

ASSAM INTRA STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT (PHASE-II) FUNDED BY AIIB



ASIAN INFRASTRUCTURE
INVESTMENT BANK



ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) – ENVIRONMENT AND SOCIAL MANAGEMENT PLAN (ESMP) FOR THE PROPOSED 220/132kV (2X160 MVA) AIS AT MORIGAON AND ASSOCIATED TRANSMISSION LINES (PACKAGE-E)

Submitted By



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LIST OF ABBREVIATIONS

AEGCL	Assam Electricity Grid Corporation Limited
AGM	Assistant General Manager
AIIB	Asian Infrastructure Investment Bank
AIS	Air Insulated Substation
AISTSEP	Assam Intra-State Transmission System Enhancement Project
ARAP	Abbreviated Resettlement Action Plan
ASBB	Assam State Biodiversity Board
ASDMA	Assam State Disaster Management Authority
ASTC	Assam State Transport Corporation
BMC	Bio-diversity Management Committees
BOQ	Bill of Quantity
CEA	Central Electricity Authority
CESMP	Contractor's Environmental and Social Management Plan
CoP	Conference of Parties
CPCB	Central Pollution Control Board
Cr	Crore (1 Crore = 10 Million)
CTE	Consent to Establish
CTO	Consent to Operate
CWRA	Central Wetlands Regulatory Authority
D/C	Double Circuit
E&S	Environment and Social
E&S Officer	Environment and Social Officer
E&S Policy	Environmental and Social Policy
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMPF	Environmental and Social Management and Planning Framework
ESS	Environmental and Social Standard
ESZ	Eco Sensitive Zone
GIS	Gas Insulated Substation
GoA	Government of Assam
GoI	Government of India
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HIV	Human Immunodeficiency Virus
HTLS	High Temperature Low Sag
IA	Implementing Agency
INR	Indian Rupee
IoE	Inspectorate of Electricity
IP	Indigenous Peoples
IPP	Indigenous People Plan



IUCN	International Union for Conservation of Nature and Natural Resources
Km	Kilometer
LILO	Loop In Loop out
MoEF&CC	Ministry of Environment, Forest and Climate Change MVA
MVA	Mega Volt Ampere
NBA	National Biodiversity Authority
NBWL	National Board of Wildlife
NGO	Non-Government Organization
NGT	National Geern Tribunal
OPGW	Optical Power Ground Wire
PAPs	Project Affected Persons
PCB	Pollution Control Board
PFA	Power for All
PIU	Project Implementation Unit
PMC	Project Management Consultancy
PMU	Project Management Unit
S/S	Substation(s)
SBWL	State Board of Wildlife
SCorS/C	Single Circuit
SEIAA	State Environment Impact Assessment Authority
STU	State Transmission Utility
T&T	Tower and Transmission
TL	Transmission Line
VU	Vulnerable
Mbgl	Meters Below Ground Level

WEIGHTS AND MEASURES

1 ha (Hectare)	=	10,000 sq.m or 2.47 Acre
1 km (kilometer)	=	1,000 meters
1 kV (kilovolt)	=	1,000 volts
1 Crore	=	10 million
1 US\$	=	INR 91.68

Executive Summary

Background: The Asian Infrastructure Investment Bank (AIIB), in collaboration with the Government of India (GOI), has received a request from the Government of Assam (GoA) for financial and technical support to upgrade and enhance Assam's power transmission network as part of the Power for All (PFA) initiative. To improve the reliability of power supply, AIIB has provided assistance for the "Assam Intra-State Transmission System Enhancement Project" (AISTSEP), which is being carried out by Assam Electricity Grid Corporation Limited (AEGCL). This project aims to expand the capacity of transmission lines and substations by constructing new transmission substations, along with the necessary accompanying transmission lines, while also upgrading existing transmission capacities. AISTSEP is structured into two phases, with Phase I currently in progress and Phase II has commenced, both aimed at significantly boosting the reliability of the power network through these targeted interventions.

