Chief Executive Officer (CEO) FREMAA	Chairperson
2.	Chief Executive Officer (CEO) AADB	Member
3.	Secretary to the Govt. of Assam, Revenue and Disaster Management Department	Member
4.	Chief Engineer, WRD	Member
5.	Deputy Chief Executive Officer (DyCEO), FREMAA	Member-Secretary
6.	Chief Technical Officer (CTO)	Member

Source: FREEMA

Figure 8-1: Grievance Redress Process



Source: FREEMA

E. Key Elements of GRM under the project

232. The project GRM has the following key elements and procedures for satisfactory functioning:

233. **Flexible Grievance Registration Process**: The grievances can be registered by person, phone, text message, mail, email, via website, verbal, etc. Prior to registering the complaint/ query, a procedural step will be in place to assess its eligibility and check that issues raised in the complaint fall within the scope that the GRM is mandated to address. Queries or complaints may be received in a variety of forms ranging from verbal communications to formal and written complaints; also, directly from APs or via third parties. Whatever the source and the form in which the query or complaint is received, it will be accepted by the focal points and registered in a grievance register and online portal. It is also to be mentioned that uniformity will be maintained in the complaint registration systems across different sections and agencies of the project.

234. **Log of Grievances and Database:** A Grievance Register will be maintained in which all grievances are recorded and digitized and maintained as a database at the PIU level by the designated official to document the grievance as per the prescribed format attached including details

of the date and type of grievance received, the date of personal hearing provided to the complainant, the date when grievance was redressed or if not redressed date of forwarding the grievance to GRC. Provision will be made to record and maintain grievances received directly on-site and incorporated in the Grievance Register. This register will be placed at the Executive Engineer's office of the concerned division. This will serve as the First Level of Grievance resolution.

235. **Redressal Durations and Disclosed Procedures:** The GRM procedures will be publicly advertised and popularized for use by the stakeholders. The GRM will also set out the length of time users can expect to wait for acknowledgement, response, and resolution of their grievances. The GRM system will be popularized among the communities through IEC campaigns, IEC material, wall writings, etc. In addition to this, the length of time the complaints can expect to wait for acknowledgment, response, and resolution of different types of grievances. The response time prescribed for the GRC would be three weeks at each level. Since the entire resettlement component of the project has to be completed before the construction starts for the whole project, the GRC will meet at least once a month, or as needed, to resolve the grievances. Sixty percent attendance of the committee members at all three levels will constitute the quorum for the meeting. However, in case of divisional and district level GRC, participation of community members and representative of APs and RP implementing agency will be mandatory. The PIU will also ensure installation of Display Boards at site with GRM information with support from the civil works contractors/ implementing support NGO and in consultation with project Management Unit (PMU), FREMAA. The GRC will meet once in a month.

236. **Transparency and Good Governance:** The GRM procedures, governing structure and decision-making process will be popularized among the communities through IEC materials and campaigns. For transparency and good governance, community members are selected as members of the GRC at field level, Grievances that cannot be resolved at the PIU/ PMU level and in cases where the complainant is not satisfied with the decision, will be referred to the district level GRC. Consultative meetings along with distribution of leaflets with the community and APs will also be conducted to educate them on the GRM and its escalation matrix for resolving grievances to encourage them to use and access it in case of need. The PMU and PIU and adhere to the principle of confidentiality while informing the same to the district level GRC (if required) as the case may be. The designated official at the PIU will also be responsible to ensure that a mechanism is put in place to address grievances of labors and staff deployed at project sites by the Contractors.

237. **Escalation:** The project GRM provides for escalation at different levels, so that the unresolved grievances might be redressed at higher levels of GRM. Mediation is also encouraged as an option when the users are not satisfied with the grievance redressal.

238. Further, for land related grievances, the GRC will provide an opportunity to have their grievances redressed prior to approaching the State level LARR Authority, constituted by Government of Assam in accordance with Section 51(1) of the RFCTLARR Act, 2013. Decision of the District Level GRC will be final, unless an appeal is preferred with the PMU level. If the committee is unable to arrive at a decision through consensus, the matter will be referred to the appellate authority with a note on opinion of the committee members. Other than disputes relating to ownership rights and apportionment issues, on which the LARR Authority has jurisdiction, GRC will review grievances involving eligibility, valuation, all resettlement and rehabilitation benefits, relocation, and payment of assistances.

239. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make a good faith effort to solve their problems by working with

the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.[39]

[39]For further information see: http://www.adb.org/Accountability-Mechanism/default.asp.

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. EMP & EMoP

240. An Environmental Management Plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable level and monitoring the same. This is presented in the Table 9-1, which shows the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

241. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

242. A copy of the EMP must be kept at work sites at all times. The EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

243. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate budget for compliance with these EMP measures, requirements and actions.

244. The following Table 9-1 show the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring during pre-construction, construction, and operation and maintenance phases.

Table 9-1: Stage Environmental Management Plan (EMP)

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
Pre-Construction Phase					
-	Protected areas	The project interventions in outside notified ESZ/10 km of protected areas, where ESZ not notified of the project. No impacts on the protected areas are foreseen	-	-	-
-	Location impacts	No impact during the design and preconstruction period is envisaged	-	-	-
-	Environmental, social and culturally sensitive resources	No impacts during the design and preconstruction envisaged	-	-	-
Preparatory works	Tree cutting	The project site doesn't have any standing trees with girth size more than 30m and thus no tree felling for the hostel. There is presence of grasses, climbers and shrubs which shall be cleared	-	-	-
Preparatory works	Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	• Obtain all necessary consents (including CTE and CTO for construction plants), permits, clearance, and NOCs prior to award of civil works. Following consents are required: 1. Storage, handling and transport of hazardous materials if any from PCB Assam 2. Opening of new sand mining,	Contractor	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			quarries, borrow areas from Department of mines and Geology, SEIAA/MoEFCC 3. CTE & CTO for batching plants 4. Labor licenses from Government of Assam 5. Workmen compensation insurances, medical insurances and accident insurance coverage for all workers at site 6. Utility shifting permissions, if any 7. Boring permission from Ground Water Authorities • Ensure that all necessary approvals for construction from various authorities are obtained by contractor before start of construction • Submit all copies of the various consents, permissions, clearances and NOCs to the Engineer and submit regular reports on compliance all obtained consents, permits, clearance, NOCs, etc. as required by the authorities • Include in detailed design drawings and documents all conditions and provisions if necessary • Obtain all necessary approvals from the Engineer including but not limited to setting up of labor camps, construction		

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			methodologies, and construction schedule before the start of construction		
Sourcing of materials	Extraction of materials	• Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. • Illegal quarrying may lead to land use change, unstable rock formation, air and noise pollution	• Obtain materials from aggregate and sand quarries/crusher sites which has necessary permissions from the Department of Mines and Geology, Prior EC from SEIAA/MoEFCC and CTO from PCBA • If other sites are necessary, contractor to verify the suitability of all material sources and to obtain the approval of Engineer • If additional quarries will be required after construction has started, contractor to obtain necessary approvals from Engineer • Aggregates required for construction of embankment and roads shall be procured from quarries/crushers which has obtained EC & CTO from SEIAA/MoEFCC and approved by PCBA • Where materials are obtained from 3rd party vendors, contractors to submit all necessary documents including permission, EC documents, and CTE and CTO to the Engineer before obtaining source approvals • Permissions from the relevant authorities for use of ground water. the water quality to be tested as per guidelines of the	Contractor to prepare and submit list of approved quarry sites and sources of materials for the approval of Engineer	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			Engineer to ensure that it can be utilized for concrete mixing		
Clearing & grubbing, site preparation	Disposal of solid waste and site preparation	Removal of solid waste and other nuisance materials	• Ensure that the project sites are cleared of solid waste or other nuisance materials • Dispose solid waste from existing sites and materials into designated locations (dumping in vacant lot is not allowed) • Garbage generated during construction and especially at construction camps shall be collected and disposed at designated locations. The contractor may tie up with the GMC for disposal of the municipal wastes • Incineration of wastes shall be prohibited • Construction labor camps shall have toilets along with septic tanks, and garbage bins for segregation of wastes	Contractor	PIU, PMU & PISC
Construction and Operation Phases					
Quarrying & mining	Land use change due to project activities & construction material sourcing (quarrying)	There shall change in land use as presently the land is lying vacant and some loss of ground vegetation cover	• Construction camps shall be located on a part of the project site itself area. All requisite facilities (drinking water supply, sanitation, domestic solid waste collection and disposal, fuel supply) shall be provided at these camps. Vegetation clearance shall be limited to the extent possible • Aggregates required for the works shall be procured from quarries approved by from quarries and	Contractor	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			crushers which have obtained Prior EC from SEIAA/MoEFCC and CTO from PCBA • Where materials are obtained from 3rd party vendors, contractors to submit all necessary documents including permission, EC documents, CTO, etc. to the Engineer before obtaining source approvals • If new quarries and stone crushers are to be set up for the project, the contractor shall obtain the necessary prior EC from SEIAA/MoEFCC and the CTO from the PCBA and taking adequate measures for air pollution control		
Earthworks and activities in construction camps	Soil contamination	• Soil may get contaminated around construction site, machine maintenance area, construction camp etc. • No impacts of contamination of soil are envisaged during operation period except from accidental spillage in the parking area	<u>Construction phase:</u> • The construction vehicle shall be fueled or repaired/serviced at the approved garages and refuel pump stations outside the site • Oil spill kits should be available at the site to minimize the damage to soil quality in case of spillage. <u>Operation Phase:</u> • Depending on the nature and magnitude of spill, appropriate land remediation measures shall be employed by the concerned authorities	Contractor during implementation implementation until defects liability (DLP). PIU & PISC during operation period	PIU, PMU & PISC during construction PMU during operation
Earthworks and activities in construction camps and construction	Solid Waste	<u>Construction phase:</u> • Some waste will be generated due to excavated earth material	<u>Construction phase:</u> • Debris and excavated earth material can be reused subject to the approval of the Engineer	Contractor during implementation implementation until defects liability	PIU, PMU & PISC during construction

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
site		and waste from construction. <u>Operation Phase:</u> • Since institutional training and residential arrangement will be undertaken at the proposed hostel, there will not be any adverse environmental impact during operation • There may be generation of some waste on account of maintenance and operation of the proposed hostel. • There will be generation of different types of solid wastes (municipal waste from residential areas, E-Waste from IT and computer facilities and discarded lead acid batteries) • These wastes will require handling, transport, and disposal as per regulatory requirements of their respective categories to avoid environmental impacts	during the construction • Waste generated during construction will be disposed of as Construction and Demolition Waste Management Rules, 2016 and to the satisfaction of the Engineer • The disposal locations for waste will be finalized in consultation with local civic authorities and in compliance with construction and demolition waste management rules 2016. • The clean-up and restoration operations will be implemented by the contractor prior to demobilization. The contractor will clear all temporary structures and dispose of all garbage from project site including the unused vehicles dumped by GMC. • The non-usable, non-saleable, non-hazardous construction waste shall be disposed-off through the GMC • Usable or saleable waste shall not be disposed off to landfill. All efforts shall be made to prevent soil contaminations • The wastes will comprise of broken pieces of bricks, surplus earth, discarded and/or spilled construction materials, shuttering materials etc. • It shall be mandatory for the contractor to ensure proper disposal of the construction waste	period (DLP). PIU & PISC during operation period	PMU during operation

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			at the disposal site as designated by the FREMAA and WRD and/or landfills operated by GMC <u>Operation Phase:</u> • During operation phase, the solid waste generated at proposed hostel will be segregated and Its disposal will be integrated with Guwahati City local waste disposal • Hostel operators will be responsible for collecting the waste for possible reuse and recycling		
Subproject operations	Water Quality	<u>Construction phase:</u> • The major source of surface water pollution during project construction phase will be sewage and wastewater generated from labor camps as well as workshop areas • For the outside laborers, the contractor will establish a labor camp and it is expected that 50-100 laborers shall stay in the construction/labor camps. It may pollute land and other nearby water bodies if discharged untreated <u>Operation Phase:</u> Continuous withdrawal will have impact on ground water table in the	<u>Construction phase:</u> • Ground and surface water quality shall be tested by the contractor at periodic intervals as per the Environmental Monitoring Plan (EMoP) • Septic tanks shall be provided to treat the domestic sewage. Provision of mobile toilets also shall be considered with the provision of channeling the sewage to septic tank in a closed loop system. • Discharge of untreated domestic sewage to the to the natural drain in the vicinity will not be permitted <u>Operation Phase:</u> • During operation period, the hostel shall have fully functional toilet blocks connected to	Contractor during implementation implementation until DLP. PIU & PISC during operation period	PIU, PMU & PISC during construction PMU during operation

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
		surroundings of institution	sewerage network of the Proposed hostel as sewage treatment plant has been planned for wastewater treatment • The waste generated (mainly sludge) will be disposed of after appropriate treatment in low lying areas in the campus. • The impact of extraction of ground water during operation phase shall be taken care through design of ground water recharge features (rainwater harvesting structures) in the campus • Based on raw water characteristics, necessary treatment will be provided. The treatment for raw water will include screening, reduction of total suspended solids (TSS) and hardness and disinfection to meet drinking water standards specified in IS:10500 by the Bureau of Indian Standards		
Construction works and activities within construction camps	Air quality	<u>Construction phase:</u> • Various construction activities will decrease the ambient air quality. • Fugitive emissions will form a major proportion of air pollution in the form of particulate matter from storage and handling of construction material • Fugitive dust sources associated with construction phase include	• Batching plant shall ideally be located away from the project site. However, in case the plant is set up in the site, then it shall be away from the school boundary in the downwind direction and be fitted with the air pollution control devices • The emission should meet Pollution Control Board standards • Permanent screens of tin sheets or similar materials having a height of at least 1m higher than	Contractor during implementation and DLP. PIU & PISC during operation period	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
		vehicular traffic generating fugitive dust and aggregate handling. • The emission of particulate matter during the construction phase will be generated from the activities like clearing and grubbing, earthworks, movement of stone aggregates, road dust emissions etc. <u>Operation Phase</u> • A diesel generator (1500 kVA capacity) will be required, but it will be operated only during power cuts. The generator will be of the silent type and will comply with the levels stipulated by Central Pollution Control Board	the top of the batching plant shall be used to cover the entire boundary on the side of the school and residential properties • For procurement of the material from the market/third parties the contractors shall submit the compliance certificates (i.e., valid CTO of crusher, EC of mines and other permits) the approved third parties to the Engineer by the contractor before commencing the procurement of material • Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered. Water may be sprayed on earthworks, on a regular basis to arrest dust • Regular maintenance of machinery and equipment will be carried out • Ambient air quality monitoring shall be carried out during construction phase as per the Environmental Monitoring Plan (EMoP) through NABL accredited/MoEFCC recognized laboratories and the test reports shared with the Engineer and reported in the periodic Environmental Monitoring Reports (EMR). If monitored parameters are above the prescribed limits, suitable control measures must be taken. The contractor will submit emission monitoring results as a		

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			compliance with environmental monitoring plan • Care shall be taken to keep all material storages adequately covered and contained so that they are not exposed to situations, where winds on site could lead to dust/particulate emissions • All vehicles and construction equipment operating for the contractor, FREMAA, and WRD will obtain and maintain "Pollution under Control" (PUC) certificates		
Construction works and activities within construction camps	Noise levels	<u>Design and Construction Phase</u> • Noise will be generated from various activities such as clearing and grubbing, excavation, earthworks, borrow works, etc. • The general noise levels during construction phase such as due to working of heavy earth moving equipment and machineries installation may sometimes go up to 100 dB(A) or more at the work sites. • During construction phase, the increase in vehicular movement is expected to increase and thus an increase in noise level is expected.	• Transportation of construction materials will be confined to daytime before or after school hours, depending upon extent of construction activity • A well raised (1.8 m height above ground level) boundary wall will be ready before start of intensive construction activities of Proposed hostel. This will also act as noise barrier. In case the noise is not mitigated, appropriate noise barriers especially near the school shall be placed. The noise barrier material shall be approved by the Environmental Specialist of the Engineer • Construction activities shall be prohibited between 9.00 pm and 6.00 am near residential areas throughout the subproject stretch • Appropriate PPE devices like ear plugs or ear muffs will be provided to the workers operating in the	Contractor during implementation and DLP.	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			vicinity of high noise generating machines • Construction equipment and machinery shall be fitted with silencers and regularly maintained • Regular noise monitoring measurements shall be carried out as per the EMoP • Use of manual labor where ever feasible over machines shall be encouraged		
Construction works and activities within construction camps	Ecology	<u>Construction Phase</u> • Since the site is entirely covered by human habitat on all sides, no conflict with wild animals is envisaged	<u>Construction Phase</u> • In case of chance encounter with wild animals like snakes, the wildlife rescue team shall be intimated. Workers shall be provided awareness trainings on how encounters with wild animals. <u>Operation Phase</u> • Landscaping and plantation of native trees during the post construction period shall increase the aesthetic beauty of the site.	Contractor during implementation and DLP. PIU & PISC during operation period	PIU, PMU & PISC
Construction works and activities within construction camps	Accident and safety	<u>Construction Phase</u> • The risks associated with the proposed project are minimal • Improper stockpiling of construction materials could obstruct movement of locals accessing the WRD residential colony, if stored outside delineated site boundary in open area	<u>Construction Phase</u> • The construction zones and the camps shall be barricaded and proper fences provided • Adequate lighting and signage (including road signages) to be provided at the construction site to aware the locals of the dangers • All signage shall be in multiple language (Assamese, Hindi/Bengali besides English, if Engineer desires).	Contractor during implementation and DLP. PIU & PISC during operation period	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			• The workers shall be provided with necessary personal protective equipment and a first aid unit including adequate supply of dressing materials, transport means, nursing staff and an attending doctor, shall be available at each construction site • Regular health checkup camps to be organized at a frequency defined in EMP • Mandatory health checkups of laborers to be done during joining and periodically during the construction phase • Due consideration will be given for proper materials storage within the construction site. Stockpiles (sand, subgrade and earth) will be covered (with covered bricks or polythene sheet) to protect from dust and erosion. • A Traffic Management Plan shall be prepared by the contractor and approved by Engineer before the start of work <u>Operation Phase</u> • The design of the Proposed hostel buildings shall include structural and seismic safety measures required by India's latest building codes (in seismic zone V). The Proposed hostel will be equipped with fire-fighting systems with portable fire extinguishers and smoke detectors. The staircase will have adequate width to allow		