Phase II of the project involves the construction of 6 new substations, consisting of 220/132 kV and 132/33kV GIS and AIS designs, along with the associated transmission lines. The current Environmental and Social Impact Assessment-Environmental and Social Management Plan (ESIA-ESMP) report specifically addresses the planned construction of a 220/132KV 2x160MVA AIS at Morigaon, which is part of Package E under Phase II of the AISTSEP.

In accordance with AIIB's Environmental and Social (E&S) policy and the compliance requirements outlined in the approved Environmental and Social Management Planning Framework (ESMPF-Phase II) for the project, an Environmental and Social Impact Assessment, along with an Environmental and Social Management Plan (ESIA-ESMP), must be established for the substations prior to the start of any work. This ESIA-ESMP report is centered on the proposed new 220/132KV, 2x160MVA AIS at Morigaon (Package E) under Phase II of AISTSEP and the associated transmission line, viz., a) 220 kV 4 CKT Baghjap LILLO line; and b) 220 kV D/C TATA Line, which are part of "Package E" and is covered under Phase II of the project. The ESIA-ESMP for transmission line has been undertaken based on the outcome of initial walk over survey which identified a preferred alignment based on analysis of three potential alternatives associated with the Bee-line between the two end-points. More detailed information about the accurate alignment of the transmission line, specific parcels of land which the RoW will intersect, and the exact footprint of the transmission towers would be available during the next phase of project planning, involving Check Surveys is not covered in this ESIA.

This ESIA-ESMP will be updated following completion of the Check Surveys, i.e., upon confirmation of the exact T/L alignments and tower footings, the E&S risks and impacts, and mitigation measures of the exact project footprint will be further updated.

Description of the Project: The subproject site is situated within the premises of AEGCL's existing 132/33KV Baghjap Grid Sub Station at Baghjap in Morigaon district, Assam, with geographic coordinates 26°10'7.50"N and 92°13'24.44"E.

The New Morigaon Air-Insulated Substation (AIS) is proposed to be located on Plot no. 464 in Baghjap Village and 171 in Junbil Village within AEGCL's existing 132/33 kV (2x50 MVA) Baghjap Grid Substation campus, in Mayong Circle of Morigaon District (26°10'09"N 92°13'28"E). The detailed description of the proposed subproject locations is presented in the table below.

SS Aspects	Description
Name of the Substation	New 220/132kV AIS at Morigaon (Package E)
Coordinates	26°10'09"N., 92°13'28"E
Location Village/ Town	Village Baghjap, Tehsil Mayong
District	Morigaon
Name of the T&T Division	Narengi
S/S Land Status	SS land owned by AEGCL
Area (Ha)	25 Bigha (3.34 Ha) in Baghjap Village; 10 Bigha (1.34 Ha) in Junbil Village; Total= 35 Bigha Land (4.68 ha)
Terrain	Plain
Current Land-use	Partly built-up (staff quarters), grass and shrub cover with number of small and large tree, overhead water tank and pumphouse; AEGCL acquired Government land in 1984, to establish the existing 132kV Baghjap Grid substation, which was constructed in around 1990.

A total area of 35 Bigha (4.68 ha) was transferred by the District Commissioner of Nagaon in January 1984 to AEGCL for setting up the existing Grid Substations. Out of the total of 4.68ha 1.34ha was utilized to construct the existing 132/33kV Grid substation, while the remaining 3.34ha was used to construct staff quarters and associated infrastructure and open space.

After assessment, it was concluded that the remaining 3.34ha of land would be adequate to construct the new Morigaon Air-Insulated substation (220/132kV). Moreover, the staff quarters and overhead water tank, pump-house, are aged and in a dilapidated condition, a number of small and large trees that would be cut, before the land is developed.

Transmission Line: The two transmission lines, 220kV Baghjap LILO and 220kV D/C TATA Line extend for a distance of 5.43 km and 8.31 km respectively and would fall in the districts of Morigaon. The detailed description of the proposed Transmission Line locations is presented in the table below.

TL Aspects	Description	
Name of the Transmission Line	220 kV 4 CKT Baghjap LILO Line	220 kV D/C TATA Line
Total Route Length	5.43 KM (Approx)	8.31 KM (Approx)
Total Tower Quantity	21 Towers	33 Towers; 04 Gantry
Coordinates	Starting point: 26°08'09"N 92°14'31"E Ending point: 26°10'07"N 92°13'24"E	Starting point: 26°10'07"N 92°13'26"E Ending point: 26°07'27"N 92°13'07"E
Location Village/ Town	Baghjap, Junbill, Bangthai Gaon Kharbeel, Bangfor	Baghjap, Junbill, Bangthai Gaon, Kharbeel, Bangfor, Tegheria
District	Morigaon	Morigaon
Name of the T&T Division	Narengi	Narengi
T/L Land Status	Land Schedule will be finalized after engagement of EPC. As per the KMZ file, the proposed line is passing through the	Land Schedule will be finalized after engagement of EPC. As per the KMZ file, the proposed line is passing through the

TL Aspects	Description	
	agricultural land.	agricultural land. Final status will be known after land schedule verification from the CO office.
Area (Ha) RoW	19 Ha (approx.)	29 Ha (approx.)
Terrain	Plain and agricultural land (Paddy Field)	Plain and agricultural land (Paddy Field)
Current Land-use	Agricultural Land. Final status will be identified after land schedule verification from the CO office.	Agricultural Land. Final status will be identified after land schedule verification from the CO office.

As per the plan, the RoW of the alignment would be 35 m and transmission towers are expected to be set up every 250-300 m (approx. 3-4 towers per km depending on the terrain and other technical, environmental and social considerations), each occupying a land footprint of about 30m to 45m square. From the land use point of view, the line alignments would primarily cover agricultural and barren/wasteland use types. The ends of the transmission line would originate from the respective substations of Baghjap, which have access through road. At several other points along the route, crossings with roads (national and state highways) and railway line are expected to occur. For access to other points of the proposed transmission lines, access would have to be obtained through existing village roads and open terrain.

Existing facilities of the subproject: The 132/33 kV AIS at Bahgjap is an existing and operational substation owned and managed by Assam Electricity Grid Corporation Limited (AEGCL). The proposed 220/132 kV AIS at Morigaon is planned to be developed within the same campus of this existing facility.

For the associated transmission line of the subproject, i.e., the 220 kV 4-CKT Bahgjap LILO line, power will be evacuated from the existing 220 kV Karbi Langpi–Sarusajai D/C transmission line.

According to the Asian Infrastructure Investment Bank’s (AIIB) Environmental and Social Framework (ESF) 2024, this subproject does not include any associated facilities. Its scope is strictly confined to upgrading and enhancing the current transmission infrastructure to improve system reliability and efficiency.

Land requirement for the 220/132kV (2x160 MVA) Morigaon AIS and associated Transmission Line:

Substation: The proposed 220/132kV (2X160 MVA) AIS substation at Morigaon is planned to be constructed on the 3.34ha which presently has dilapidated and partly occupied staff quarters, over-head water tank, a pump-house, and small and large trees. Following a joint site verification and stakeholder consultation conducted by the PMC’s Environmental and Social Safeguard Specialists and Team Leader and an official of the existing substation on January 3rd and 8th, 2026, it was confirmed that the identified site is free from encroachments. A thorough multi-step verification process was undertaken, including physical inspection, cross-verification with official land records, analysis of Google Earth imagery, and consultations with the Resident Engineer of the existing Baghjap substation. The site is confined within existing boundary walls and has no claims or ongoing usage.

Transmission Line: The construction phase of the project would involve the following activities; (a) site clearance – ground vegetation and/ or crops on the field would be cleared and trees would be lopped or felled, to the extent required, for gaining access to the corridor and to allow for tower construction and stringing activities; (b) for setting up towers, limited excavations would be undertaken for footings,

concrete foundation developed, framework inserted, and the tower frame would be erected after hauling components to a nearby laydown area using existing roads and the transmission corridor RoW; (c) mechanical stringing of conductors between towers would be done using a winching machine. As mentioned earlier, a total land of 48ha of land would be utilized in the RoW for both the lines. In all there would be 54 towers for both the lines. Thus, an area of about 0.31ha of land would be utilized for tower footing¹.