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			for people to exit the campus buildings during any fire-related or other eventuality. Building design and toilet facilities will be barrier-free for physically challenged persons. • Onsite emergency plan will be prepared by the PIU-WRD with support from PMU- FREMAA • For natural calamities, the Disaster Management Plan prepared by GoA for Kamrup Metro district will be followed. The GoA has prepared district wise Disaster Management Plans as per provisions of Disaster Management Act 2005 of Government of India\ • During natural hazards, the trainees and staff will be safely evicted as per the disaster management plan		
Construction works and activities within construction camps	Social conflict	<u>Construction Phases</u> • Most of the unskilled and semi-skilled workers will be from the local areas with some skilled migrant workers for which contractor may establish a labor camp. They may conflict in culture and lifestyle and compete with local laborers over some job opportunities and may also create potential health issues such as HIV/AIDS	• The contractor shall ensure that all migrant laborers are housed in the labor camps • Preference shall be given to locals for employment as unskilled and semi-skilled workers • All migrant workers will undergo workshop/briefings to sensitize them on local culture and lifestyle awareness • Appropriate measures for addressing potential health issues such as human immunodeficiency virus/ acquired immunodeficiency syndrome	Contractor	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
			(HIV/AIDS).		
Activities within construction camps	Establishment and operation of construction camps and workers facilities	• Proper provision and maintenance of facilities is necessary for proper living conditions and avoid health, environment and safety issues • Proper provision and maintenance of facilities is necessary for proper living conditions and avoid health, environment and safety issues. • Operation of construction camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants • Potential impacts are negative but short-term and reversible by mitigation measures. • Operation of construction camps can cause temporary air and noise pollution from machine operation, water pollution	• Ensure conditions of livability at work camps are maintained at the highest standards possible at all times • Living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation [40] which include: provision of safe housing having well-ventilated and well-lit accommodation,, availability of electricity, plumbing, potable water supply, gender segregated sanitation facilities, adequate fire protection. Accommodation shall be in the range from 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface) per worker, a minimum ceiling height of 2.10 meters; a reasonable number of workers are allowed to share the same room –	Contractor	PIU, PMU & PISC

[40] https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
		from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures	(standards range from 2 to 8 workers) • workers with accompanying families shall be provided with a proper and safe accommodation • The permission for labor employment (registration with local labor office) should be obtained (under the Inter State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979) • Dust bins, hand sanitizer and hand washing facilities will be provided in adequate numbers at camp site • Proper beds with mosquito nets, potable drinking water, separate toilets for men & women connected to the septic tanks and soak pits, separate kitchen and dining facilities, Condom boxes/vending machines to be mandatorily provided in the labor camps. Laborers shall not be sleeping on the ground. Spraying of insecticides, carbolic acids etc. shall be done regularly (at least once a week) • First aid boxes as per Factory Act and first aiders to be provided in the construction sites and labor camps		
Construction works and activities within construction	Occupational Health and Safety Plan due to COVID 19	• Though the effect of COVID-19 pandemic has subsided in the India but the threat remains as the	• In case of recurrence of pandemic ensure that the project related staff at all levels are appropriately vaccinated.	Contractor during implementation and DLP.	PIU, PMU & PISC

Construction / Subproject activity	Environmental Aspect	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Supervision
camps	Pandemic	pandemic like situation occurs in some countries globally. In case of recurrence of the COVID-19 pandemic in India the local community members involved in project activities may be at a heightened risk of virus exposure	• Ensure project staff, consultants, contractors, and workers have in their mobile devices the Aarogya Setu App, which is a mobile application developed and recommended by the government of India to proactively reach out to and inform the users of the app regarding risks, best practices and relevant advisories pertaining to the containment of COVID-19. • Ensure mandatory isolation of the personnel or workers, either asymptomatic or showing symptoms, who have had direct contact with anyone tested positive for COVID-19. • The isolation procedures issued by the government shall be followed along with proper disposal of used PPE following guidelines and procedures issued by the government.		

Source: ADB TA Consultant

Table 9-2: Environmental Monitoring Plan (EMoP)

Environmental Component	Project stage	Parameter	Standards	Location	Duration/Frequency	Implementation	Supervision
Air Quality	Pre-construction Phase	$PM_{2.5}$, PM_{10}, SO_2, NO_x, CO, Pb	National Ambient Air Quality Standards & CPCB guidelines for collection of samples and	At 2 locations – a) within the project site and b) in front of Assam Water Center building/other location	Continuous 24-hourly, twice a week for two weeks as baseline	Contractor through NABL accredited/MoEFCC approved Environmental Laboratories	PMU, PIU & PISC
	Construction Phase				Continuous 24-hourly, twice a week for two weeks. Twice every year (summer and winter)		

Environmental Component	Project stage	Parameter	Standards	Location	Duration/Frequency	Implementation	Supervision
			testing	identified by the contractor & approved by the Engineer	during construction period		
	Operation Phase				Continuous 24-hourly, twice a week for two weeks. Only once in the first summer season of operation period/DLP		
Surface Water Quality	Pre-construction Phase	pH, BOD, COD, TDS, TSS, DO, Oil and grease and other physio-chemical and biological parameters	Grab sample collected from source and analyzed as per standard methods for examination of water and wastewater & CPCB Water Quality Criteria	At 1 location – Perennial natural drain on the western boundary of the project site at location identified by the contractor & approved by the Engineer	Once before start of construction works as baseline	Contractor through NABL accredited/MoEFCC approved Environmental Laboratories	PMU, PIU & PISC
	Construction Stage				Twice a year during pre- monsoon (between March – May) & post monsoon seasons (between October – December) every year during construction period		
	Operation Phase				Only once either during pre-monsoon (between March – May) or post monsoon seasons (between October – December) in the first year of operation period/DLP		
Ground and Drinking Water Quality	Pre-construction Phase	pH, BOD, TDS, DO, Fl, Cl, As, Cd, MG, Mn, total coliform and other physio-chemical and	Grab sample collected from source and analyzed as per standard methods for examination of water & IS 10500:1991	At 2 locations including a) boring at construction & labor camp sites and b) other ground water source for drinking water identified	Once before start of construction works as baseline	Contractor through NABL accredited/MoEFCC approved Environmental Laboratories	PMU, PIU & PISC
	Construction Stage				Twice a year during pre- monsoon (between March - May) & post monsoon seasons (October – December) every year during construction		

Environmental Component	Project stage	Parameter	Standards	Location	Duration/Frequency	Implementation	Supervision
		biological parameters		by the contractor & approved by the Engineer	period		
	Operation Phase				Only once either during pre-monsoon (between March - May) or post monsoon seasons (between October – December) in the first year of operation period/DLP		
Noise	Pre-construction Phase	Noise levels in dB (A) for day, night, L_{10}, L_{90}, Lmax, Lmin	As per National Standards for Noise & CPCB guidelines for collection of samples and testing	At 3 locations including a) construction sites, b) Dakhin Beltola high schol and c) in front of Assam Water Center building/other location identified by the contractor & approved by the Engineer	One day hourly measurements for continuous 24 hours before start of construction works as baseline	Contractor through NABL accredited/MoEFCC approved Environmental Laboratories	PMU, PIU & PISC
	Construction Phase				One day hourly measurements for continuous 24 hours. Twice a year for every year (i.e. summer and winter seasons) during construction period		
	Operation Phase				Only once either during summer (between March - May) or winter seasons (between December - February) in the first year of operation period/DLP		
Soil quality	Pre-construction Phase	Monitoring of NPK & heavy metals,	ICAR Criteria of Soil Quality	At 1 location – within project site identified by the	Once before start of construction works as baseline	Contractor through NABL accredited/MoEFCC approved	PMU, PIU & PISC
	Construction				Twice a year during		

Environmental Component	Project stage	Parameter	Standards	Location	Duration/Frequency	Implementation	Supervision
	Phase	grease and other baseline parameters		contractor & approved by the Engineer	pre- monsoon (between March - May) & post monsoon seasons (between October – December) every year during construction period	Environmental Laboratories	
	Operation Phase				Once either during pre-monsoon (between March - May) or post monsoon seasons (between October – December) in the first year of operation period/DLP		
Terrestrial and Aquatic Ecology	Construction & operation phases	Census & Habitat Study	Wildlife Institute of India guidelines & Good Industry Practices	All throughout the project area	One season during construction phase (in the 1st monsoon season of construction period One season during the winter season in the operation period	PISC	PMU

FREMAA- Flood and River Erosion Management Agency of Assam, CWC- Central Water Commission, dbA- Decibel, IS- Indian Standard, PCBA- Pollution Control Board Assam, WRD- Water Resource Department, Govt. of Assam.

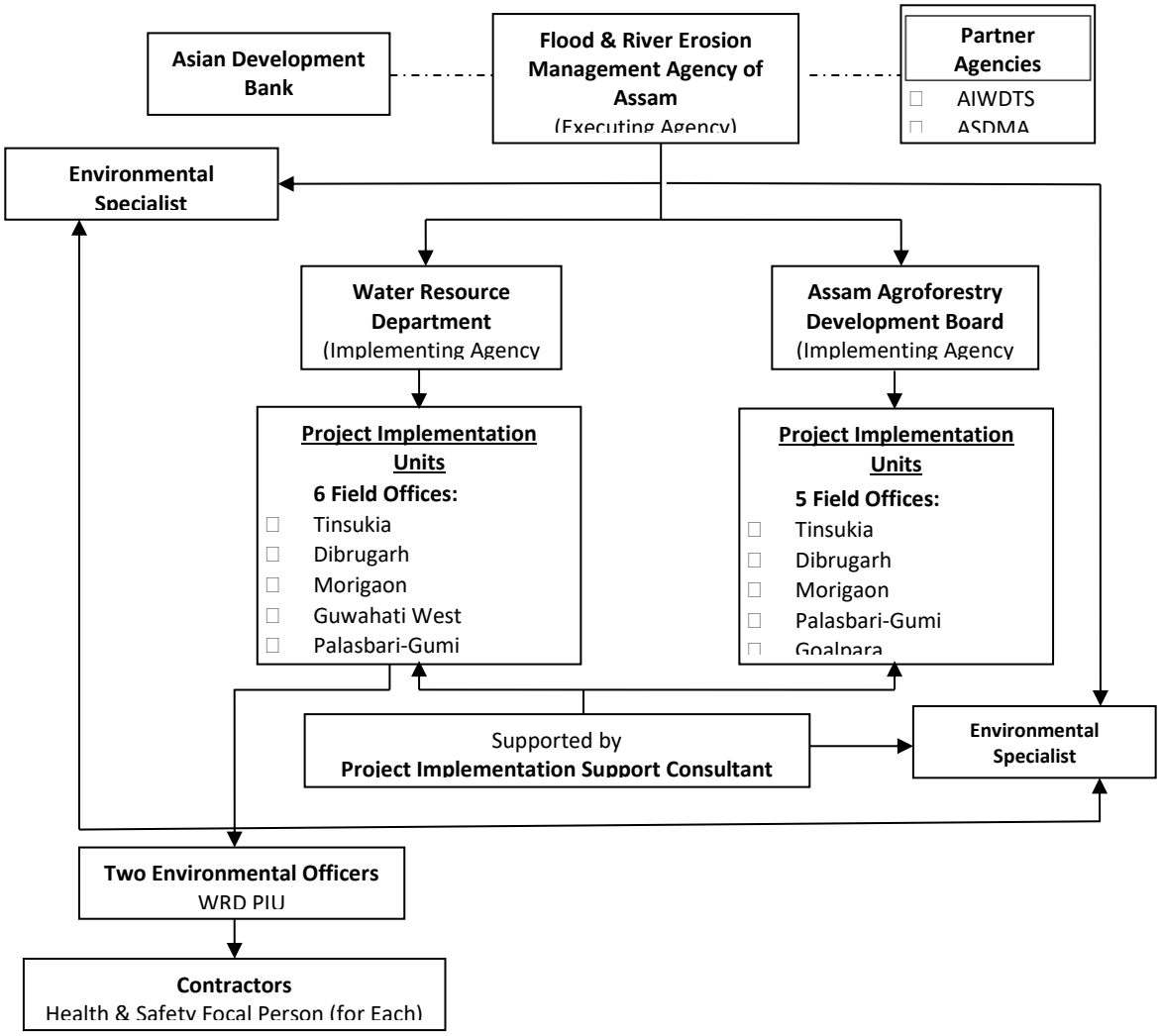
Source: ADB TA Consultant

B. Implementation Arrangement and Responsibilities of EMP implementation:

245. All the policy decisions, including incorporation of the EMP requirements in compliance to loan covenants shall be the responsibility of the recommended FREMAA as the executing authority which is registered under the Societies Act. The FREMAA is completed execution of ADB project AIFRERMIP and is currently executing World Bank project Assam Integrated River Bank Management Program (AIRBMP).

246. The project management unit (PMU) FREMAA will have responsibility to implement overall EMP. The PMU is responsible for the full compliance of the project with the loan agreement, ADB's SPS, and all applicable laws and rules of the government. The PMU is supported by an environment specialist to ensure compliance with environmental safeguards. The PMU will be assisted by WRD and AADB as PIUs. WRD PIU will be supported by two Environment Officers for implementing the environmental safeguard requirements. There will be 6 PIUs at WRD for execution of anti-erosion and flood protection works and 5 PIUs at AADB for implementing nature-based solutions. The organizational structure for implementation arrangement for safeguard implementation in the project is shown in Figure 9-1.

Figure 9-1: Organizational Structure for Environmental Safeguards



Source: WRD & FREMAA

247. The **PMU** will:

(i) comply with the government policies, standards, and other environment-related statutory requirements of the project;

(ii) review and approve the construction EMP(s) prepared by the contractor(s) with the support of PISC and PIUs;

(iii) be responsible for application of key documents and forwarding to government agencies for the processing of clearances and permits including, but not limited to: environmental clearance certificate, forest clearance, tree cutting permit, and other relevant permits and license, prior to awarding any works contracts to any contractor;

(iv) ensure the preparation, review, and submission of EMRs (as stated on the loan agreement) for disclosure on the ADB and FREMAA websites;

(v) conduct training and workshops on environmental management, and site induction of all staff and workers involved in the project implementation. The staff and workers will include all engineers, and field supervisors and laborers of contractors;

(vi) guided by the IEEs submitted to ADB, implement effective environmental monitoring during pre-construction, construction, and operation phases. This includes, but is not limited to, inspections, review of monitoring forms prepared by the contractors, and documentation of the issues received through GRM;

(vii) take proactive and timely measures to address any environment safeguards related challenges at the national, state or district levels such as (a) delays in processing of clearances during pre-construction stage and (b) significant grievances during construction and operation stages);

(viii) review and approve, for submission to ADB, annual EMRs prepared by the PIUs and PISC;

(ix) lead in complying with disclosure of annual EMRs;

(x) review and approve corrective action plans (CAPs) for environment safeguard noncompliance.

(xi) inform ADB on any unanticipated environmental impact/s occurred during project implementation phase; and

(xii) ensure GRM, as envisaged in the IEEs and in this PAM, is in place and fully operational from the onset of project implementation.

248. As **PIU,** the WRD will:

(i) ensure that the project, and all contractors obtain permits, licenses, etc. for activities such as the operation of asphalt plants, quarries, borrow areas etc. before the implementation of the respective construction activity;

(ii) carry out regular field verification and review environmental compliances by the contractor during project implementation, in coordination with the PISC and the contractor's environmental focal person;

(iii) with PMU's support through environment specialist and field supervisors, provide and record environmental observations during any site visits that may include, but not limited to, excessive dust, loud noises, improper disposal of wastes, chemical/oil spills, camp hygiene, health and safety, and improper borrow area management; and

(iv) in case of potential risks and hazards to health, environmental quality, and properties that may result from poor EMP implementation, immediately instruct the contractor to cease the construction activities that pose risk and conduct immediate containment and mitigation activities.

249. If there are any unanticipated environment impacts during project implementation, the PMU, with support from the PISC, will update the IEE/s and EMP/s. Both documents will be reviewed by ADB and disclosed on ADB's website.

250. **Contractor**: The contractor is the principal agent to implement the EMP and environmental quality monitoring during the pre- and construction, and operation stages. Specifically, the contractor will:

(i) appoint the contractor's environment, health and safety focal person and attend the site induction workshop to be organized by the PMU and WRD;

(ii) obtain necessary environmental license(s), permits etc. from relevant agencies as specified in the IEE and this PAM for the ancillary facilities such as quarries, tree cutting, etc. prior to commencement of works;

(iii) as part of detailed survey, collect the baseline data on environmental quality of the construction sites before the start of physical works and continue collection of information (e.g., air quality, noise level, and water quality) during civil works as per the initial EMP;

(iv) revise and finalize the construction EMP and environmental quality monitoring plan;

(Implement and document all mitigation measures in the EMP and environmental quality monitoring plan;

(v) ensure that all workers, site agents, including site supervisors and management, participate in all environmental safeguard related training sessions;

(vi) ensure compliance with environmental statutory requirements and contractual obligations;

(vii) participate in resolving issues as a member of the GRM;

(viii) respond promptly to grievances raised by the local community or any stakeholder and implement environmental corrective actions or additional environmental mitigation measures as necessary and inform WRD; and

(ix) based on the results of EMP monitoring, cooperate with WRD to implement environmental corrective actions and corrective action plans, as necessary.

251. If there are any environment safeguard non-compliance during project implementation, the PMU will prepare necessary Corrective Action Plans (CAP), and reflect them in the periodic Environmental Monitoring Reports (EMRs). ADB will monitor WRD performance on the CAP.

252. ADB is responsible for the following:

(i) review EMRs, and disclose the final reports and on ADB's website;

(ii) explain policy requirements and safeguard covenants in the loan and project agreements to PMU and PIUs;

(iii) monitor implementation of the EMP through due diligence missions;

(iv) assist PMU and PIUs, if required, in carrying out its responsibilities and in building capacity for safeguard compliance;

(v) monitor overall compliance of the subprojects to this PAM; and

(vi) if necessary, provide further guidance to PMU and PIUs on the format, content, and scope of the periodic monitoring reports for submission to ADB.

253. The environmental safeguard roles and responsibilities of AADB's PIU are yet to be defined at this stage. The IEE shall be updated later to include the roles and responsibilities of AADB.

254. The environmental management plan and resettlement plan will be updated from time to time during project implementation, upon availability of detailed engineering design, and to reflect adaptive management of project changes and unforeseen circumstances or in response to project performance, ensuring that standards originally planned are not lowered.

255. **Capacity Building and Training:** Executing and implementing agencies need to have a sustained capacity to manage and monitor environmental safeguards. Although specialist consultants support will be available to PMU and PIUs, it is necessary to mainstream safeguards in day-to-day working. Therefore, PMU and PIUs require capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling the PMU and PIU staff to understand impact assessments and carry out environmental monitoring and implement EMPs. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs, understand government and ADB requirements for environmental assessment, management, and monitoring (short and long-term), and incorporate environmental features into future project designs, specifications, and tender documents and carry out necessary checks and balances during project implementation.

256. The PISC will facilitate the implementation of capacity building program for the PMU, PIU, and contractors, with specific topics on environmental safeguards such as but not limited to the list below. The contractors will be responsible for conducting site-specific/work-specific orientation on environmental safeguards for their workers prior to deployment to work sites. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; (v) monitoring and reporting system; and (vi) project GRM. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The proposed training program along with the frequency of sessions, is presented in Table 9-3.