The construction activities are anticipated to involve 15-20 people during construction of tower foundation and tower erection and 10-15 people would be involved in tower erection and 20-30 people would be involved in stringing. Mostly the labour would be staying in fly camps while remaining workers would be staying in laydown areas (comprising of labour quarters and material storage areas). Typical vehicles on site at the construction site would include 2 trucks, 2-3 excavators and 6 light-duty vehicles (LDV), puller and tensioner.

The total cost for the construction of this substation and associated transmission line (220kV 4CKT Baghjav LILO and 220kV D/C TATA Line) is estimated at **INR 229.38 Crores**.²

The baseline studies have profiled the environmental and social conditions of the Baghjav SS in Morigaon site and the transmission line corridors (220kV 4 CKT Baghjav LILO and 220kV D/C TATA Line), covering, study area of 500m and 2km around substation and a buffer distance of 500 m on either side of the RoW and a 10km buffer to appraise any significant environmental sensitivity. The studies were designed to collect information from secondary sources and to obtain primary information through site visits and consultations with local communities and other related stakeholders. Overall, the baseline is reflective of the environmental and social landscape of the area and the Morigaon District. Site specific environmental and social baseline is described in the Table below:

Environmental Setting	
Terrain & Slope	The terrain is flat with slight undulations.
Soil	Soil is compacted
Existing drainage pattern	There is a natural channel in east of the existing SS.
Environmental pollution in the vicinity	There is a Dalmia Cement Plant, due south-west from the Baghjav Grid SS, within an aerial distance of 2km.
Other environmental sensitivity	Nil
Social Setting	
Status of Land	A total area of 35 Bigha (4.68 hectares) that belongs to AEGCL, on which the existing Baghjav Grid SS covers an area of 10 Bigha (1.34 hectares). The remaining area of 25 Bigha (3.34 hectares) would be utilized for constructing the proposed 220/132 kV AIS substation. The two transmission lines, viz., 220kV Baghjav LILO and 220kV D/C TATA Line spanning a distance of 5.43 km and 8.31 km respectively, would utilize an area of 48ha under its RoW (given the RoW width at 35m).
Habitations	The nearest major habitation includes Baghjav Village and Junbil Village which

¹ An average footing area of 57sqm has been taken, based on the different types of towers that may be used in this subproject.

² SS - 167.25 Cr + TL - 62.13 Cr = 229.38 Cr

Environmental Setting	
	are located approx. 10m and approx. 2 Km away from the SS respectively.
Religious & Culture related sensitivity (including sacred groves)	No cultural sensitivities were identified near the project site.

The potential impacts of the proposed AIS project were identified and evaluated using standard impact assessment procedures. Source references including past project experience, professional judgment and knowledge of both the project activities as well as the environmental and social setting of the site and surroundings were used as a basis for the assessment.

Policy, Legal and Administrative Framework: Power substation and transmission line projects are not included in the list of environmentally sensitive projects, and therefore, do not require an Environmental Clearance (EC), according to the Environmental Impact Assessment (EIA) notification of 2006 and its subsequent amendments by the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India. However, activities associated with the project, such as quarry operations, may require prior Environmental Clearance (EC).

Since the project is financed by the AIIB, the Bank's Environmental and Social Policy (ESP) is applicable. The project has been classified as "Category B" under AIIB's ESP, with specific reservations outlined in the approved Environmental and Social Management Planning Framework (ESMPF), thus necessitating an ESIA and ESMP for the proposed substations to be included in its investment. This ESIA, along with the resulting Environmental and Social Management Plan (ESMP), will detail measures to mitigate the environmental and social risks and impacts of the subproject in alignment with AIIB's ESP and ESSs.

Environmental and Social Standards:

Environmental and Social Assessment and Management (ESS 1) is relevant to the project since civil works may lead to a limited number of potentially adverse environmental and social impacts. These impacts are not new and are confined to the project's existing boundary. The proposed substation will be built on land already owned by AEGCL within the current 132/33KV Baghjap Grid Sub Station area, so land acquisition is not necessary for this component; **Involuntary Resettlement (ESS 2)** is not triggered for the construction of the proposed substation. However, the ESS 2 is applicable as there is involuntary permanent and temporary restrictions on land use for the tower footing as well as RoW of the Transmission line despite ownership of land remaining with affected persons. **Indigenous Peoples ESS 3** becomes applicable when Indigenous Peoples are present in or hold a collective attachment to the project's area. For the Substation, the 220kV 4 CKT Baghjap LILLO Line, and the 220kV D/C Tata Line, a screening process was undertaken using the IP Screening Checklist. The assessment reveals that the impacted population is a mix of Assamese communities, including the Tiwa community categorized as a Scheduled Tribe (ST) Plains group. This group does not exhibit any significant socio-cultural traits typically associated with Indigenous Peoples as outlined in AIIB's ESS-3. While they retain separate customary institutions, they adhere to the same administrative frameworks and social practices as a wider community, use Assamese as their primary language instead of a distinct indigenous one, and are socially as well as culturally integrated into the mainstream society. Moreover, the project site lies outside any Sixth Schedule areas as designated by the Indian Constitution.

It is noted that the applicability of ESS 3 requires further verification. Accordingly, ESS-3 will be assessed in detail following the identification of landowners for tower footing locations and the Right of Way (RoW) of

the transmission line, and upon completion of the census survey of affected persons.

Description of the Environment: The proposed subproject site is located in Village Baghjap, in the Morigaon district of Assam, India, on land owned by AEGCL. Baseline data from secondary sources was gathered in January 2026. Primary data collection took place during site visits in January 3 and 8, 2026, conducted by a team of Environmental and Social Experts from the PMC. The main report provides details on the baseline conditions of the substation.

The direct impacts of the subproject are limited to the existing boundary, while indirect or induced impacts extend into the Area of Influence (Aoi), defined by a 2 km buffer zone. A 10 km radius is also examined to assess potential effects on the ecological and biological environment, including flora and fauna in the area. Furthermore, sensitive receptors such as schools, hospitals, religious structures, and settlements have been specifically mapped within a 500-meter radius of each substation site to identify environmental and social risks unique to each location.

The assessment of environmental and social attributes were conducted through both primary and secondary research. Primary attributes, including air quality, water, soil, noise levels, flora and fauna, as well as public consultations, were evaluated via field visits, and on-site monitoring, and reviews of historical studies.

Secondary attributes, such as land use patterns, geology, topographical characteristics, and socio-economic profiles, were analyzed through a literature review of previous research conducted by government agencies and published articles or annual reports and web-based research.

The proposed subproject site is situated close to developed areas, settlements and agricultural land. Within proposed substation area, a total of approx. 85 small and large trees of different species were identified for potential removal/ felling. A few trees are listed under Schedule-I of the Assam Trees Outside Forest (Sustainable Management) Rules, 2022, which exempts them from requiring prior felling permission. The remaining tree species are not listed in the aforementioned schedules and therefore necessitate prior approval from the relevant Forest Department for removal.

The site also includes 6 numbers 2-storied building consisting of 25 flats; which is occupied by 6 staff members with their families and 11 bachelor staff, while 8 flats are vacant. Overall, the structures are in a dilapidated state. Other structures such as dug-well, water storage overhead tank, pump-house, and water filter unit are also precenting within the premises. These structures are currently in poor condition and pose safety risks. As part of the site preparation, it is proposed that these buildings be demolished. Additionally, a small temple under a Peepal tree, and a security barrack are located within the existing substation boundary, and are not likely to be demolished.

There are no ecologically sensitive areas, such as National Parks, Wildlife Sanctuaries, or Biosphere Reserves, or designated historical, archaeological, or cultural sites within the 2 km and 10 km buffer zone of the proposed subproject location. However, two Key Biodiversity Areas (KBAs), namely Pobitora Wildlife Sanctuary and Amchang Wildlife Sanctuary, located approximately 14.4 km and 23.5 km from the proposed substation, respectively. These distances further increase along the alignment of the associated transmission lines, indicating the absence of sensitive ecological zones in the immediate vicinity of the proposed substation and transmission line corridors.