Table 9-3: Capacity Building Program on EMP Implementation

Description	Target Participants and Venue	Estimate (INR)	Cost and Source of Funds
1. Introduction and Sensitization to Environmental Issues (1 day) • ADB Safeguards Policy Statement • Subproject selection criteria, categorization etc., • Government of India and Government of Assam applicable environmental safeguard laws, regulations and policies including but not limited to core labor standards, OEHS, Covid - 19, safety etc. • IEE preparation and EMP formulation • Incorporation of EMP into the project design and contracts • Monitoring, reporting and corrective action planning	Participants: All staff and consultants involved in the project Venue: PMU, FREMAA	200,000 (Lump sum)	PMU cost
2. Implementing EMP (1/2 day - once at the beginning and at a frequency of once in six months during implementation) • Site-specific mitigation & monitoring measures • Roles and responsibilities • Public relations, Consultations & Grievance redress	Participants: All staff and consultants involved in the subproject. All contractors immediately after mobilization of the	200,000 (Lump sum)	PMU cost

Description	Target Participants and Venue	Estimate (INR)	Cost and Source of Funds
• Monitoring and corrective action planning • Reporting and disclosure • Construction site standard operating procedures (SOP) • Chance findings (archeological) protocol • Traffic management plan • Waste management plan • Site clean-up & restoration	contractor Venue: PIUs		
3. Contractors Orientation to Workers (1/2 day) • Environment, health and safety in project construction (OEHS, Covid-19 safety, core labor laws, spoils management, etc.)	Participants: Once before the start of work, and thereafter regular briefing every month once. Daily briefing on safety prior to start of work to all workers (including unskilled laborers)	100,000 (Lump sum)	Contractor's cost

Source: ADB TA Consultant

257. Summary of Capacity Building cost for EMP Implementation

- Contractor Cost - INR 100,000.00
- PMU Cost - INR 400,000.00
- **Total** **- INR 500,000**.00

258. **Environmental Monitoring Reports (EMRs).** The EMRs will be submitted annually to document the progress on the EMP implementation. The PMU and PIUs will be supported by the PISC to monitor EMP implementation (pre-construction, construction and post construction phases) and implementation of nature-based solutions. An outline of the EMR is in Appendix 7. This outline is a template but additions, such as additional text, tables, charts, figures, may be made to ensure appropriate documentation of (i) project implementation progress, (ii) compliance with safeguard measures and their progress, and (iii) necessary corrective actions. The annual EMRs will be due for submission to ADB within one month following the end of the EMR period. The submission of EMRs to ADB will continue until the project completion report is issued by ADB.

259. The EMRs will be disclosed on the ADB's and FREMAA's websites after review and acceptance by ADB.

C. EMP Implementation Cost

260. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. There are some of the provisions in bid documents like compliance of the requirements of health and safety during construction works as per applicable labor laws, labor insurance, equipment fitness, provision of labor welfare facilities, healthcare facilities etc. which are unanimously bound to contractor bidding for the project therefore it is understood that costs for such requirements are bound to contractor and no need to consider as cost of EMP implementation.

Regardless of this, any costs of mitigation by the construction contractors or consultants are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of PMU/PIU will be provided as part of their management of the project, Cost for the capacity building program is included as part of the project. Cost of environmental management is given in Table 9-4.

Table 9-4: EMP Cost

Sl. No.	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	**Mitigation Measures**						
1	Obtaining and submission of copies (to PMU) all consents, permits, clearances, no objection clearances or NOCs, and other relevant permits from various authorities before the start of construction	Pre-Construction & Construction	Lump sum	-	-	5,00,000	Civil works contract
2	Disposal of all solid wastes during construction to designated locations and/or use of local municipal services	Pre-Construction & Construction	Lump sum	-	-	30,00,000	
3	Provision of all requisite facilities (i.e., drinking water supply, sanitation, domestic solid waste collection & disposal, fuel supply etc.) at construction camps. Decommissioning of construction camp before handling over the subproject.	Construction & Operation	Lump sum	-	-	30,00,000	
4	Provision of Dust screen/tin sheets all around the boundary of the project site	Construction	Lump sum	-	-	15,00,000	
5	Water sprinkling for dust suppression, barricading, temporary noise barriers, and provision of personal protective equipment (such as boots, life-saving-jackets, etc.)	Construction	Lump sum	-	-	25,00,000	
Subtotal (A)						**1,05,00,000**	
B.	**Monitoring Measures**						
1	Air quality monitoring	Construction & Operation	Per sample	64	10,000	6,40,000	Civil works contract
2	Noise levels monitoring	Construction & Operation	Per sample	24	6,000	1,44,000	
3	Surface water monitoring	Construction & Operation	Per sample	8	15,000	1,20,000	
4	Drinking & Ground water monitoring	Construction & Operation	Per sample	14	15,000	2,10,000	
5	Soil monitoring	Construction & Operation	Per sample	8	10,000	80,000	
6	Biodiversity Census & surveys	Construction & Operation	Lump sum	-	-	15,00,000	PISC contract
Subtotal (B)						**26,94,000**	
C.	**Capacity Building**						
1	Training on EMP Implementation, COVID-19 protocols and other health & safety topics, wildlife, first aid, HIV/AIDS etc.	Pre-construction & Construction	Lump sum	-	-	10,00,000	Civil works contract
2	Preparation of plans and protocols (i.e., building plans, fire & safety plan, traffic management plan, waste or spoil management plan, chance find	Pre-construction & Construction	Lump sum	-	-	5,00,000	

Sl. No.	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
	protocol etc., and other relevant activities)						
Subtotal (C)						**15,00,000**	
Total (A+B+C)						**1,46,94,000**	
Miscellaneous, provisional sum and contingency @ 5% of the subtotal						**7,34,700**	
					Grand Total	**1,54,28,700**	

Source: ADB TA Consultant

X. CONCLUSIONS AND RECOMMENDATIONS

261. The conclusions are based on environmental assessment carried out for the proposed hostel under proposed ADB CRBFRERMP. All potential impacts associated with proposed hostel works were identified in relation to pre-construction, construction, and operation phases. The hostel is considered as environmental category B under ADB SPS 2009 and the findings of the IEE study support this categorization as no significant impact are anticipated to be generated from the subproject.

262. Construction activities will be confined to the proposed site behind the Assam Water center in Guwahati in Kamrup Metropolitan District. There will be temporary negative impacts, arising mainly from construction dust and noise, hauling of construction materials, waste and equipment on local roads (traffic, dust, safety etc.), quarrying of construction materials, and occupational health and safety aspects. During the construction phase impacts will arise from the dust and noise, increase in traffic by the construction vehicles, and from the need to dispose of large quantities of wastes. The social impacts (access disruptions) due to construction activities are negligible as the entire site is presently having boundary walls and not accessible to general public. There shall be no impacts on community properties as the entire subproject site belongs to WRD, Government of Assam. No private persons occupies part or whole of the project site presently, either as a squatter or encroacher. General temporary reversible impacts around inhabited subproject area due to setting-up of the construction camp by the contractor are expected, and there are well developed methods of mitigation that are suggested in the EMP. Other specific measures include safe handling of wastes, vegetation removal etc.

263. The subproject area is primarily an urban area and is not located within protected or sensitive environmental areas such as forest areas, WLS and NP, Ramsar wetlands or archeologically protected areas.

264. The nearest protected areas are the Deepor Beel WLS (approximately 11.9 km away from the propsed site) and Amchang WLS, with site being approximately 2.93 km away from the notified Ecological Sensitive Zone (ESZ) of the WLS. The ESZ of Deeport Beel WLS is yet to be notified and thus a 10 km radius from the boundary of the PAs shall be taken as ESZ. Since the site is approximately 11.9 km away from the WLS, it is also outside the ESZ of the WLS. No permissions and clearances from the CWLW and or State Board of are required and no negative impacts on the protected areas are foreseen.

265. As per information made available from IBAT[41], there are 97 IUCN red listed species within 50 km radius of the project area. These includes 12 CR (6 avian, 5 reptilian and 1 mammalian species), 35 EN (2 floral, 1 Arthropoda, 9 reptilian, 2 Pisces, 9 avian and 12 mammalian species) and 50 VU species (2 floral, 1 Arthropoda, 7 reptilian, 6 Pisces, 17 avian and 17 mammalian species). As per the IBAT screening, 1 KBA – Amchang Hills WLS are within 10 km radius of the subproject area. However, no negative impact is anticipated on any endangered species as the works are in the middle of human habitat in the city of Guwahati.

266. No critically endangered, endangered or vulnerable species are found in the near vicinity of the project site and exclusive to the project site. No damage to the habitat of any of these species is anticipated. There are no other environmental sensitive resources found in the project area, which is likely to be affected by the project.

267. Project activities are likely to generate some adverse environmental impacts during construction. However, these will be temporary. Implementation of the prescribed mitigation

[41] IBAT Proximity Report. Generated under licence 5840-42046 from the Integrated Biodiversity Assessment Tool on 14 April 2023 (GMT). www.ibat-alliance.org

measures will minimize impacts. Moreover, the impacts shall be monitored continually by implementing the EMP and EMoP.

268. The project is welcomed by all the stakeholders who were involved in developing the IEE through face-to-face discussions. Views expressed by the stakeholders were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the PMU and ADB websites. The consultation process will be continued during project implementation to ensure that stakeholders are engaged in the project and have the opportunity to participate in its development and implementation. The project's grievance redress mechanism will provide the citizens with a platform for redress their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

269. There is a possibility that the subproject area may be affected by the impacts of extreme climate events and other natural hazards including major earthquakes. While the impacts of these events may well extend beyond the economic life of the subproject investments (about 30 years), available study indicates the possible climate change impact of increased precipitation by up to 30% in the north-eastern region by 2040-60, although diverse anticipation still coexists. The building shall be built as per the National Builiding Code 2016 and after obtaining all relevant permisisons from the GMDA, GMC and Fire & Energency Services Department taking into the seismological hazard (entire Assam is in Zone V or the highest risk zone from earthquakes).

270. Though the impact of COVID-19 pandemic has subsided with a sustained vaccination campaign and following of appropriate behavior. The recurrence of pandemic like situation cannot be ruled out. In case of recurrence of the COVID-19 pandemic in India the local community members involved in project activities may be at a heightened risk of virus exposure. Project shall also adhere to necessary protocols in response to infectious diseases such as the corona virus disease (COVID-19) consistent with the guidelines of relevant government healthcare agencies and the World Health Organization.

271. The IEE and EMP will be included in the bid and contract documents to ensure compliance with the conditions set out in this document. The EMP will assist the PMU, PISC, and contractors in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. The EMP will also ensure efficient lines of communication between PMU, PISC, and contractor. The EMP shall be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance. Copy of the EMP will be kept on site during the construction period at all times.

272. It is expected that the proposed ostel will be filling up the present lacuna and provide quality accommodation to the trainees (officials and staff of Water Resource Department). This shall offer quality training ambience for the trainees and help them in getting gainful training to upgrade their skills related to water resources and flood risk management. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigation measures and environmentally sound engineering and construction practices. To conform with government guidelines all necessary permissions and NOCs are to be obtained from the concerned departments prior to start of construction.

273. This IEE shall be updated by FREEMA (PMU) and WRD (PIU) to reflect the final design and scope of works of the proposed hostel, and will be reviewed and approved by ADB. Where unanticipated environmental impacts become apparent during subproject implementation, this IEE will be updated and its EMP, or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

Appendix 1: Summary of Flood and Riverbank Erosion Assets to be Constructed

Type of Work	Dibrugarh (Including Tinsukia district)	Morigaon	PGP/Guwahati West	Goalpara	Total Project
New Embankment (km)	1.20	0.00	0.00	2.08	**3.28**
Upgrading Embankment (km)	0.00	1.15	0.00	0.00	**1.15**
Riverbank Revetment (km)	21.26	15.65	11.54	11.35	**59.80**
Adaptation Works/Emergency contingency (km)	4.65	0.25	8.75	0.25	**13.90**
Porcupine screen (no.)	173	7	8	6	**194**
Porcupine screen (km)	24.1	1.0	2.7	4.5	**32.3**
Regulator (no.)	1	0	0	3	**4**
Fish pass (no.)	1	0	0	0	**1**
Other works	• Revival of Maijan beel with nature-based solutions	-	• Pump house at Palashbari • Hostel for trainees next to Assam Water Center in Guwahati	-	**As listed**

Appendix 2: Details of Scope of Works

Subproject	New Embankments (km)		Upgrading Embankments (km)		Riverbank Revetments (km)		Adaption Works/Emergency contingency (km)		Porcupine screen (no.)	Porcupine screen (km)	Regulator (no.)		Fish pass (no.)	Other works
Dibrugarh (including Tinsukia district)	Close gap in embankment at Maijan Beel	1.20	0		Nagaghuli to Kachari Line	0.90	Kasuoni	1.00	173	24.1	RCC triple shutter sluice gate in Maijan Beel embankment	1	1	Revive of Maijan beel with nature based solutions
					Filunuguri to 7400 ft Spur	1.70	Mothola	2.40						
					DTP Dyke (Dibrugarh Town Area)	3.93	DTP dyke	1.00						
					DTP Dyke (Amoraguri)	0.27	Emergency	0.25						
					Mohanaghat	0.78								
					Nagakhelia	0.60								
					Chaulkhowa at D/S of Bogibeel Bridge	3.69								
					Milanpur to Hatighuli	1.50								
					Pheliai to Naokota	2.00								
					Gariating Gaon	0.40								
					Simaluguri Satra	0.40								
					Bahjan to Notun Gaon	2.10								
					upstream Guijan	0.30								
					Rungagorah to Dinjan	2.70								
Subproject Total	1.20		0		21.26		4.65		173	24.1	1		1	
Morigaon	0		Shifting/widening existing embankment at Kuptimari	0.70	Mikirgaon-Kathani-Tengaguri area	7.50	Emergency	0.25	7	1.0	0		0	
					Kuptimari-Balidunga area	1.90								
					Upstream of Panchali spur	0.25								
			Chutiagaon spur recoupment	0.45	Downstream of Panchali spur to Baralimari	2.00								
					Gagalmari-Garubandha area	4.00								
Subproject Total	0		1.15		15.65		0.25		7	1.0	0		0	

Subproject	New Embankments (km)		Upgrading Embankments (km)	Riverbank Revetments (km)		Adaption Works/Emergency contingency (km)		Porcupine screen (no.)	Porcupine screen (km)	Regulator (no.)		Fish pass (no.)	Other works
PGP/Guwahati West	0		0	Kalitapara	0.80	Palashbari	3.50	8	2.7	0		0	Pump house at Palishbari Hostel for trainees next to Assam Water Center in Guwahati
				Futuri	1.45	Guwahati West	5.00						
				Simina	0.64								
				Guimara	0.20								
				Gumi	0.85	Emergency	0.25						
				Borakhat	3.90								
				Panikhaity	1.10								
				Lotordia	2.60								
Subproject Total	**0**		**0**	**11.54**		**8.75**		**8**	**2.70**	**0**		**0**	
Goalpara	Embankment Goalpara town	2.08	0	Goalpara Town Two stretches, 2.35 km - Baladmari 3.00 km - Goalpara (geobags with PCC blocks)	5.35	Emergency	0.25	6	4.50	Goalpara town (1 shutter sluice and 4 shutters sluice)	2	0	
				Chinair to Jaleswar	6.00					Chunari (4 shutters)	1	0	
Subproject Total	**2.08**		**0**	**11.35**		**0.25**		**6**	**4.50**	**3**		**0**	
Project Total	**3.28**		**1.15**	**59.80**		**13.90**		**194**	**32.30**	**4**		**1**	**As above**

Appendix 3: Rapid Environmental Assessment (REA) Checklist

ADB
Asian Development Bank

Memorandum

South Asia Department
Environment, Natural Resources and Agriculture Division

2 December 2022

To: Bruno Carrascosa 8-Dec-22
Director General concurrently Chief Compliance Officer, SDCC

Through: Bruce Dunn
Director, SDSS 8-Dec-22

Mio Oka (e-signed 2 December 2022)
Director, SAER

From: Olivier Drieu (e-signed 2 December 2022)
Senior Water Resources Specialist, SAER

Subject: **56283-001 India: Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam** — *Request for Approval of Environment Categorization*

Attached for your review and approval:

1. Environment (B)
2. REA Checklist
3. Climate Screening Checklist
4. COVID-19 Checklist for Environment

cc: B. Angeles, SAER; O. Joyce, SAER

ENVIRONMENT CATEGORIZATION

Date: 2 December 2022

A. Instructions

(i) The project team completes and submits the form to the Safeguards Division (SDSS) for endorsement by SDSS Director, and for approval by the Chief Compliance Officer (CCO). OM F1/OP on *Safeguard Review Procedures* (paras. 4–7) provides the requirements on environment categorization.
(ii) The classification of a project is a continuing process. If there is a change in the project components or/and site that may result in category change, the Sector Division submits a new form and requests for recategorization, and endorsement by SDSS Director and by the CCO. The old form is attached for reference.
(iii) In addition, the project team may propose in the comments section that the project is highly complex and sensitive (HCS), for approval by the CCO. HCS projects are a subset of Category A projects that ADB deems to be highly risky or contentious or involve serious and multidimensional and generally interrelated potential social and/or environmental impacts.

B. Project Data

Country/Project No./Project Title	:	IND: Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam
Department/ Division	:	South Asia / Environment, Natural Resources and Agriculture
Processing Stage	:	Project Concept Paper
Modality	:	

[x] Project Loan [ ] Program Loan [ ] Financial Intermediary [ ] General Corporate Finance
[ ] Sector Loan [ ] MFF [ ] Emergency Assistance [ ] Grant
[ ] Results-based lending[1] [ ] Other financing modalities

C. ENVIRONMENT CATEGORY [PLEASE TICK ONE CATEGORY BASED ON THE SET OF CRITERIA IN OMF1 (PARAS. 6–7)]

[X] NEW [ ] RECATEGORIZATION — PREVIOUS CATEGORY [ ]

[ ] Category A	[x] Category B	[ ] Category C	[ ] CATEGORY FI

D. Basis for Categorization/ Recategorization (please. attach supporting documents):

[x] REA Checklist
[x] Project and/or Site Description
[ ] Other: _____

E. Comments

Project team comments:	SDSS Comments:
The project aims to reduce economic vulnerability and social disruption induced by flood and riverbank erosion flood prone areas along the main stem of the Brahmaputra River in Assam. It will (i) stabilize identified critical locations within four river reaches by providing integrated climate resilient riverbank erosion and flood protection infrastructure to ultimately recover lost floodplain and charland and enhance navigation; (ii) strengthen institutional capacity; and (iii) support improved livelihoods of the most vulnerable riparian population and increase their resilience to shocks through inclusive economic empowerment. The project is categorized as "*B*". Subproject areas are in rural parts of Assam. No key biodiversity areas or national protected areas nearby the subprojects. None of the project components will have significant adverse environmental impacts because environmental risks are mostly temporary on air, water, soil and noise during construction periods. Mitigation measures will be	Based on the information provided during the categorization process the Category B for Environment can be confirmed. However, given the sensitivity of the Brahmaputra River which supports significant biodiversity interest and is itself a Key Biodiversity Area in a number of locations – further Critical Habitat Assessment needs to be done to establish whether CH is triggered for the areas where the works will be and to confirm that works must be done in a sensitive way to maintain water quality and flow. Given the size of the river in the relevant locations it seems unlikely that project risks will be significant. However detailed information in the EMP will be needed to ensure that project activities do not impact on the river.