Prior to the start of construction activities, an Environmental Quality Monitoring Tests (EQMT) was

conducted. The measured concentrations of PM₁₀ and PM_{2.5} were 72.3 µg/m³ and 37.3 µg/m³, respectively, both of which are significantly below the NAAQS 24-hour standard of 100 µg/m³. Levels of SO₂, NO₂, NH₃, and CO are within the limits set by both NAAQS and WHO. However, while PM₁₀ and PM_{2.5} levels meet NAAQS standards, they surpass WHO guidelines. In India, such exceedances are often attributed to road dust, vehicle emissions, and development activities. To mitigate impacts during substation construction, strategies such as water spraying, covering stockpiles, minimizing dust-generating activities in high winds, and providing personal protective equipment (PPE) along with awareness programs should be implemented.

The equivalent noise level at the AIS site, termination of 220/132 Baghjap LILLO Line and 220/132 D/C TATA Line was recorded at 59.3 dB(A), 55.9 dB(A) and 61.7 dB(A) during the daytime, which is below the permissible limit of 65 dB(A) for commercial areas as defined by the CPCB under The Noise Pollution (Regulation and Control) Rules, 2000, and WHO guidelines from 2021. These measurements establish a clear baseline, against which any future deviations will be systematically monitored and addressed through appropriate mitigation measures specified in the Environmental and Social Management Plan (ESMP).

Impact Assessment: Environmental sensitive areas and Key Biodiversity Areas (KBA) are not located in the vicinity or adjacent to the proposed substation site and along the proposed transmission lines at Morigaon. As assessed from the site visit and observation, the impacts are localized, temporary and manageable as no major environmental and social issues have been recorded. Details of impact and mitigation measures are discussed in the main report.

Environmental and Social Management Plan: The Environmental and Social Management Plan (ESMP) addressing identified impacts and the necessary administrative measures to guarantee the implementation of mitigation strategies at the site, along with regular monitoring of their effectiveness through the Environmental and Social Monitoring Program, is thoroughly outlined in the main report.

The estimated cost for implementing key environmental and social measures, as well as the associated monitoring plans, amounts to INR 229.38 Crores. This falls under the best engineering practices expected from the Engineering Procurement Construction (EPC) Contractor.

Monitoring and reporting arrangements for the AISTSEP, including the reporting line from the contractor to the AIIB, are established and detailed in the main report. Additionally, capacity building programs are being conducted by the Project Management Consultant (PMC) in accordance with requirements set forth in the PMC contract. The Environmental and Social (E&S) team of AIIB is also facilitating training and capacity building initiatives to ensure compliance with E&S requirements.

Climate Risk Assessment and Adaptation at the Design Stage: Remedial measures for climate risks have been adapted for the proposed sub-stations at design stage.

Stakeholder & Public Consultation and Information Disclosure: Stakeholder and public consultations were conducted with local residents, the Residential Engineer of the Baghjap substation, and vulnerable groups near the substation site on 3rd and 8th January 2026. Additional consultations will be held prior to the commencement of construction, focusing on communities affected by the substation and transmission line and living in and around the subproject, women-oriented groups, relevant government offices responsible for Right of Way (RoW) clearance and compensation (including Forest, Revenue, and Circle Offices).

This draft Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management

Plan (ESMP) will be disclosed online on the websites of AIIB and AEGCL. Hard copies of the full English version and the Assamese version of the Executive Summary will be available at the following locations:

Project Director cum CGM (PP&D),
Address: 1st Floor, AEGCL, Bijulee Bhawan,
Contact No.: 0361-2739520
Website: www.aegcl.co.in

Project Manager cum RE, Baghjap
Address: -132kV Baghjap GSS, AEGCL
Contact No.: 84863-16381

The PMC, concerned EPC contractor and PIU officials of AEGCL will ensure that relevant environmental and social information from these documents is made available to affected communities and stakeholders in a timely, accessible, inclusive, and culturally appropriate manner, including translation into local language(s), particularly Assamese.

Community consultations were conducted along the proposed transmission line (TL) alignments and in adjoining villages, including Baghjap and Junebil, to understand local perceptions, livelihood patterns, and concerns related to the project. Community members emphasized that the transmission line should avoid habitation areas, maintain adequate ground clearance, and ensure that tower construction is not undertaken during harvesting season. They also requested implementation of all necessary safety measures to prevent accidents, sought clarification on the land valuation method for compensation (government rate versus market rate), and demanded compensation prior to commencement of construction. Additionally, local residents expressed the need for prioritization of employment opportunities during construction. The consultations further confirmed that there is no dependency or encroachment on the proposed AIS substation site. Impact identification and evaluation were carried out using standard assessment procedures, supported by baseline surveys, past project experience, and professional judgment.

Grievance Redress Mechanism (GRM): To ensure environmentally and socially responsible implementation a free, multi-tiered Grievance Redress Mechanism (GRM) will be established to promptly address concerns or complaints from project-affected people or workers, helping to resolve issues efficiently and avoid litigation.

The GRM will consist of two levels of committees:

- Tier I—Operates at the field level.
- Tier II – Functions at the Project Management Unit (PMU)/Headquarter level.

The contact representative of the PIU shall be the Additional General Manager (AGM), Guwahati T&T Division, AEGCL. Focal point of person shall be the Resident Engineer (RE), Baghjap Substation and EPC representative. The EPC Representative shall be disclosed once onboard.

The Project-affected People's Mechanism (PPM) has been established by AIIB to provide an opportunity for the independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by the AIIB's failure to implement its ESP in situations when their concerns cannot be addressed satisfactorily through the Project-level GRM or the AIIB's management processes. Information about the PPM is available at: <https://www.aiib.org/en/policies-strategies/operational-policies/policy-on-the-project-affected-mechanism.html>

Implementation, Monitoring, and Reporting: Implementation of the GRM and GAP will be overseen by AEGCL's Project Management Unit with support from the Project Management Consultant and EPC contractors through clearly defined institutional arrangements. Environmental and Social officers will

monitor compliance, maintain grievance and gender-related records, and ensure timely corrective actions. Key indicators—such as grievance resolution rates, women’s employment levels, availability of gender-responsive facilities, and stakeholder satisfaction—will be tracked through monthly, quarterly, and semi-annual Environmental and Social monitoring reports. These reports will be reviewed internally and shared with AIB to ensure accountability, transparency, and continuous improvement in environmental and social performance across the project.

Gender Action Plan (GAP): The Gender Action Plan aims to ensure that women and men benefit equitably from project interventions and that gender considerations are integrated across all phases of implementation. Recognizing the relatively low female workforce participation and socio-economic disparities in the project area, the GAP promotes women’s participation in consultations, employment, and skill development opportunities. Measures include promoting the employment of women in construction and allied activities (targeting at least 30% where feasible), ensuring equal wages for equal work, providing gender-sensitive workplace facilities, and strengthening safeguards against gender-based violence and harassment in line with applicable laws. The plan also supports capacity-building, targeted outreach, and livelihood opportunities for women from affected communities, thereby contributing to inclusive development and social sustainability.

Summary, Recommendations and Conclusion: The ESMP provides a structured approach to ensure that the temporary impacts during construction are minimized, while also maximizing the positive benefits such as local employment opportunities, through effective management and monitoring.

It is recommended to implement all the mitigation measures outlined in Environmental and Social Management Plan, monitor Environmental and Social Monitoring Plan, continuous public consultation and maintaining GRM.

In conclusion, the proposed subproject will yield positive result in terms of reliable & enhanced power supply and the environment & social impacts identified in the ESIA study are manageable and can be mitigated effectively through preventive measures, and careful planning during the construction & operational phase.

Chapter 1 : Introduction

1.1 Project Background and Rationale

Assam Electricity Grid Corporation Limited (AEGCL) is a dynamic and growth-oriented public sector enterprise, registered under the 'Company Act, 1956'. Established in 2003 following the restructuring of the Assam State Electricity Board, AEGCL was designated as the State Transmission Utility (STU). Its primary responsibility is the efficient transmission of electrical power from bulk power sources to distribution networks across Assam.