[1] For Results-Based Lending (RBL) modality, please refer to the Staff Instruction on Business Processes for RBL for Programs issued on 17 March 2021. The supplemental checklist needs to be submitted to SDSS for confirmation of eligible activities under the RBL program by the CCO.

readily available and compliant with international standards and practices.	Nature-based Solutions should be explored as part of the schemes which appear to be largely traditional hard engineering solutions in the information provided. Duncan Lang Senior Environment Specialist, SDSS 08/12/22

F. Approval

Proposed by: **(e-signed 2 December 2022)** Olivier Drieu, Senior Water Resources Specialist SARD/SAER Project Team Leader Date: 2 December 2022	**Endorsed by**: Bruce Dunn, Director, SDSS Date: 8 December 2022	
(e-signed 2 December 2022) Brando M. Angeles, Associate Environment Officer SARD/SAER Date: 2 December 2022 **Endorsed by**: **(e-signed 2 December 2022)** Mio Oka, Director, SAER Date: 2 December 2022	**Approved by**: Bruno Carrasco Director General, SDOD concurrently Chief Compliance Officer Date: 8 December 2022	☐ Highly Complex and Sensitive Project

Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (SDES), for endorsement by Director, SDES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: **India: Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam**

Sector Division: SAER/SARD

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site	✓		There is no cultural heritage site in the subproject areas. All the project related activities will be confined within 20-30m of right of way (RoW). However, there are temples, mosque (i.e. Namghar) in nearby villages with human settlements.
▪ Legally protected Area (core zone or buffer zone)		✓	Subproject areas do not fall into any core zone or buffer zone of legally protected area. In Morigaon subproject area, Orang National Park is located on the other side (ie: north bank) of the Brahmaputra River at an aerial distance of approximately 10 km. Pobitora Wildlife Sanctuary is located approximately 4 km from the end point of the reach downstream towards countryside. Moreover, the subproject area and the wildlife sanctuary are separated by human settlements, state highways and other human activities. Since the project related activities will be within the RoW at the southern bank of the Brahmaputra River, these areas will not have any impact that could potentially be caused by project activities. For the Dibrugarh subproject, the Dibru-Saikhowa National Park is more than 15 km upstream of the location of the proposed anti-

Screening Questions	Yes	No	Remarks
			erosion measures. The other proposed measures are located downstream of these anti-erosion measures. Thus, all the proposed works do not fall into any core zone nor buffer zone of the legally protected area.
▪ Wetland	✓		The subproject areas do not fall under any perennial wetlands. However, there are many wetlands and waterbodies nearby subproject areas, which become active during the rainy season.
▪ Mangrove		✓	Subprojects are not located along any coastal zones. Hence no such sensitive ecosystems exist nearby.
▪ Estuarine		✓	
▪ Special area for protecting biodiversity		✓	Target sites are not adjacent to or within any special area for biodiversity protection. At Palasbari-Gumi-Guwahati West subproject, vegetation cover exists along the highland of the Dakhala area which is a reserve forest. However, the project related activities for riverbank protection works will be limited to adjacent land along the riverbanks. Hence, no project impacts on the reserve forest are anticipated. Please see remarks above for the legally protected areas related to Dibrugarh and Morigaon subprojects.
B. Potential Environmental Impacts Will the Project cause…			
▪ impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		✓	There are neither historical sites nor cultural areas in any of the four subproject areas.
▪ disturbance to precious ecology (e.g. sensitive or protected areas)?		✓	The project activities in the subproject areas will not cause disturbance to precious ecology such as sensitive or protected areas.
▪ alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?		✓	The project activities in the subproject areas will not cause alteration of surface water hydrology of waterways by increased soil erosion at construction sites. Overall, the project activities, including launching of geotextiles bags, etc., will mitigate riverbank erosion and enhance land reclamation in the vicinity of the subproject sites.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	✓		Worker–based camps will be established away from the main channel towards country-side. These camps will generate minimal sanitary waste. Potential contamination of water induced by camp operations is expected, however these impacts are of local and temporary nature (i.e., during the construction periods only). Chemicals will not be used during the construction activities.
▪ increased air pollution due to project construction and operation?	✓		During the construction periods, increase of the air pollution may result due to construction activities such as movements of vehicles, potential use of generators in workers camps, etc..
▪ noise and vibration due to project construction or operation?	✓		The project activities are expected to increase noise and vibration levels

Screening Questions	Yes	No	Remarks
			associated with use of construction machineries (geotextile bags stitching machines, use of generators in workers camps) and use of vehicles.
▪ involuntary resettlement of people? (physical displacement and/or economic displacement)	✓		The project activities will be focused on the existing underwater and and immediate vicinity of above water bank of the Brahmaputra River. Hence, physical displacement and resettlement of people living on some of the embankments targeted under the project will be needed for their rehabilitation. Details will be confirmed after the Poverty and Social Impact Assessment studies during the project preparation stage.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Disproportionate impacts on the poor, women, children, indigenous peoples or other vulnerable groups are not anticipated due to the project activities. The project includes an output to specifically address people living on the embankments or chars in the subproject areas who are poor and destitute and negatively affected by river erosion or floods, especially women in these locations. After completion of the works in the subproject areas, there will be growth in economic activities in the area benefitting all riparian population.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?	✓		Establishment of construction camps will temporarily add to the population in the subproject areas and likely to have poor sanitation and solid waste disposal in the camps and work sites, where transmission of communicable diseases from workers to local populations are possible. As the workers are expected to be from the same or adjacent districts within the state which will maintain cultural balance among the workers and local populations.
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	✓		The project activities will not directly create any breeding habitats for diseases such as those transmitted by the mosquitoes and rodents. However, improper disposal of domestic solid waste generated by workers camps can provide suitable conditions for rodents and mosquitoes.
▪ social conflicts if workers from other regions or countries are hired?		✓	Workers will be recruited by the contractors from the same or adjacent districts.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Large population of workers is not expected considering the limited scope of works. Most of the labors will be hired locally and a few some may be from the nearby districts.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	✓		There are risks and vulnerabilities related to occupational health and safety due to physical hazards during construction.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	No explosive will be used for any of the works. Fueling of vehicles used for the project purpose will be undertaken in the public gasoline stations.

Screening Questions	Yes	No	Remarks
• community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		During the construction phase, health and safety risk of nearby communities may have increase due to the operations of vehicles and machines.
• generation of solid waste and/or hazardous waste?	✓		Worker camps and storage facilities will only generate solid waste.
• use of chemicals?		✓	Chemicals will not be used for any of the project activities.
• generation of wastewater during construction or operation?	✓		During construction periods, worker camps will generate some wastewater.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: India: Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam

Sector : Environment, Natural Resources and Agriculture

Subsector: Rural flood protection; Rural water policy, institutional and capacity development

Division/Department: SAER, SARD

Screening Questions		Score	Remarks[1]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	Not likely. There is no alternative options for the subproject sites.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	2	Trends of increased 24-hour rainfall events and number of rainy days (ie: rainfall greater than 2.4 mm in 24 hours) have been observed and projected in Assam that could result in increases of river discharges and riverbank erosion rates associated with highly turbulent flows reaching the deeper levels of the river. The crest levels of the flood embankment to be built/rehabilitated will be derived from peak flood water levels and peak wind generated wave heights. Both of these may increase in the future. Additionally, with climate-induced increased discharges, current loading may increase. The design of the underwater and riverbank protection works will include parameters such as high flood levels and river flow velocity.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of	1	Increase in flood water levels and more intense rainfall in the project area beyond the anticipated and designed levels will require higher embankments to provide the same level of protection. Also, increased river discharges and flow velocities induced by

[1] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

	project inputs over the life of project outputs (e.g. construction material)?		climate change may result in increased scouring, hence in increased scour protection elements along the riverbanks.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	2	The predicted increase in peak levels and volume of floods due to climate change will require more frequent monitoring, repair and maintenance activities by Water Resources Department and communities, as well as appropriate operation and maintenance budgets.
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	2	The predicted increase in peak levels and volume of floods due to climate change over the 30 years design life span of the assets poses threat to the communities behind the flood embankments. Activities under the project will include riverbank protection and flood embankments works as well as community-based flood risk management capacity building to increase resilience to flood and erosion and enable the communities to adapt to and be better prepared against the challenges of extreme flood events.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): High

Other Comments:_____

_____

(e-signed 2 December 2022)
Prepared by: Olivier Drieu

PROJECT DESCRIPTION
INDIA: CLIMATE RESILIENT BRAHMAPUTRA INTEGRATED FLOOD AND RIVERBANK EROSION RISK MANAGEMENT PROJECT IN ASSAM

Rationale

Combining structural and nonstructural measures, the project will be implemented in four high-priority flood- and erosion-prone subproject areas selected to contribute to the broader stabilization of the Baramaputra River in Assam.[1] The project will (i) stabilize identified critical locations within the four river reaches by providing integrated climate resilient riverbank erosion and flood protection infrastructure to ultimately recover lost floodplain and charland and enhance navigation2; (ii) strengthen the institutional capacity for climate and disaster resilient FRERM supported by an enhanced knowledge base to inform risk-based decisions related to disaster prevention and asset maintenance; and (iii) support improved livelihoods of the most vulnerable riparian population and increase their resilience to shocks through inclusive economic empowerment.

The project will focus on priority river reaches of the Brahmaputra Main Stem (Figure 1), and will inlcude a full range of structural and nonstructural measures in each reach.

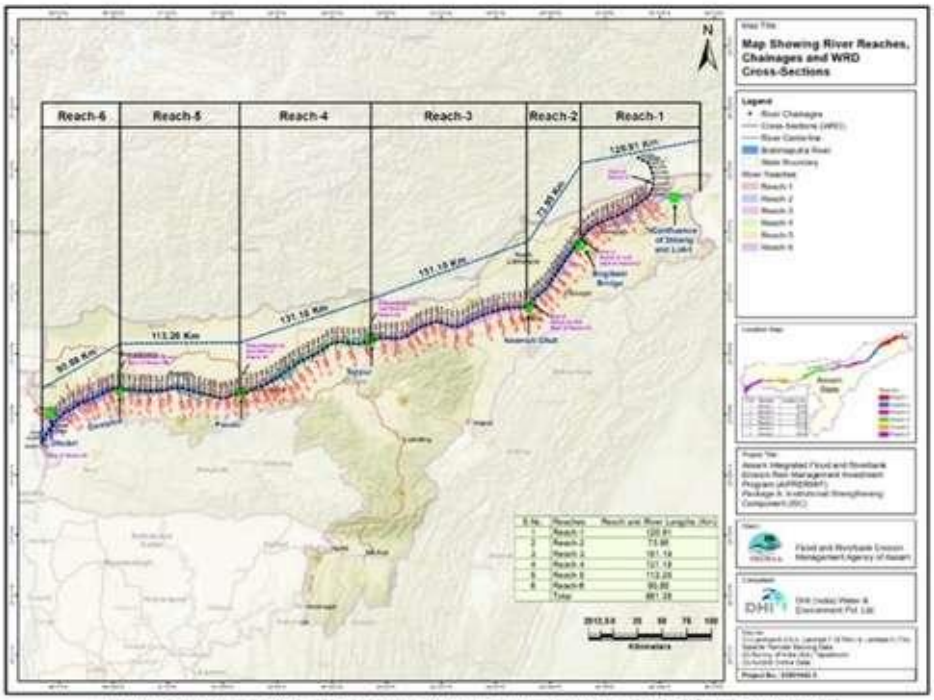


Figure 1. Map of the Reaches of the Brahmaputra Main Stem in Assam

Structural Measures

Riverbank protection. To cope with riverbank erosion on the Brahmaputra Main Stem, the project will dominantly follow the ADB-financed Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program (AIFRERMIP)[3] approach of building long-guiding geotextile sand-filled bags (geo-

[1] The four high-priority subprojects are Dibrugarh, Morigaon, Palasbari-Gumi-Guwahati West, and Goalpara.
[2] An accretion in a river, the chars are valuable to the economy as additional cultivable areas.
[3] The multitranche financing facility (MFF) to India for the Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program was approved by ADB in 2010 to increase the reliability and effectiveness of flood

bags) revetments in an adaptive way. These combine the stabilization of riverbanks at erosion locations and guide the river over some length, hence contributing to larger river stabilization. Also, activities will include provisions for adaptation of existing Water Resources Department (WRD) and AIFRERMIP works in the selected reaches to accelerate the stabilization process of longer river reaches.

Flood embankments. The project will aim at providing riverbank protection first, and then building/rehabilitating climate-resilient modern multi-purpose flood protection embankments, including systematic geotechnical engineering to reduce future risk of breaches. Multi-purpose embankments are primarily characterized by separating the flood protection function (through a separate crest at the river side) and the transport function (through a road on a lower lying land-sided shoulder). The embankment design will be based on morphological river modelling accounting for a range of possible river morphologies which could result in different flood water levels for the same return periods.

Land reclamation via channel closures. Land reclamation benefits are important aspects to enhance socio-economic development, especially in the Dibrugarh and Palasbari-Gumi reaches. It will be investigated further whether reclamation could also be feasible in other reaches. Land reclamation will involve channel closures through dredging ('sand overloading') and pro-siltation measures ('porcupines') but also bioengineering measures to trap fine sediments during the flood season. The closed channels might be equipped with upstream intakes for a defined water flow to be used for example for wetland conservation/restoration, dry season irrigation purposes, and local drainage.

Ancillary structures. Embankments will be provided with openings ('sluice gates') to enable water to flow onto and from the floodplain. Sluice gates will be provided with fish passes, where required, to enable interconnectivity of floodplain and river and enhance biodiversity.

Nonstructural Measures of the Project

Flood forecasting and early warning. In continuation of AIFRERMIP, State Government of Assam water level forecasting and warning measures will be continued and expanded along the Brahmaputra Main Stem. These measures will be developed in parallel to a World Bank project. The measures to be developed by the project can be integrated later into a comprehensive system for the Brahmaputra floodplain.

Flood mapping. This includes covering the flood and erosion risk, but also providing information, such as inundation (extents, depth, duration), vulnerability to flooding of the affected population and of assets (including critical assets) in urbanized areas (for example Gumi and Dibrugarh). Flood hazard assessment for rural areas will enable to assess the potential of flooding (depth and duration) during different embankment breach scenarios and for different combinations of high river flood levels and rainfall events.

Surveys and river monitoring. The project will establish baseline information through systematic surveys of all river channel in one reach during successive flood seasons[1] and high-resolution topographic surveys providing the baseline digital elevation models or DEM for accurate flood hazard and flood risk assessment. The baseline surveys will also improve the accuracy of the flood forecasting and warning models for the Brahmaputra Main Stem.

Capacity building. The project will support WRD in expanding the capacity of a specialized design wing, including preparation of a guideline for river and flood management measures in Assam. This guideline is expected to accelerate the planning process for riverbank protection in the future and assist the transition from piecemeal work to holistic integrated systematic river stabilization measures.

Erosion prediction model. The model developed under AIFRERMIP will be expanded to incorporate other reaches of the Brahmaputra Main Stem. It is anticipated to conduct annual erosion prediction for the

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and riverbank erosion risk management systems in flood-prone areas in Assam, through structural and nonstructural interventions, policy strengthening, and institutional and knowledge bases. The second and final tranche of the MFF was physically completed on 18 October 2020.

[1] The survey will include bathymetric surveys, water levels, and water and sediment discharge surveys

Brahmaputra Main Stem and to combine the results with inundation maps as a planning tool for the districts and potential emergency works as well as future State Government investments.

Asset management system. The system developed under AIFRERMIP will be expanded to cover the selected river reaches of the Brahmaputra Main Stem. An operation and maintenance module comparing the actual condition of the assets with their design status will enable to derive annually a risk-based prioritized maintenance program and identify rivers sections that require major strengthening or adaptation works.

Community-based flood risk management (CbFRM) and flood shelters. Drawing on the experience and lessons learned under AIFRERMIP, activities will focus on disaster preparedness of riparian communities as well as population located behind flood embankments (which can breach). In areas not embanked, the construction of flood shelters and disaster-resilient access to them will be investigated further for possible incorporation in the project design.

Proposed Subproject Areas

(i) Morigaon Subproject

The proposed subproject area is in Morigaon District of Assam, which is southern bank of Brahmaputra River. The proposed antierosion activities for a length of 37.44km will include mainly launching of geo-bags for riverbank protection works.

The proposed project area does not fall under any eco-sensitive zone. Orang National Park is in the other side of the Brahmaputra at Odalguri district with aerial distance of more than 10km. Pobitora Wildlife Sanctuary is located approximately 4km downstream towards the countryside from the end point of the project locations. There is no animal corridor near the project area.

Pokoriya River flows from the southern side of subproject site. The river confluences with the Brahmaputra River approximately 1km downstream from the end point of the subproject's reach.

Rainy season is from the month of June to October. November to May is the active working season for construction.

Table 1. Geocoordinates[1] and length of the subproject.

Name of Division	Name location/Village	geocoordinates		Reach Length (m)
		From	To	
Morigaon	Chutiagaon to Teteligurin(Near Kasasila)	26°26'21.04"N 92°20'0.44"E	26°16'35.96"N 92° 3'17.85"E	37,440

[1] The details are yet to be endorsed by the WRD.

Figure 2. Map (Google Earth) of the subproject site showing the starting and end points at Morigaon Subproject.

(ii) Palasbari-Gumi Subproject

With 4 reaches for antierosion works, the Palasbari-Gumi (PGP) proposed subproject area is located at Kamrup District as well. The target reaches under the subproject are approximately 25km from Guwahati. The proposed activities will have a length of 3.09km and include launching of geo-bags as river bank protection works. Vegetation cover exists along the Dakhala reaches which is a highland area in the bank of Brahmaputra River. Rests of the three reaches are located mainly in the sandbar of the Brahmaputra with very minimal vegetation. Human settlements are adjacent in the subproject area towards southern direction. The proposed project site does not fall under any eco-sensitive zone. There is no dedicated animal corridor near the project area.

Table 2. Geocoordinates and length of the subproject area

Name of Division	Name location/Village	Co-ordinate		Reach Length (m)
		From	To	
PGP	Dakhala (Kalitapara)	26°7'3.10"N	26°7'1.08"N	800.00
		91°30'49.7"E	91°30'24.82"E	
	Guimara	26°7'2.3"N	26°7'1.9"N	200.00
		91°28'9.7"E	91°28'13.8E	
	Simina	26°7'17.9"N	26°7'21.5"N	640.00
		91°27'23.6"E	91°27'8.4"E	
	Makadhuj to Futuri	26°7'41.6"N	26°7'28.5"N	1450.00
		91°26'3.3"E	91°26'43.8"E	

(a) (b)

(c)

Figure 3. Location map of: (a) Dakhala Reach, (b) Guimara Reach and (c) Simina and Makadhuj-Futuri Reaches.

(iv) Dibrugarh Subproject

For the Dibrugarh Subproject, there are 7 reaches for antierosion works and 1 reach for earthworks with triple shutter reinforced concrete (RCC) sluice gate. The proposed reaches under the are located approximately 25km from Guwahati. The proposed antierosion activities (i.e.14.88km) will include launching of geo-bags and geo matress for riverbank protection works. The reach for earthworks (with three shutter RCC sluice gate) will cover 1200m of embankments.

Dibru-Saikhowa National Park is 15km upstream of antierosion of Reach-1. The rest of reaches are downstream of the Reach-1, thus, all the reaches under the subprojects does not fall into any core zone of buffer zone of legally protected area. The proposed project site does not fall under any eco-sensitive zone.

Table 4. Geocoordinates and length of the subproject area

Name of Division	Name location/Village	Co-ordinate		Reach Length (m)	Remarks
		From	To		
Dibrugarh (Guijan to Mohanghat	Reach-1	27°31'33.01"N	27°30'54.34"N	3500	Geo-bags
		95° 0'41.88"E	94°58'43.77"E		
	Reach-2	27°30'54.34"N	27°30'43.54"N	1500	Geo-bags
		94°58'43.74"E	94°57'55.00"E		
	Reach-3	27°30'24.30"N	27°29'32.91"N	3925	Geo Mattress
		94°57'7.84"E	94°55'6.32"E		
	Reach-4	27°28'48.73"N	27°28'42.67"N	265	Geo Mattress
		94°53'34.94"E	94°53'28.25"E		
	Reach-5	27°28'28.43"N	27°28'10.00"N	785	Geo-bags
		94°53'8.96"E	94°52'50.44"E		
	Reach-6	27°27'47.68"N	27°27'37.74"N	600	Geo-bags
		94°52'17.05"E	94°51'58.89"E		
	Reach-7	27°23'14.86"N	27°21'9.07"N	4300	Geo-bags
		94°46'21.85"E	94°45'48.73"E		
	Reach-1	27°30'37.60"N	27°30'26.04"N	1200	Earth Work with Triple Shutter RCC Sluice
		94°57'51.68"E	94°57'12.67"E		

(a)

(b)

(iii) Guwahati West Subproject

With 4 reaches for proposed antierosion works, the subproject area is located at Kamrup District of Assam. In the southern bank of Brahmaputra River, target reaches Guwahati West subproject are located approximately 40km from Guwahati.

For a length of 8.45km, proposed activities will include mainly launching of geo-bags for river bank protection works. All 4 reaches are located mainly in the sandbar of the Brahmaputra River with very minimal vegetation. Human settlements are adjacent to these locations, and towards the southern direction. The proposed subproject area have no eco-sensitive zone nor animal corridor nearby.

Table 3. Geocoordinates and length of the subproject area

Name of Division	Name location/Village	geocoordinates		Reach Length (m)
		From	To	
Guwahati West	Gumi	26° 5'55.4"N	26° 5'56.5"N	850
		91°20'26.1"E	91°20'18.7"E	
	Borakhat & Achalpara	26° 6'45.31"N	26° 7'40.31"N	3900
		91°15'6.97"E	91°12'57.75"E	
	Panikhaity	26° 9'15.87"N	26° 9'22.19"N	1100
		91°10'25.72"E	91° 9'40.51"E	
	Lotordia NC	26° 9'28.28"N	26° 9'59.59"N	2600
		91° 9'10.73"E	91° 7'48.01"E	

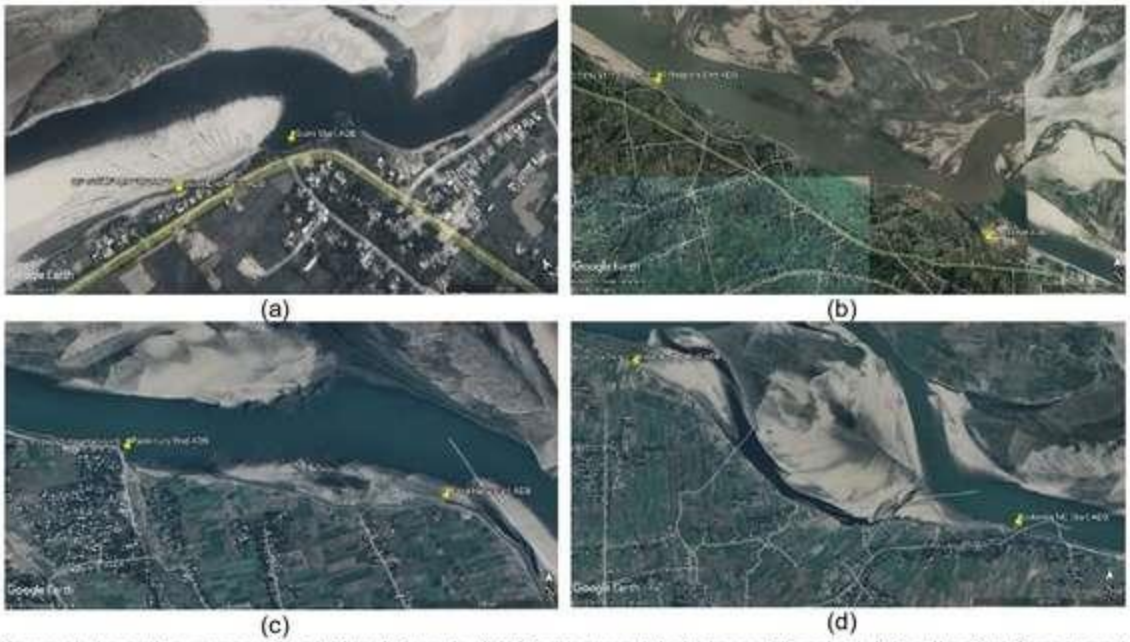


Figure 4. Location maps of: (a) Gumi Reach, (b) Borkhat and Achalpara Reach, (c) Panikhaity Reach and (d) Lotordia NC Reach

Figure 5. Location maps of: (a) Reaches 1 and 2, and Earthworks in Reach-1, (b) Reach-3, (c) Reach-4, (d) Reach-5, (e) Reach-6, and (f) Reach-7

Figure 6. Dibru-Saikhowa National Park and Dibrugarh Subproject reaches

Risk Screening for Environmental Safeguards Assessment during the COVID-19 Pandemic

- This risk screening form must be submitted for projects under preparation and with Management Review Meeting (MRM) or Staff Review Meeting (SRM) planned on or after 1 July 2021.
- If the environment categorization form of the project has already been approved by the Chief Compliance Officer (CCO), project teams must submit only this risk screening form. Project teams do not need to resubmit the environment safeguard categorization forms.
- For projects that have not submitted the environment categorization forms to SDCC, project teams must complete this risk screening form and submit it together with the Environment categorization form.

PROJECT DATA	
Country/Project Title:	IND: Climate Resilient Brahmaputra Flood And Erosion Risk Management Project
Sector Division:	South Asia Department (SARD) / Environment, Natural Resources and Agriculture Division (SAER)
	(e-signed 2 December 2022) Olivier Drieu Senior Water Resources Specialist SARD/SAER 2 December 2022
	(e-signed 2 December 2022) **Brando M. Angeles** Associate Environment Officer SARD/SAER 2 December 2022
Endorsed by:	**(e-signed 2 December 2022)** **Mio Oka** Director SARD/SAER 2 December 2022

Table 1: Project COVID-19 Risk Screening for Environmental Safeguards Assessments

Risk screening questions	Yes	No	Not sure	Remarks
1. Will project preparation be affected by the inability of experts/consultants, to visit the project site because of the pandemic?		✓		Flood and River Erosion Management Agency of Assam (FREMAA) staff and its environment specialist (consultant) have no concern on visiting the subproject sites, perform environmental risks screening and collect relevant information for categorizing the project.
2. Is the project likely to face challenges in achieving meaningful consultations because of the pandemic? If yes, please clarify the types of consultations to be affected and at what stages of environmental safeguards planning and implementation. *Examples: Project consultants are unable to travel to the project site and meet with project stakeholders. Face to face consultations with project affected people cannot be organized due to travel restrictions or social distancing requirements.*		✓		There is no perceived issue on achieving meaningful consultations in the near future.
3. Is the project likely to face challenges in preparing safeguards assessments/planning instruments and/or implementing environmental safeguards plans because of the pandemic? Please be as specific as you can in the remarks section. *Example: Collection of environmental baseline data is not possible as consultants are unable to travel and conduct field studies.*		✓		Currently, there are no concerns for preparing safeguards assessment. FREMAA and their experts can perform due diligence and environmental assessments during project processing phase.

Note.

- *If the answer is "no" to all three questions, project teams may continue preparing the project following standard methods of due diligence.*
- *If the answer is "yes" or "not sure" to any of the questions above, the project teams must follow Figure 2 of the Guidance Note on Safeguards Compliance during the COVID-19 Pandemic during further steps of project preparation.*
- *For further detailed guidance, please refer to the Guidance Note on Safeguards Compliance during the COVID-19 Pandemic*

Additional comments from the Project Team (if any)

Currently, there are no perceived challenges on achieving the requirements of ADB SPS 2009. In case of any challenges to achieve SPS 2009 in the near future, FREMAA will utilize adaptive mechanisms to perform public consultations, collection of environmental baseline information, and environmental risks analysis of the project.

SDSS Comments

No issues identified.

Duncan Lang
Senior Environment Specialist
Date: 8 December 2022

Endorsed by:

Bruce Dunn
Director, SDSS
Date: 8 December 2022

Appendix 4: National and International Environmental Quality Standards and Guidelines

NATIONAL ENVIRONMENTAL QUALITY STANDARDS

National Ambient Air Quality Standards

Pollutants	Time-weighted average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Areas (notified by Central Government)	
Particulate Matter (size less than 10 µm) or PM_{10} µg/m_3	Annual*	60	60	• Gravimetric • Tapered Element Oscillating Microbalances (TOEM) • Beta attenuation
	24 hours**	100	100	
Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ µg/m_3	Annual*	40	40	• Gravimetric • TOEM • Beta attenuation
	24 hours**	60	60	
Sulphur Dioxide (SO_2) µg/m3	Annual*	50	20	• Improved West and Gaeke • Ultraviolet fluorescence
	24 hours**	80	80	
Nitrogen Dioxide (NO_2) µg/m_3	Annual*	40	30	• Modified Jacob and Hochheiser (Na-Arsenite) • Chemilumiscence
	24 hours**	80	80	
Carbon Monoxide (CO) (mg/m3)	8 hours**	2	2	• Non-Dispersive Infra-Red (NDIR) spectroscopy
Ozone (O_3) µg/m_3	8 hours**	100	100	• UV photometric • Chemiluminescence • Chemical Method
	1 hour**	180	180	
Lead (Pb) µg/m_3	Annual*	0.5	0.5	• Atomic Absorption Spectrophotometry/ Inductively Coupled Plasma (AAS/ICP) method after sampling on EPM 2000 or equivalent filter paper • Energy Dispersive X-ray Fluorescence (ED-XRF) using Teflon filter
	24 hours**	1	1	
	1 hour**	4	4	
Ammonia (NH3) µg/m_3	Annual*	100	100	• Chemiluminescence • Indophenol Blue Method
	24 hours**	400	400	
Benzene (C6H6) µg/m_3	Annual*	5	5	• Gas chromatography based continuous analyzer • Adsorption and Desorption followed by Gas Chromatography (GC) analysis
Benzo(a) Pyrene Particulate Phase only	Annual*	1	1	• Solvent Extraction followed by High performance liquid chromatography (HPLC)/ GC analysis

Pollutants	Time-weighted average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Areas (notified by Central Government)	
ng/m_3				
As ng/m_3	Annual*	6	6	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
Ni ng/m_3	Annual*	20	20	• AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week, 24 hourly at uniform interval.; ng: nano gram

** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be compiled with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or monitoring and further investigation.

Source: MoEFCC Notification dated 16 November 2009

Emission Standards for Diesel Engines ≤ 800 kW for DG sets (2014)

Power Category	Emission limits (g/kW-hr)			Smoke Limit (Light absorption coefficient, m-1)
	CO	NOx + HC	PM	
P ≤ 19 kW	≤ 3.5	≤ 7.5	≤ 0.3	0.7
More than 19 kW up to 75 kW	≤ 3.5	≤ 4.7	≤ 0.3	0.7
More than 75 kW up to 800 kW	≤ 3.5	≤ 4.0	≤ 0.2	0.7

Notes:

1. The abbreviations used in the Table shall mean as under: NOx – Oxides of Nitrogen; HC – Hydrocarbon; CO – Carbon Monoxide; and PM – Particulate Matter.
2. Smoke shall not exceed above value throughout the operating load points of the test cycle.
3. The testing shall be done as per D2 – 5 mode cycle of ISO: 8178- Part 4.
4. The above-mentioned emission limits shall be applicable for Type Approval and Conformity of Production (COP) carried out by authorised agencies.
5. Every manufacturer, importer or, assembler (hereinafter referred to as manufacturer) of the diesel engine (hereinafter referred to as 'engine') for genset application manufactured or imported into India or, diesel genset (hereinafter referred to as 'product'), assembled or imported into India shall obtain Type Approval and comply with COP of their product(s) for the emission limits which shall be valid for the next COP year or, the date of implementation of the revised norms specified above, whichever earlier. Explanation — The term 'COP year' means the period from 1 April to 31 March.
6. Stack height (in metres), for genset shall be governed as per Central Pollution Control Board (CPCB) guidelines

Source: MoEFCC Notification dated 11th December 2013, g/kW-hr: gram per kilowatt hour

Noise Standards

National Ambient Noise Quality Standards

Category of Area/Zone	Limits in dB(A) Leq	
	Day Time	Night-time
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence Zone	50	40

Note: (1) Day time shall mean from 6.00 a.m. to 10.00 p.m. (2) Nighttime shall mean from 10.00 p.m. to 6.00 a.m. (3) Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority (4) Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

Source: Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended by the Noise Pollution (Regulation and Control) (Amendment) Rules, 2000 vide S.O. 1046(E), dated 22.11.2000 and by the Noise Pollution (Regulation and Control) (Amendment) Rules, 2002 vide S.O. 1088(E), dated 11.10.2002, under the Environment (Protection) Act, 1986.

National Occupational Noise

Occupational permissible exposure limit is permitted to 90 dB(A) for 8 hours/day and shall not be exposed to a noise level exceeding 115 dB(A) at any time. The permissible levels for noise exposure for work zone areas have been prescribed under the Model Rules of the Factories Act,1948:

Peak sound pressure level in dB	Permitted number of impulses or impacts/day
140	100
135	315
130	1000
125	3160
120	10000

Notes: No exposure in excess of 140 dB peak sound pressure level is permitted. For any peak sound pressure level falling in between any figure and the next higher or lower figure as indicated in column 1, the permitted number of impulses or impacts per day is to be determined by extrapolation on a proportionate basis.

Source: https://moef.gov.in/wp-content/uploads/2017/06/moef_gov_in_citizen_specinfo_noise_html.pdf

Total time of exposure to sound pressure level (continuous or a number in dB(A) of short-term exposures) per day, in hours	Sound pressure level in dB(A)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	107
0.25	110

Notes: No exposure in excess of 115 dB(A) is to be permitted. For any period of exposure falling in between

any figure and the next higher or lower figure as indicated in column 1, the permissible sound pressure level is to be determined by extrapolation on a proportionate basis.

Source: https://moef.gov.in/wp-content/uploads/2017/06/moef_gov_in_citizen_specinfo_noise_html.pdf

National Ambient Noise Quality Standards for DG sets

Category	Limits in dB(A) Leq
Diesel generator sets (up to 1000 KVA) manufactured on or after the 1 January 2005 at 1 meter from the enclosure surface	75

Source: Noise Limit for Generator Sets run with Diesel were notified by Environment (Protection) second Amendment Rules vide GSR 371(E), dated 17 May 2002 at serial no.94 and its amendments vide GSR No 520(E) dated 1 July 2003; GSR 448(E), dated 12 July 2004; GSR 315(E) dated 16 May 2005; GSR 464(E) dated 7 August 2006; GSR 566(E) dated 29 August 2007 and GSR 752(E) dated 24 October 2008; G.S.R. 215 (E), dated 15 March, 2011 under the Environment (Protection) Act, 1986

Water Quality Standards

Surface Water Quality Standard

Sl. No.	Designated Best Use	Class of Water	Criteria
1	Drinking Water source (with conventional treatment)	A	• Total Coliform MPN/100 ml shall be 50 or less • pH between 6.5 to 8.5 • Dissolved Oxygen 6 mg/l or more • Biochemical Oxygen demand (BOD) 5 days 20°C 2 mg/l or less
2	Outdoor bathing (organised)	B	• Total Coliform MPN/100 ml shall be 500 or less • pH between 6.5 to 8.5 • Dissolved Oxygen 5 mg/l or more • Biochemical Oxygen demand (BOD) 5 days 20°C 3 mg/1 or less
3	Drinking Water source (without conventional treatment)	C	• Total Coliform MPN/100 ml shall be 5000 or less • pH between 6 to 9 • Dissolved Oxygen 4 mg/l or more • Biochemical Oxygen demand (BOD) 5 days 20°C 3 mg/1 or less
4	Propagation of Wildlife	D	• pH between 6.5 to 8.5 for fisheries • Dissolved Oxygen 4 mg/l or more • Free Ammonia (N) 1.2 mg/l or less
5	Irrigation, Industrial Cooling, Controlled Waste	E	• pH between 6.0 to 8.5 • Electrical Conductivity at 25°C µmhos/cm Max. 2250 • Sodium absorption rations Max. 26 • Boron, Max.2 mg/l

Source: CPCB (1999). Bio mapping of rivers, Parivesh New Letter, 5 (iv), Central Pollution Control Board, Delhi, PP.20.

General Standards for Discharge of Environmental Pollutants: Effluents[42]

Sl. No.	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/coastal areas
1	Colour and odour	All efforts should be made to remove colour and unpleasant odour as far as practicable		All efforts should be made to remove colour and unpleasant odour as far as practicable	All efforts should be made to remove colour and unpleasant odour as far as practicable
2	Suspended solids mg/l, max.	100	600	200	(a) For process wastewater (b) For cooling water effluent 10 per cent above total suspended matter of influent.
3	Particle size of suspended solids	Shall pass 850 micron IS Sieve	-	-	(a) Floatable solids, solids max. 3 mm (b) Settleable solids, max 856 microns
4	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	shall not exceed 5oC above the receiving water temperature	-	-	shall not exceed 5oC above the receiving water temperature
6	Oil and grease, mg/l max,	10	20	10	20
7	Total residual chlorine, mg/l max	1.0	-	-	1.0
8	Ammoniacal nitrogen (N),mg/l, max.	50	50	-	50
9	Total kjeldahl nitrogen (N) ;mg/l, max. mg/l, max.	100	-	-	100
10	Free ammonia (NH3), mg/l, max.	5.0	-	-	5.0
11	Biochemical oxygen demand (3 days at 27oC), mg/l, max.	30	350	100	100
12	Chemical oxygen demand, mg/l, max.	250	-	-	250
13	Arsenic(As).	0.2	0.2	0.2	0.2
14	Mercury (Hg), mg/l, max.	0.01	0.01	-	0.01
15	Lead (Pb) mg/l,	0.1	1.0	-	2.0

42 These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified in Schedule of the Environment Protection Rules, 1989

Sl. No.	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/coastal areas
	max				
16	Cadmium (Cd) mg/l, max	2.0	1.0	-	2.0
17	Hexavalent chro-mium (Cr + 6),mg/l, max.	0.1	2.0	-	1.0
18	Total chromium (Cr) mg/l, max.	2.0	2.0	-	2.0
19	Copper (Cu) mg/l, max.	3.0	3.0	-	3.0
20	Zinc (Zn) mg/l, max.	5.0	15	-	15
21	Selenium (Se)	0.05	0.05	-	0.05
22	Nickel (Ni) mg/l, max.	3.0	3.0	-	5.0
23	Cyanide (CN) mg/l, max.	0.2	2.0	0.2	0.2
24	Fluoride (F) mg/l, max.	2.0	15	-	15
25	Dissolved phos-phates (P),mg/l, max.	5.0	-	-	-
26	Sulphide (S) mg/l, max.	2.0	-	-	5.0
27	Phenolic compounds (C6H50H)mg/l, max.	1.0	5.0	-	5.0
28	Radioactive materials: (a) Alpha emitters micro curie mg/l, max. (b)Beta emitters micro curie mg/l	10-7 10-6	10-7 10-6	10-8 10-7	10-7 10-6
29	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
30	Manganese	2 mg/l	2 mg/l	-	2 mg/l
31	Iron (Fe)	3mg/l	3mg/l	-	3mg/l
32	Vanadium (V)	0.2mg/l	0.2mg/l	-	0.2mg/l
33	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l

Notes:

Annexure 1: the state boards shall follow the following guidelines in enforcing the standards specified under Schedule IV:

The wastewater and gases are to be treated with the best available technology (BAT) in order to achieve the prescribed standards.

The industries need to be encouraged for recycling and reuse of waste materials as far as practicable in order to minimize the discharge of wastes into the environment.

The industries are to be encouraged for recovery of biogas, energy and reusable materials.

While permitting the discharge of effluents and emissions into the environment, State Boards have to take into account the assimilative capacities of the receiving bodies, especially water bodies so that quality of the intended use of the receiving waters is not affected. Where such quality is likely to be affected, discharges should not be allowed into water bodies.

The central and state boards shall put emphasis on the implementation of clean technologies by the industries in order to increase fuel efficiency and reduce the generation of environmental pollutants.

All efforts should be made to remove color and unpleasant odour as far as practicable.

The standards mentioned in this Schedule shall also apply to all other effluents discharged such as mining, and mineral processing activities and sewage.

The limit given for the total concentration of mercury in the final effluent of caustic soda industry, is for the combined effluent from (a) cell house; (b) brine plant; (c) chlorine handling; (d) hydrogen handling; and (e) hydrochloric acid plant.

All effluents discharged including from the industries such as cotton textile, composite woollen mills, synthetic rubber, small pulp & paper, natural rubber, petrochemicals, tanneries, paint, dyes, slaughterhouses, food & fruit processing and dairy industries into surface waters shall conform to the BOD limit specified above, namely, 30 mg/l. For discharge of an effluent having a BOD more than 30 mg/l, the standards shall conform to those given above for other receiving bodies, namely, sewers, coastal waters and land for irrigation.

Bioassay shall be made compulsory for all the industries, where toxic and nonbiodegradable chemicals are involved.

In case of fertilizer industry, the limits in respect of chromium and fluoride shall be complied with at the outlet of chromium and fluoride removal units respectively.

In case of pesticides.

a. The limits should be complied with at the end of the treatment plant before dilution.
b. Bio-assay test should be carried out with the available species of fish in the receiving water, the COD limits to be specified in the consent conditions should be correlated with the BOD limits.
c. In case metabolites and isomers of the pesticides in the given list are found in significant concentrations, standards should be prescribed for these also in the same concentration as the individual pesticides.
d. Industries are required to analyze pesticides in wastewater by advanced analytical methods such as GLC/HPLC.

The chemical oxygen demand (COD) concentration in a treated effluent, if observed to be persistently greater than 250 mg/l before disposal to any receiving body (public sewer, land for irrigation, inland surface water and marine coastal areas), such industrial units are required to identify chemicals causing the same. In case these are found to be toxic as defined in the Schedule-I of the Hazardous Rules, 1989, the state boards in such cases shall direct the industries to install tertiary treatment stipulating time limit.

Standards specified in Part A of Schedule VI for discharge of effluents into the public sewer shall be applicable only if such sewer leads to a secondary treatment including biological treatment system otherwise the discharge into sewers shall be treated as discharge into inland surface waters.

Source: GSR 801 (E), EPA, 1986, dated 31 December 1993

Drinking Water Specifications: IS 10500:2012

Sl. No.	Substance/Characteristics	Requirement (acceptable limit)	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate source	Methods of Test (ref. To IS)	Remarks
Essential Characteristics						
1	Colour, Hazen Units, Max.	5	Above 5, consumer acceptance decreases	15	IS 3025 (Part 4)	Extended to 15 only if toxic substances, in absence of alternate sources.
2	Odour	Agreeable	-	Agreeable	IS 3025 (Part 5)	A test cold and when heated. Test at several dilution
3	Taste	Agreeable	-	Agreeable	IS 3025 (Part 7 & 8)	Test to be conducted only after safety has been established
4	Turbidity NTU, Max.	1	Above 5, consumer acceptance decreases	5	3025 (Part 10): 1984	
5	pH value	6.5 to 8.5	Beyond this range the water will not affect the mucous membrane and/or water supply system	No relaxation	IS 3025 (Part 11)	
6	Total hardness (CaCO3) mg/1, Max.	300	Encrustation in water supply structures an adverse effect on domestic use	600	IS 3025 (Part 21)	
7	Iron (Fe) mg/l Max.	0.3	Beyond this limit taste/appearance are affected has adverse effect on domestic uses and water supply structures and promotes iron bacteria	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (Mn) and iron (as Fe) shall not exceed 0.3 mg/l
8	Chlorides (Cl) mg/1 Max.	250	Beyond this limit, taste corrosion and palatability are affected	1000	IS 3025 (Part 32)	
9	Residual, free chloride, mg/1 Min.	0.2		1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When

Sl. No.	Substance/Characteristics	Requirement (acceptable limit)	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate source	Methods of Test (ref. To IS)	Remarks
						protection against viral infection is required, it should be Min. 0.5 mg/1
Desirable characteristics						
1	Dissolved solids mg/1 Max.	500	Beyond the palatability decreases and may cause gastrointestinal irritation	2000	IS 3025 (Part 16)	
2	Calcium (Ca) mg/1 Max.	75	Encrustation in water supply structure and adverse effects on domestic use	200	IS 3025 (Part 40)	
3	Magnesium (Mg) mg/1, Max.	30	Encrustation in water supply structure and adverse effects on domestic use	100	IS 3025 (Part 46)	
4	Copper (Cu) mg/1 Max.	0.05	Beyond taste, discoloration of pipes, fitting and utensils will be caused beyond this	1.5	IS 3025 (Part 42)	
5	Manganese (Mn) mg/1, Max.	0.1	Beyond this limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures.	0.3	IS 3025 (Part 59)	
6	Sulphate (SO4), mg/1, Max.	200	Beyond this causes gastro-intestinal irritation when magnesium or sodium are present	400	IS 3025 (Part 24)	May be extended up to 400 provided (Mg) does not exceed 30
7	Nitrate (NO3) mg/l, Max.	45	Beyond this methaemoglobinemia take place	No relaxation	IS 3025 (Part 34)	To be tested when pollution is suspected
8	Fluoride (F) mg/1, Max.	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1.5	IS 3025 (Part 60)	To be tested when pollution is suspected
9	Phenolic compounds (C6H5OH) mg/1, Max.	0.001	Beyond this it may cause objectionable taste and odour	0.002	IS 3025 (Part 43)	To be tested when pollution is suspected
10	Mercury (Hg) mg/1, Max.	0.001	Beyond this the	No	IS 3025	To be tested

Sl. No.	Substance/Characteristics	Requirement (acceptable limit)	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate source	Methods of Test (ref. To IS)	Remarks
			water becomes toxic	relaxation	(Part 48)	when pollution is suspected
11	Cadmium (cd), mg/1, Max.	0.003	Beyond this the water becomes toxic	No relaxation	IS 3025 (Part 41)	To be tested when pollution is suspected
12	Selenium, (Se). mg/l, Max.	0.01	Beyond this the water becomes toxic	No relaxation	IS 3025 (Part 56)	To be tested when pollution is suspected
13	Arsenic (As) mg/1, Max.	0.01	Beyond this the water becomes toxic	0.05	IS 3025 (Part 37)	To be tested when pollution is suspected
14	Cyanide (CN) mg/1, Max.	0.05	Beyond this the water becomes toxic	No relaxation	IS 3025 (Part 27)	To be tested when pollution is suspected
15	Lead (Pb), mg/1, Max.	0.01	Beyond this the water becomes toxic	No relaxation	IS 3025 (Part 47)	To be tested when pollution is suspected
16	Zinc (Zn) mg/1, Max.	5	Beyond this limit it can cause astringent taste and an opalescence taste and an opalescence in water	15	IS 3025 (Part 49)	To be tested when pollution is suspected
17	Anionic detergents (MBAS) mg/1, Max.	0.2	Beyond this it can cause a light froth in water	1	Annex K of IS 13428	To be tested when pollution is suspected
18	Chromium (Cr6+) mg/1, Max.	0.05	May be carcinogenic above this limit	No relaxation	IS 3025 (Part 52)	To be tested when pollution is suspected
19	Poly nuclear aromatic hydra carbons (PAH) mg/1, Max.	0.0001	May be carcinogenic above this limit	No relaxation	APHA 6440	-
20	Mineral oil mg/1, Max.	0.5	Beyond this limit undesirable taste and odour after chlorination take place.	0.03	IS 3025 (Part 39)	-
21	Pesticides mg/1, Max.	-	Toxic	-	-	-
22	Radioactive material	-	-	-	IS 14194	-
23	Alpha emitters bq/1, Max.	0.1	-	No Relaxation	-	-
24	Beta emitter pci/1, Max.	1.0	-	No Relaxation	-	-
25	Total alkalinity (CaCO3), mg/l, max	200	Beyond this limit taste becomes	600	IS 3025 (Part 23)	-

Sl. No.	Substance/Characteristics	Requirement (acceptable limit)	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate source	Methods of Test (ref. To IS)	Remarks
			unpleasant			
26	Aluminium (Al) mg/1, Max.	0.03	Cumulate effect is reported to cause dementia	0.2	IS 3025 (Part 55)	-
27	Boron mg/1, Max.	0.5	-	1.0	IS 3025 (Part 57)	-

Source: Indian Standard Drinking Water Specification – IS 10500:2012

INTERNATIONAL (WB/IFC- EHS GUIDELINE) ENVIRONMENTAL QUALITY STANDARDS[43]

WHO Ambient Air Quality Guidelines

	Averaging Period	Guideline value in mg/m3
Sulfur dioxide (SO_2)	24-hour 10 minutes	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter $PM_{2.5}$	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Source: https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

Ambient Noise Level Guidelines

Receptor	One Hour LAeq (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational44	55	45
Industrial; commercial	70	70

Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

43 https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

44 For acceptable indoor noise levels for residential, institutional, and educational settings refer to WHO (1999).

Noise Limits for Various Working Environments

Location/activity	Equivalent level LAeq,8h	Maximum LAmax, fast
Heavy Industry (no demand for oral communication)	85 dB(A)	110 dB(A)
Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
Open offices, control rooms, service counters or similar	45-50 dB(A)	-
Individual offices (no disturbing noise)	40-45 dB(A)	-
Classrooms, lecture halls	35-40 dB(A)	-
Hospitals	30-35 dB(A)	40 dB(A)

Source: Guidelines for Community Noise, World Health Organization (WHO), 1999

Water Quality

Indicative Values for Treated Sanitary Sewage Discharges

Pollutants	Units	Guideline Value
pH	pH	6 – 9
BOD mg/l 30	mg/l	30
COD mg/l 125	mg/l	125
Total nitrogen mg/l 10	mg/l	10
Total phosphorus mg/l 2	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPN/100 ml	400

MPN = Most Probable Number

Source: https://www.ifc.org/wps/wcm/connect/3d9a54ae-c44c-488d-9851-afeb368cb9f9/1-3%2BWastewater%2Band%2BAmbient%2BWater%2BQuality.pdf?MOD=AJPERES&CVID=ls4Xbfn

Appendix 5: IBAT Analysis

IBAT

Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
PROPOSED GUEST HOSTEL

Country: India

Location: [26.1, 91.8]

Date of analysis: 26 June 2023 (GMT)

Size of site: 0 km^2

Buffers applied: 1 km | 5 km | 10 km

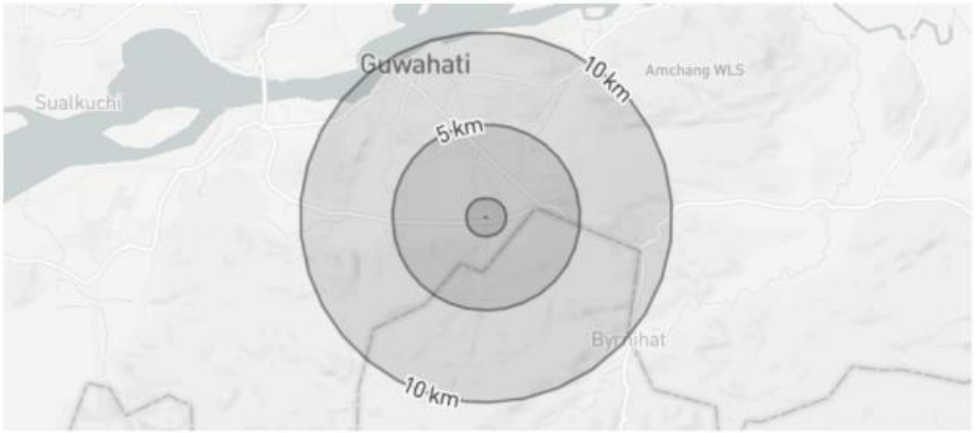
IUCN Red List Biomes: Freshwater, Terrestrial

Generated by: Arijit Choudhury

Organisation: ADB

Overlaps with:

Protected Areas	0
Key Biodiversity Areas	1
IUCN Red List	97



Displaying project location and buffers: 1 km, 5 km, 10 km

About this report

This report presents the results of [5840-45344] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 5 km, 10 km.

This report is one part of a package generated by IBAT on 26 June 2023 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the Sensitive Data Access Restrictions Policy for the IUCN Red List. This relates to sensitive Threatened species and KBAs triggered by sensitive species.

Data used to generate this report

- UNEP-WCMC and IUCN, 2023. Protected Planet: The World Database on Protected Areas (WDPA)[On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net - June 2023.
- BirdLife International (on behalf of the KBA Partnership), 2023. Key Biodiversity Areas - April 2023.
- IUCN, 2022. IUCN Red List of Threatened Species - December 2022.
- IUCN. The IUCN Red List of Threatened Species. Version 2019-3. (2019). https://www.iucnredlist.org
- IUCN. Threats Classification Scheme (Version 3.2). (2019)
- Strassburg, B.B.N., Iribarrem, A., Beyer, H.L. et al. Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). https://doi.org/10.1038/s41586-020-2784-9

Protected Areas

The following protected areas are found within 1 km, 5 km, 10 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km, 5 km, 10 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance
Amchang Hills	5 km

IUCN Red List of Threatened Species

The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Nilssonia nigricans	Black Softshell Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Pangshura sylhetensis	Assam Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Batagur dhongoka	Three-striped Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Aythya baeri	Baer's Pochard	AVES	CR	Decreasing	Freshwater
Emberiza aureola	Yellow-breasted Bunting	AVES	CR	Decreasing	Terrestrial, Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Indotestudo elongata	Elongated Tortoise	REPTILIA	CR	Decreasing	Terrestrial
Manis pentadactyla	Chinese Pangolin	MAMMALIA	CR	Decreasing	Terrestrial
Manouria emys	Asian Giant Tortoise	REPTILIA	CR	Decreasing	Terrestrial
Houbaropsis bengalensis	Bengal Florican	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Sarcogyps calvus	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial
Gyps tenuirostris	Slender-billed Vulture	AVES	CR	Decreasing	Terrestrial
Cuora amboinensis	Southeast Asian Box Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Geoclemys hamiltonii	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Hardella thurjii	Crowned River Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Morenia petersi	Indian Eyed Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Nilssonia gangetica	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Nilssonia hurum	Indian Peacock Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Platanista gangetica	Ganges River Dolphin	MAMMALIA	EN	Decreasing	Freshwater
Axis porcinus	Hog Deer	MAMMALIA	EN	Decreasing	Terrestrial, Freshwater
Cuora mouhotii	Keeled Box Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
Pillaia indica		ACTINOPTERYGII	EN	Unknown	Freshwater
Arachnochium kulsiense		MALACOSTRACA	EN	Unknown	Freshwater
Perdicula manipurensis	Manipur Bush-quail	AVES	EN	Decreasing	Terrestrial, Freshwater
Asarcornis scutulata	White-winged Duck	AVES	EN	Decreasing	Terrestrial, Freshwater
Rynchops albicollis	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
Sterna acuticauda	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
Haliaeetus leucoryphus	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
Leptoptilos dubius	Greater Adjutant	AVES	EN	Decreasing	Terrestrial, Freshwater
Laticilla cinerascens	Swamp Grass-babbler	AVES	EN	Decreasing	Terrestrial, Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Tor putitora		ACTINOPTERYGII	EN	Decreasing	Freshwater
Caprolagus hispidus	Hispid Hare	MAMMALIA	EN	Decreasing	Terrestrial
Cuon alpinus	Dhole	MAMMALIA	EN	Decreasing	Terrestrial
Elephas maximus	Asian Elephant	MAMMALIA	EN	Decreasing	Terrestrial
Hadromys humei	Hume's Rat	MAMMALIA	EN	Decreasing	Terrestrial
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Melanochelys tricarinata	Tricarinate Hill Turtle	REPTILIA	EN	Decreasing	Terrestrial
Panthera tigris	Tiger	MAMMALIA	EN	Decreasing	Terrestrial
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Nycticebus bengalensis	Bengal Slow Loris	MAMMALIA	EN	Decreasing	Terrestrial
Trachypithecus pileatus ssp. tenebricus	Tenebrous Capped Langur	MAMMALIA	EN	Decreasing	Terrestrial
Hoolock hoolock	Western Hoolock Gibbon	MAMMALIA	EN	Decreasing	Terrestrial
Trillium tschonoskii	Tschonoskii's Wakerobin	LILIOPSIDA	EN	Decreasing	Terrestrial
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ploceus megarhynchus	Finn's Weaver	AVES	EN	Decreasing	Terrestrial
Tectona grandis	Teak	MAGNOLIOPSIDA	EN	Decreasing	Terrestrial
Trachypithecus pileatus ssp. pileatus	Blond-bellied Langur	MAMMALIA	EN	Decreasing	Terrestrial
Crocodylus palustris	Mugger	REPTILIA	VU	Stable	Terrestrial, Freshwater
Lutrogale perspicillata	Smooth-coated Otter	MAMMALIA	VU	Decreasing	Terrestrial, Marine, Freshwater
Rhinoceros unicornis	Greater One-horned Rhino	MAMMALIA	VU	Increasing	Terrestrial, Freshwater
Aonyx cinereus	Asian Small-clawed Otter	MAMMALIA	VU	Decreasing	Terrestrial, Marine, Freshwater
Pangshura tecta	Indian Roofed Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
Liotelphusa quadrata		MALACOSTRACA	VU	Unknown	Freshwater
Physoschistura elongata		ACTINOPTERYGII	VU	Unknown	Freshwater
Wallago attu		ACTINOPTERYGII	VU	Decreasing	Freshwater
Devario assamensis		ACTINOPTERYGII	VU	Unknown	Freshwater
Schistura reticulofasciata		ACTINOPTERYGII	VU	Unknown	Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Ortygornis gularis	Swamp Francolin	AVES	VU	Decreasing	Terrestrial, Freshwater
Aythya ferina	Common Pochard	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Halcyon pileata	Black-capped Kingfisher	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Grus antigone	Sarus Crane	AVES	VU	Decreasing	Terrestrial, Freshwater
Gallinago nemoricola	Wood Snipe	AVES	VU	Decreasing	Terrestrial, Freshwater
Sterna aurantia	River Tern	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Clanga clanga	Greater Spotted Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Leptoptilos javanicus	Lesser Adjutant	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Schoenicola striatus	Bristled Grassbird	AVES	VU	Decreasing	Terrestrial, Freshwater
Lissemys punctata	Indian Flapshell Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
Xenochrophis cerasogaster	Painted Keelback	REPTILIA	VU	Decreasing	Freshwater
Schizothorax plagiostomus	Snow Trout	ACTINOPTERYGII	VU	Decreasing	Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Mulleripicus pulverulentus	Great Slaty Woodpecker	AVES	VU	Decreasing	Terrestrial
Buceros bicornis	Great Hornbill	AVES	VU	Decreasing	Terrestrial
Aceros nipalensis	Rufous-necked Hornbill	AVES	VU	Decreasing	Terrestrial
Rhyticeros undulatus	Wreathed Hornbill	AVES	VU	Decreasing	Terrestrial
Turdus feae	Grey-sided Thrush	AVES	VU	Decreasing	Terrestrial
Pellorneum palustre	Marsh Babbler	AVES	VU	Decreasing	Terrestrial
Argya longirostris	Slender-billed Babbler	AVES	VU	Decreasing	Terrestrial
Clanga hastata	Indian Spotted Eagle	AVES	VU	Decreasing	Terrestrial
Arctonyx collaris	Greater Hog Badger	MAMMALIA	VU	Decreasing	Terrestrial
Oryza malampuzhaensis		LILIOPSIDA	VU	Decreasing	Terrestrial
Capricornis sumatraensis	Mainland Serow	MAMMALIA	VU	Decreasing	Terrestrial
Hoolock hoolock ssp. hoolock	Western Hoolock Gibbon	MAMMALIA	VU	Decreasing	Terrestrial
Paris polyphylla	Love Apple	LILIOPSIDA	VU	Decreasing	Terrestrial

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Bagarius bagarius		ACTINOPTERYGII	VU	Decreasing	Freshwater
Bos gaurus	Gaur	MAMMALIA	VU	Decreasing	Terrestrial
Helarctos malayanus	Sun Bear	MAMMALIA	VU	Decreasing	Terrestrial
Macaca arctoides	Stump-tailed Macaque	MAMMALIA	VU	Decreasing	Terrestrial
Melursus ursinus	Sloth Bear	MAMMALIA	VU	Decreasing	Terrestrial
Neofelis nebulosa	Clouded Leopard	MAMMALIA	VU	Decreasing	Terrestrial
Panthera pardus	Leopard	MAMMALIA	VU	Decreasing	Terrestrial
Trachypithecus pileatus	Capped Langur	MAMMALIA	VU	Decreasing	Terrestrial
Ursus thibetanus	Asiatic Black Bear	MAMMALIA	VU	Decreasing	Terrestrial
Macaca leonina	Northern Pig-tailed Macaque	MAMMALIA	VU	Decreasing	Terrestrial
Arctictis binturong	Binturong	MAMMALIA	VU	Decreasing	Terrestrial
Rusa unicolor	Sambar	MAMMALIA	VU	Decreasing	Terrestrial
Elaphe taeniura	Cave Racer	REPTILIA	VU	Decreasing	Terrestrial
Python bivittatus	Burmese Python	REPTILIA	VU	Decreasing	Terrestrial
Cnemaspis assamensis	Assamese Day Gecko	REPTILIA	VU	Unknown	Terrestrial

Recommended citation

IBAT Proximity Report. Generated under licence 5840-45344 from the Integrated Biodiversity Assessment Tool on 26 June 2023 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.

Appendix 6: Summary of Stakeholder Consultations including Attendance Sheets

Sl. No.	Place	Date	Consultations heldwith	Issues discussed	Outcome of discussions and consideration in projectdesign and implementation
1	Assam Water Centre	8th May 2023	With local people residing near the site, WRD officials	Project components, benefits of project, implementation schedule, environmental and social impacts during project implementation, etc.	○ Participants welcomed the commencement of the project and assured all help during project implementation ○ One participant enquired about access road through Hostel site to access the WRD Office since most of the residential are employees of the WRD, to avoid long route through the main road. CTO, FREMAA has ensured that it will be considered during the DPR preparation. ○ The environmental specialist solicited suggestions for environment protection from the participants. The participants suggested that plantation and waste disposal should be done with care. The environmental specialist replied that plantation and landscaping plan for the campus will be prepared and implemented. The solid waste disposal will be as per regulatory requirements. ○ One local participant suggested during discussion that there is intense rainfall in during the monsoon season (June to August) so drainage should be installed. The FREMAA and WRD officials informed that campus will be designed with proper drainage system considering rainfall.
2	Dakhin Beltola High School, Bongaon Beltola	19th May'2023	With teaching staff of the high school adjacent to the boundary wall of proposed Guest Hostel, particularly Dakhin Beltola High School, Bongaon, Beltola, Guwahati,	Guest Hostel Project components, benefits of project, implementation	During the consultation, the Environmental Officer and Social Development Officer of the EAP Wing, WRD gave a brief description of the proposed project to the teachers of Dakhin Beltola High School and took a stock of the no. of classes, staff, class and examination timings etc. Thereafter, the officials explained about the probable impacts of the proposed intervention and sought for any specific suggestions from the participants to reduce the impacts. The specific suggestions of the participants were as follows: 1. As there may be high intensity noise generation during the proposed construction activities, therefore, the authorities should avoid the examination period i.e. the month of February, March, June and September while carrying out the proposed activities.

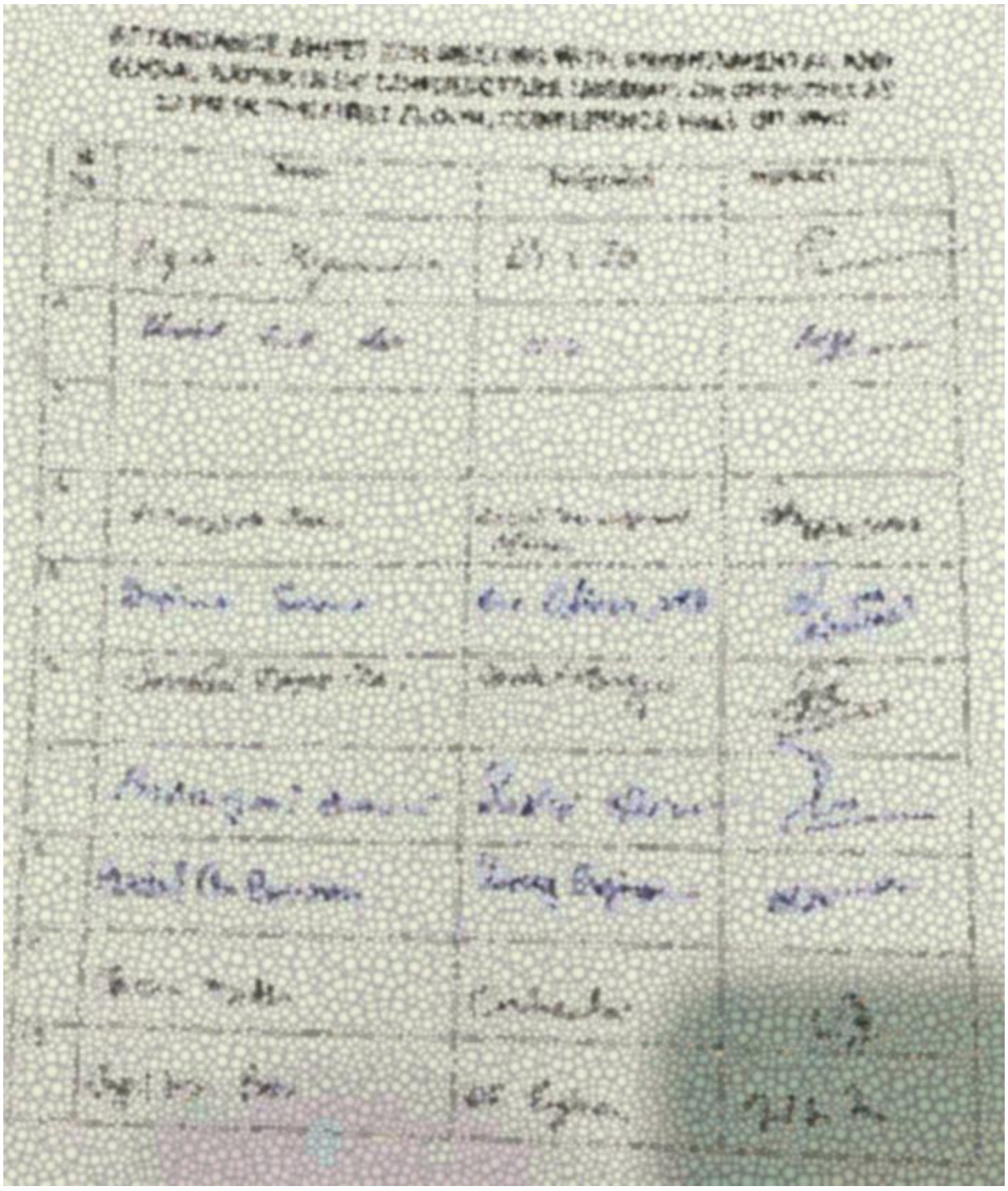
Sl. No.	Place	Date	Consultations heldwith	Issues discussed	Outcome of discussions and consideration in projectdesign and implementation
			Assam		2. High protective walls should be made surrounding the construction site so as to restrict the dispersion of the construction air pollutants. 3. Authorities should ensure the restriction of the labour movements inside the school premises to avoid any kind of unwanted situations. 

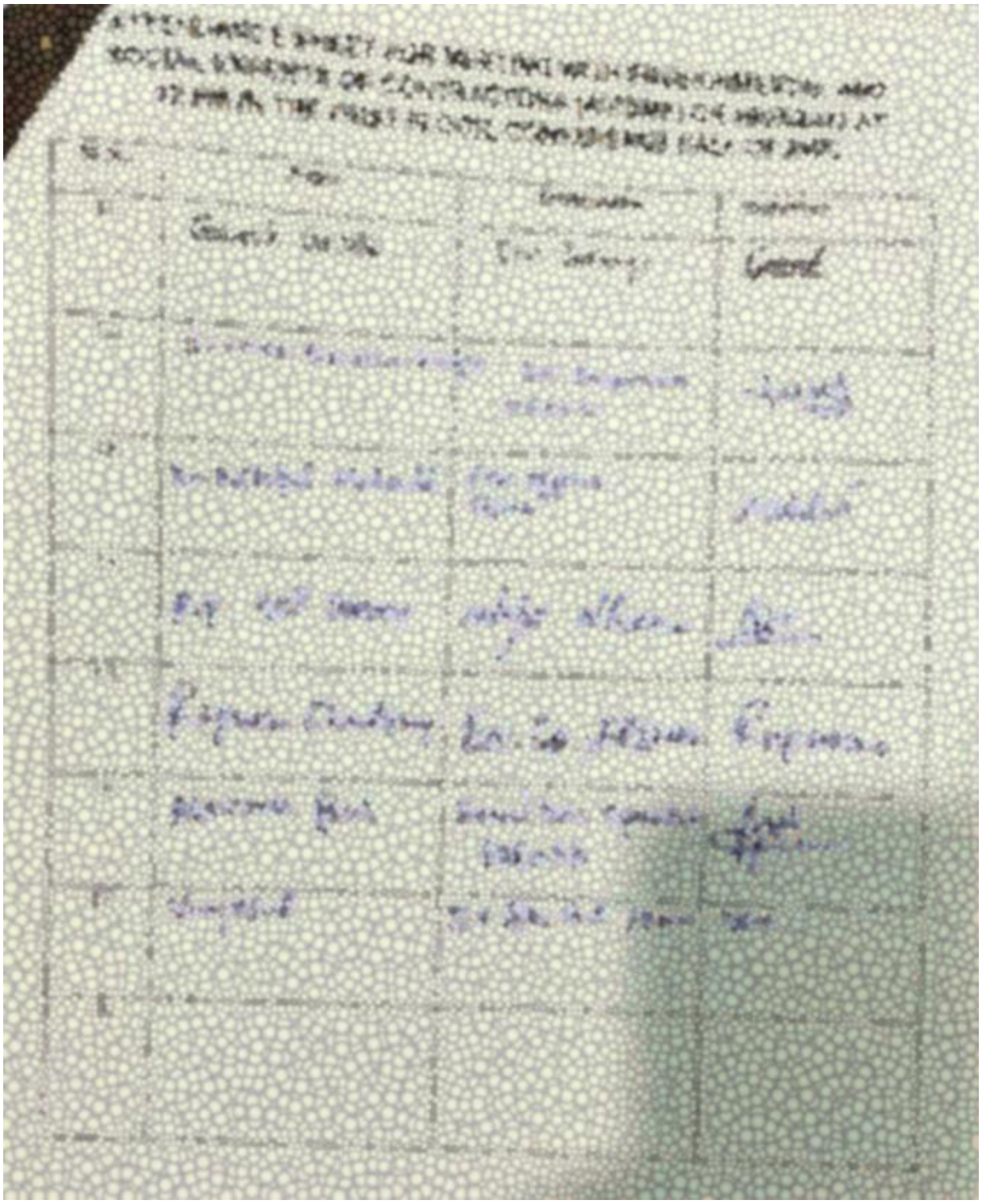
Source: FREEMA & WRD

CONSULTATION ATTENDANCE

(photographs' resolutions of the attendance sheets are modified to hide personal details of participants)

Assam Water Center (Employees, Vendors and nearby Residents)





Dakhin Beltola High School (Teaching Staff)

Consultation Photographs

Assam Water Center (Employees, Vendors and nearby Residents)

Dakhin Beltola High School (Teaching Staff)

INSTITUTIONAL CONSULTATION PHOTOGRAPHS

Consultation with Mr. Biren Baishya, GIS Expert, Assam State Disaster Management Authority

Consultation with Sri Sandeep Kumar, IFS (Principal Chief Conservator of Forest (Biodiversity), Assam)

Consultation with M. D Adhikary, Sr. Env. Scientist, Head Water Section, Pollution Control Board Assam

Appendix 7: Annual Environmental Monitoring Report Format

I. INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation / Office	Email Address	Contact Number
1. PMU			
2. PIUs			
3. Consultants			

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/ List of Works	Status of Implementation (Preliminary Design / Detailed Design / On-going Construction/Completed / O&M)[a]	Contract Status (specify if under bidding or contract awarded)	If On-going Construction	
				%Physical Progress	Expected Completion Date

a- If on-going construction, include %physical progress and expected date of completion.

II. COMPLIANCE STATUS WITH NATIONAL, STATE OR LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

Package No.	Subproject Name	Environmental Requirements[a]	Status of Compliance[b]	Validity if obtained[c]	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent / Permit to Established[d]

a- All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period.

b- Specify status of compliance (e.g. nvironmental clearance? Permit/consent to establish? Forest clearance? etc.)

c- Specify if obtained, submitted and awaiting approval, application not yet submitted.

d- Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (REFER TO EMP TABLES IN APPROVED IEE/s)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.
- Identify the role/s of Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.
- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.
- Include as appendix all supporting documents including **signed** monthly environmental site inspection reports prepared by consultants and/or contractors.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

Package-wise Implementation Status

Package Number	Component	Design Status (Preliminary Design Stage/ Detailed Design Completed)	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) Approved by Project Director? (Yes/No)	Remarks
			Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclose d on project website (Provide Link)	Final IEE provided to Contractor/ s (Yes/No)		

- Provide the monitoring results as per the parameters outlined in the approved EMP (or site- specific EMP/construction EMP when applicable).
- In addition to the table on EMP implementation, the main text of the report should discuss in details the following items(but not limited to):
    - Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
    - Identify muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads.
    - Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these were intact following heavy rain;
    - Identify designated areas for concrete works, chemical storage, construction materials, and refuelling. Attach photographs of each area.
    - Confirm spill kits on site and site procedure for handling emergencies.
    - Identify any chemical stored on site and provide information on storage condition. Attach photograph.

- Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
- Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
- Provide information on barricades, signages, and on-site boards. Provide photographs.
- Provide information on checking if there are any activities being under taken out of working hours and how that is being managed.

Overall Compliance with CEMP/EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

- Brief description on the approach and methodology used for environmental monitoring of each subproject

VI. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 $\mu g/m_3$	SO2 $\mu g/m_3$	NO2 $\mu g/m_3$

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Government Standard)	
			Day Time	Night Time

*Note: add more tables to show results of other monitoring activigties.

Summary of Environmental Monitoring Activities (for the Reporting Period)[a]

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

[a] Attach Laboratory Results and Sampling Map/Locations

VII. GRIEVANCE REDRESS MECHANISM

Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

Complaints Received during the Reporting Period. Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

VIII. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- Summary of follow up time-bound actions to be taken within a set timeframe.

APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

Appendix 8: Contractor's Monthly Environmental Monitoring Report Format

Project Name:

Contract Agreement No:

{Project Name, Contract Package / Lot}

Reporting Period {Month Year}

Submission Date: {Day Month Year}

Executing Agency:

Submitted by: Contractor's Name

Red text serves as guide for report preparation, please delete it when the report is finalized}

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E. Material Usage and Sustaibaility considerations

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6. Critical Habitat (CH) Assessment

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8. Grievance Redressal
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ABBREVIATIONS

Abbreviations	Full Form	Abbreviations	Full Form

1. Introduction

{Please provide a brief in 2-3 paragraphs.}

{Succinctly convey the details of the contract package, details of construction camps and other temporary facilities}

{Highlight any unanticipated impacts in relation to change in the project scope, locations or alignments of components no matter how minor the contractor considers they may be, construction methods, and/or implementation schedule during the reporting period, if none confirm this.}

{Describe the implementation stage reached (design, pre-construction, construction, commissioning) and the % progress, main project activities and milestones achieved during the reporting period. Report on updates to IEE/EMP that were required during the reporting period, status of delivery of documents, permissions received, required amendments, consultation and disclosure undertaken etc.}

{Include table and/or organogram of environmental safeguards staffing at contractors/subcontractors and relationships between subcontractors, etc. Highlight any changes in the project organization and environmental safeguards staffing during the reporting period, if none confirm this}

Table X-1: Details of Contract

Sl. No.	Contract	Details of Work	District	Contract Amount	Appointed Date	Expected Date of Completion
1						

Source: Contract Agreement

Figure X-1: Location Map

Table X-2: Proposed Interventions / Summary of Construction Work Package X

Particulars	Details	Progress Status
		-
		-
		-
		-
		-
		-

Source:

2. Project Progress

The contract for was signed on xxx & the xx% physical progress achieved. Details of current progress of works are presented in table below:

Table X-3: Progress of Work Up to Month Year

Sl. No.	Description	Contract Package xxxx
1	**Financial progress**	
a	Mobilization Advance	Rs. xxx Crores up to date payment Certified
b	Mobilization Advance Recovery	Up to date recovered till end of xxx is xxx, as it is a stage payment of xx%
c	Stage Payment	Up to date Amount certified up to xxx is Rs. xxx Crores out of xxx Crores (xxx %)
2	**Pre-Construction Activities**	
a	Tree Cutting (if required)	

Sl. No.	Description	Contract Package xxxx
b	Electric Pole Erection / Shifting (if involved)	
c	Applicable Insurances	• Submitted by as per provision of contract • Employee Compensation Insurance valid till xxx • Contractor's All Risk Insurance Policy (CAR) valid till xxx • Professional Indemnity Insurance policy valid till xxx
3	**Design Review**	
a	Plan & Profile drawings for xxx	• Submitted by vide letter no. xxx dated xxx • Finalized for: xxx • Approved vide letter no. xxx dated xxx
b	Plan & Profile drawings for xxx	• Submitted by vide letter no. xxx dated xxx • Finalized for: xxx • Approved vide letter no. xxx dated xxx
c	Plan & Profile drawings for xxx	• Submitted by vide letter no. xxx dated xxx • Finalized for: xxx • Approved vide letter no. xxx dated xxx
5	**EMP**	• Site specific EMP submitted vide letter no. xxx dated xxx • Approved vide letter no. xxx dated xxx
6	**QAP & Work Programme**	• QAP submitted by vide letter no. xxx dated xxx • Reviewed and approved vide letter no. xxx dated xxx
7	**Plant Status**	
a	xxx Plant (Hot mix, batching, crusher etc.)	• Intimation of plant submitted vide letter no. xxx dated xxx • Installation and calibration completed and production started on xxx
b	xxx Plant (Hot mix, batching, crusher etc.)	• Intimation of plant submitted vide letter no. xxx dated xxx • Installation and calibration completed and production started on xxx
8	**Civil work**	
A	**Survey Work**	
a	NGL	• xxx % completed
b	OGL	• xxx % completed
c	TBM Fixing	• xxx % completed
9	**Milestone I**	• Milestone date is to be achieved on xxx • xxx Works xxx% Completed
10	**Milestone II**	• Milestone date is to be achieved on xxx • xxx Works xxx % Completed
11	**Milestone III**	• Milestone date is to be achieved on xxx • xxx % Completed
12	**Milestone IV**	• Milestone date is to be achieved on xxx
13	**Milestone xxx**	• Milestone date is to be achieved on xxx
14	**Physical Progress (%)**	• xxx %

Source:

3. Site Visits & Review Meetings by Client

{Please provide a brief in one – two paragraphs}

4. EHS Setup / Organization Chart

{Please provide a brief in one – two paragraphs}

Figure X-2: Organization Chart of EHS Team

Table X-4: Environmental, Health & Safety Staff

Name	Designation	Location	Mobile	Email address	Mobilization Date	Demobilization Date	Total Days Absent in last month	Total present (Months)

5. Compliance on Environment, Health & Safety Safeguards

5.1 Camp Details

{xxx camps, xxx separate labor / operator's camps besides xxx temporary labor camps for the project have been established. The details of the plants in the camps are given below:}

Table X-5: Details of Camps Established as on Month & Year

Sl. No.	Camp No.	Camp Location	Plants	Unit	Capacity	Clearance	Remarks
1							
2							

Source:

Table X-6: Details of Labor Camps Established as on Month Year

Sl. No.	Camp No.	Camp Location	Occupant (No.)	Grade	Facilities
1					• Toilets: XX No. • Lodging: XX No. • Kitchen XX No.
2					• Toilets: XX No. • Lodging: XX No. • Kitchen XX No.
3					• Toilets: XX No. • Lodging: XX No. • Kitchen XX No.
4					• Toilets: XX No. • Lodging: XX No. • Kitchen XX No.
5					• Toilets: XX No. • Lodging: XX No. • Kitc`hen XX No.

Source:

5.2 Compliance to Environmental Management Plan

{With reference to the EMP of the project, include a table following sample table below with the compliance status during the reporting period, with sufficient details (evidence) to show how compliance was achieved, or corrective action to be taken if there was non-compliance including timeline and budget}

{Flag if previous environmental monitoring report(s) included corrective action plan, if it did details of that corrective action plan should be incorporated into the EMP table and compliance status reported}

{Provide explanations of any instances where performance standards were temporarily exceeded during the reporting period, along with details of any response taken to rectify the exceedance once identified, even if at the end of the reporting period the project is deemed as being compliant}

{Copies of clearances, CEMP, construction method statements, and other documentation produced in accordance with EMP during the reporting period should be included as an appendix}

Table X-7: Status of EMP as of Month Year

Item #	**Requirement**	**Prior Corrective Action** **Compliance Status** {complied; partially complied; not complied; still ongoing or n/a at current stage of the project}	**Remarks** {provide sufficient details (evidence) to show how compliance was achieved; or explain the corrective action to be taken if there was noncompliance including timeline and budget}

5.3 Status of National / State/ Local Statutory Environmental Requirements

{Status of compliance and further action to ensure ongoing compliance; if there is partial or no compliance recommendations for corrective action are required. Provide explanations of any instances where the requirements of regulations or agreements were breached along with details of responses taken to rectify the breach once identified. Include all the applicable National Regulations and International Agreements following the sample table below attaching copy of the consents/license in the period they were obtained}

Table X-8: Status of Legal Compliance as of Month Year

Sl. No.	**Activities**	**Statutory Authority**	**Status (Yes, No or Partial only)**		**Expiry Date**	**Remarks**
			Applied	**Obtained**		
1	Camp Layout Plan	Engineer			-	
2	NOC letter	District Commissioner			-	
3	Storage, Handling, and Transport of Hazardous Materials	State Pollution Control Board				Consent No. xxx dated xxx
4	Labor License	Labor Commissioner				Consent No. xxx dated xxx
5	Withdrawal of Ground	Ground Water				Consent No. xxx

Sl. No.	Activities	Statutory Authority	Status (Yes, No or Partial only)		Expiry Date	Remarks
			Applied	Obtained		
	Water for Construction	Board				dated xxx
6	Registration of Vehicles & PUC	Motor Vehicle Department				-
7	Debris Disposal Sites	Gram Panchayat				Consent No. xxx dated xxx
8	Any other clearances / permits / NOCs					

Source: EPC Contractor

5.4 Spoil Disposal Sites & Utilization of Construction Wastes

{Please provide a brief in 2-3 paragraphs. Provide not more than 4 photographs showing before & after scenario}

Figure X-3: Some Photographs of Spoil Disposal Sites

5.5 Environmental Supervision and Monitoring Results

{With reference to the contract budget earmarked for EMP (if any) summarize details of budget allocated and the current spend profile}

Table X-9: Status of Budget allocated for EMP and spent as of Month Year

Activity	Allocated Budget (INR)	Budget Spent (INR	% Spent	Remarks
Total				

5.6 Environmental Pollution Monitoring

{Please provide a brief in one – two paragraphs. Provide not more than 1 photograph at each site for each activity}

{Environmental monitoring results – summarize in a table the reporting period's quantitative monitoring activities and data obtained in accordance with the Environmental Monitoring Plan (EMoP) of the project. Provide explanations of any instances where performance standards were exceeded along with details of responses taken to rectify the exceedance once identified. Attach survey reports}

Typically, this section will include the results of:

- Flora and fauna surveys
- Air quality surveys
- Noise and vibration surveys
- Water quality surveys

{Indicate monitoring locations using a map or plan with grid coordinates, dates, times, duration of samples as

applicable, weather conditions as applicable, parameters measured, equipment used, standards, tests, and limits used etc.}

{Corrective actions with timeline and budget are required to ensure any exceedances will be prevented in the future}

{Calibration and QA certifications of monitoring equipment and laboratories analyzing samples should be included as an appendix}

Figure X-4: Photographs Environmental Monitoring

Table X-10: Ambient Air Quality Monitoring Results

Name of sampling site	Geo-Coordinates	Parameters					
		PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	Lead
Location xx							
Location xx							
Location xx							
Location xx							
Stack emission of DG Location xx (xx KVA)							
Stack emission of DG Location xx (xx KVA)							
National Ambient Air Quality Standards[45]		**100**	**60**	**80**	**80**	**4**	**1**
Emission Limits for Diesel generator set up to 800 kW[46]		**0.2**		**-**	**4**	**3.5**	**-**

Source:

Table X-11: Ambient Noise Quality Monitoring Results

Name of sampling site	Geo Coordinates	Parameters		National Standards		Remarks
		Leq (Day)	Leq (Night)	Day time	Night time	
Location xx						
Location xx						
Location xx						
Location xx						
DG at Location xx						
DG at Location xx						

Source:

Table X-12: Drinking Water Quality Monitoring Results

Parameters	Location					National Standards (IS 10500:2012)	
	Location xx	Location xx	Location xx	Location xx	Location xx	Acceptable Limit	Permissible Limit
Color						5 max.	15 max.
Odor						Agreeable	Agreeable
Turbidity						1 max.	5 max.

[45] National Ambient Air Quality Standards, Notification dated 16th November 2009

[46] Environment (Protection) (Third Amendment) Rules, 2013 dated 11th December 2013, G.S.R. 771(E)

Parameters	Location					National Standards (IS 10500:2012)	
	Location xx	Location xx	Location xx	Location xx	Location xx	Acceptable Limit	Permissible Limit
pH						6.5 – 8.5	No Relaxation
Total Dissolved Solids						500 max.	2000 max.
Total Hardness ($CaCO_3$)						200 max.	600 max.
Total Alkalinity ($CaCO_3$)						200 max.	600 max.
Chloride (Cl)						250 max.	1000 max.
Fluoride (F)						1.0 max.	1.5 max.
Sulphate (SO_4)						200 max.	400 max.
Nitrate (NO_3)						45 max.	No Relaxation
Iron (Fe)						0.3 max.	No Relaxation
Lead (Pb)						0.01 max.	No Relaxation
Zinc (Zn)						5 max.	15 max.
Total Chromium (Cr)						0.05 max.	No Relaxation
Copper (Cu)						0.05 max.	1.5 max.
Calcium (Ca)						75 max.	200 max.
Magnesium (Mg)						30 max.	100 max.
Manganese (Mn)						0.1 max.	0.3 max.
Total Arsenic (As)						0.01 max.	0.05 max.
Total Coliform						Should be absent	No Relaxation
E. Coli						Should be absent	No Relaxation

Source:

5.7 Supply & Status of PPE

The details of the PPEs are given in table below:

Table X-13: Status of PPEs on Month Year

Sl. No	PPE	Opening Stock	Distributed	Closing Stock	Ordered
	Helmets – Laborers (Yellow)				
	Helmets – Supervisors (color)				
	Helmets – Engineers (color)				
	Helmets – EHS (Green)				
	Helmets – Visitors (color)				
	Helmets – Others (color)				
	Gloves				
	Masks				
	Goggles				
	Safety Shoes				
	Gum boots				

Sl. No	PPE	Opening Stock	Distributed	Closing Stock	Ordered
	Safety Tackles				
	Safety Jacket – Laborers (color)				
	Safety Jacket - Engineers (color)				
	Safety Jacket – Others (color)				
	Others, please specify				

Source:

5.8 Medical Facilities

Please provide details of the medical facilities including first aid and hospitals in one – two paragraphs.

Table X-14: Details of First Aid / Medical Room on Month Year

Sl. No	Camp	Size (m^2)	No. of First Aider	No. of Beds	Capacity to Treat (No. of Laborers that can be treated)	Compliant with Labor laws
						Yes/No

Table X-15: Details of First Aider as on Month Year

Sl. No	Camp	Name	Qualification	Years of Experience	Deployment Date	Employment Status

Table X-16: Details of Hospitals & Doctors tied up with as on Month Year

Sl. No	Name	Location	Distance from Site	MoU Number	Date of MoU	Facilities offered	Expiry Date

Table X-17: Details of First Aid Boxes in Project Site as on Month Year

Sl. No	Location	Size of Box	Date of last Inspection	Inspected by (Name & Designation)	Status of Inspection

Table X-18: Details of Ambulances in Project Site as on Month Year

Sl. No	Location	Vehicle Type	Vehicle Number	Date of last Inspection	Inspected by (Name & Designation)	Status of Inspection	Fitness Certificate Status

Figure X-5: Photographs of Medical Facilities in camp sites

Not more than 6 photographs

Figure X-6: Photographs of Ambulances in Camp Sites

Not more than 4 photographs

5.9 EHS Trainings

Please provide a table/para showing the details of the trainings that are to be conducted as per EPC contract. Details shall include name of training and frequency. The list of attendees to be provided in the annex.

The following programs were conducted during the reporting period:

Table X-19: Training Programs Conducted during Reporting Period

Sl. No	Date	Program Name	Type of Program	Location	No. of Attendees	Faculty/Trainer

Figure X-7: Some Photographs of EHS Training Programs

5.10 AIDS & COVID 19 Awareness Camps

The following programs on COVID, 19 HIV/AIDS were conducted during the reporting period:

Table X-20: AIDS & COVID 19 Awareness Programs Conducted during Reporting Period

Sl. No	Date	Program Name	Type of Program	Location	No. of Attendees	Faculty/Trainer

Figure X-8: Some Photographs of Awareness Programs

5.11 COVID 19 Response & Mitigation (if Relevant during reporting period)

Single Paragraph on steps taken, Any Cases of COVID amongst workers etc.

6. Compliance on Labor

The details on the compliance of labor are given in sections below

6.1 Labor Details

Table X-21: Labor Details as on Month Year

Sl. No	Type	Number			Camp Location	Employment Type		
		Local	Outsider	Total		Casual	Outsourced	Permanent
	Unskilled							
	Semi-skilled							
	Skilled							
	Total							

6.2 Accident Record

{If there was any near-miss or accident, illness, or other occupational or community health and safety related incident during the reporting period (or a previously reported incident with ongoing rectification) report following the sample table below. Include as appendices work safety checklists, incident reports, and other relevant

supporting documents. If no incidents, please confirm}

- Total Man hours preceding month: xx
- Total Man hours in reporting month: xx
- Total Man hours in project till the end of present month: xx
- Total Safe Man hours preceding month: xx
- Total Safe Man hours in reporting month: xx
- Total Safe Man hours in project till the end of present month: xx
- No. of accidents in reporting month: xx
- Total Accidents in project: xx
- No. of incidents in reporting month: xx
- Total Accidents in project: xx
- Total near misses in reporting month: xx
- Total near misses in Project: xx
- Any other points: xx

Table X-22: Safety Details on Month Year

Frequency Rate	Severity Rate	Risk Index	Risk Index Factor	Accident Rate	Incident Potential Rate	Frequency of First Aid Case

Table X-23: Accident Details as on Month Year

First Aid Cases	Accidents	Fatality	Incidents	Near Miss	Dangerous Occurrenc	Unsafe Acts Observed	Complian ce %	Man-hours worked	Man-day lost	Safe Man hours

Table X-24: Safety Details on Month Year

Frequency Rate	Severity Rate	Risk Index	Risk Index Factor	Accident Rate	Incident Potential Rate	Frequency of First Aid Case

Table X-25: Accident Details as on Month Year

First Aid Cases	Accidents	Fatality	Incidents	Near Miss	Dangerous Occurrenc	Unsafe Acts Observed	Complian ce %	Man-hours worked	Man-day lost	Safe Man hours

7. Meaningful Consultation

{Meaningful consultation – report on any ongoing consultation undertaken, and main issues raised by consultees; detailed consultation records should be included as an appendix. If no ongoing consultation, please confirm}

Table X-26: Consultations in Month Year

Date	Format/Venue	Participants (Occupation, M/F)	Main Issues Raised

8. Grievance Redressal

{If there was any grievance or complaint, regardless informal or minor, during the reporting period (or previously reported complaint with ongoing rectification) provide the corrective action taken following the sample table below. Detailed grievance records and response reports should be included as an appendix}

{A paragraph on:

- Procedure for redressal
- No. of grievances received and type
- Status of grievances}

Table X-27: Grievances details as on Month Year

Grievances Received		Grievances Status of last Month		Total till Date Grievances Status	
Last Month	Total till Date	Open	Closed	Open	Closed

Table X-28: Status of Grievances on Month Year

Complainant/s or Affected Persons	Location/s and Date/s of Complaint	Description of Grievance/Complaint	Timeline*	Time-bound Corrective Action

* To be solved within 2 weeks

9. Follow up Actions & Conclusions

{Summarize the contract's environmental performance during the reporting period based on the previous sections and, if any non-compliance identified, provide detailed recommendations including responsibilities, timeliness and budget for the preparation and completion of corrective action}

{If non-compliance is major or not readily addressed then a separate corrective action plan may need to be prepared. For minor and readily addressed non-compliances the corrective action plan can be incorporated into this final section of the environmental monitoring report following the sample table below}

Table X-29: Follow up actions as on Month Year

Non-compliance	Corrective Action to be Taken	Responsibility	Timeline	Budget

APPENDICES

Photographs {Include relevant photographs of the project site and project area of influence taken during the reporting period to provide evidence of compliance and/or non-compliance. For each photo, provide a caption with description of what it illustrates, accurate location, and date taken}

Supporting Documents {E.g.,

- Maps and plans
- Checklists and reports
- Permits/Clearances/NOCs obtained in Last Month and documentation

- Training records
- Detailed monitoring data, laboratory results etc.
- Calibration and QA certificates
- Consultation records
- Meeting agendas and attendance records
- Grievance records
- Environment, health and safety reports
- EHS Correspondences in Last Month

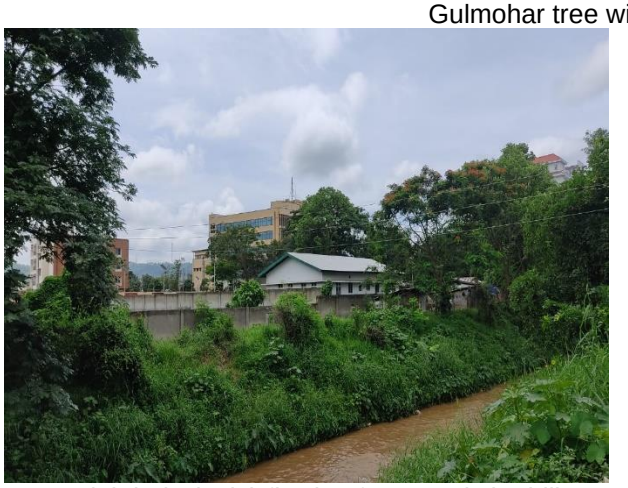
Photo Documentation

Backside of State Data Centre & adjacent to the proposed Hostel

WRD Guest house within Boundary wall from the plot of Hostel

Unused & derelict vehicles dumped by Guwahati Municipal Corporation (GMC)


Dakhin Beltola High School as seen from the project site on the other side of the boundary wall.
Gulmohar tree within school yard




Perennial drain (nala) flowing from Basistha hill towards the main city of Guwahati on the west side of the plot (outside the boundary of the plot)


Overgrown vegetation on the plot