In alignment with the Government of India's Sustainable Development Goal (SDG-7) for "Affordable and Clean Energy for All," the state of Assam is committed to strengthening its power transmission infrastructure. This initiative aims to ensure improved availability and accessibility of "Power for All" (PFA). To achieve this vision, the Government of Assam (GoA), with support from the Government of India (GoI), has launched the "Assam Intra-State Transmission System Enhancement Project (AISTSEP)," which is funded by the Asian Infrastructure Investment Bank (AIIB). The project's primary objective is to advance the state's power sector, focusing on capacity building for sustained long-term growth. A key goal of AISTSEP is to address constraints and congestion within the transmission network by increasing transmission line and substation capacity. This will involve constructing new transmission substations, building associated transmission lines, and upgrading existing infrastructure.

The AISTSEP project is divided into two phases: Phase I, currently under implementation, and Phase II has commenced. These efforts are expected to significantly enhance the reliability and efficiency of Assam's power network through strategic interventions. Phase-II of the project comprises construction of new six nos. of 220 kV and 132 kV GIS and AIS substations, as well as the associated transmission lines. The overall project expenditure amounts to approximately US\$ 444.11 million, with AIIB extending financial support of US\$ 304 million for Phase I and US\$ 140.11 million for Phase II.

The current Environmental and Social Impact Assessment-Environmental and Social Management Plan (ESIA-ESMP) report focuses on the proposed construction of a 220/132kV (2X160 MVA) AIS substation at Morigaon, which falls under Package-E of Phase II of AISTSEP. In addition to the construction of this substation, two transmission lines, viz., a new 220kV 4 CKT Baghchap LILO Line and a 220kV Double Circuit Tata Line shall be erected.

1.2 Purpose of the ESIA study

The proposed subproject, "220/132kV (2X160 MVA) AIS Substation at Morigaon (Package E) and associated transmission lines" does not require Environmental Clearance (EC), as per the Environmental Impact Assessment (EIA) notification of 2006 and its subsequent amendments, as power substation and transmission line projects are not categorized as environmentally sensitive. However, associated activities, such as quarry operations, may require prior EC approval.

To ensure compliance with the Asian Infrastructure Investment Bank's (AIIB) Environmental and Social Policy (ESP) and Environmental and Social Standards (ESSs), AEGCL is commissioning an Environmental and Social Impact Assessment (ESIA) study for this subproject. This study will identify potential environmental

and social risks and propose mitigation measures in the form of an Environmental and Social Management Plan (ESMP). This ESIA-ESMP report will be updated following completion of the Check Surveys, i.e., upon confirmation of the exact T/L alignments and tower footings. The E&S risks and impacts, and mitigation measures of the exact project footprint will also be updated accordingly. To ensure compliance with the Environmental and Social Policy (ESP) and the applicable Environmental and Social Standards (ESSs) of the Asian Infrastructure Investment Bank (AIIB), Assam Electricity Grid Corporation Limited (AEGCL) has commissioned an Environmental and Social Impact Assessment (ESIA) study for the proposed subproject. The ESIA aims to identify potential environmental and social risks and impacts associated with the project and to recommend appropriate mitigation and management measures, which are consolidated in the Environmental and Social Management Plan (ESMP).

For the Transmission Line (T/L) component, the present ESIA-ESMP is based on the preliminary route survey. The assessment will be further refined and updated upon completion of the detailed check survey. Following confirmation of the final transmission line alignment, tower locations, and associated footprint, the environmental and social risks and impacts will be reassessed as necessary, and the corresponding mitigation measures in the ESMP will be updated to reflect the exact project configuration.

1.3 Objectives and Scope of ESIA

The Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) for the subproject under Phase-II of the AISTSEP initiative have been prepared in accordance with the approved Environmental and Social Management Planning Framework (ESMPF). The ESIA and ESMP outline the guiding principles, scope, and procedural steps required to ensure compliance with applicable environmental and social safeguard requirements, including those of AIIB, the Government of India (GoI), and the Government of Assam (GoA).

The ESIA-ESMP aims to identify, assess, and mitigate potential environmental and social risks while enhancing positive impacts associated with the subproject.

The Scope of work for the ESIA study shall be:

1. Policy, Legal, and Institutional Framework Review: Conduct a thorough analysis of the relevant policies, laws, and institutional structures applicable to the proposed subproject.
2. Baseline Description: Provide a detailed description of the current physical, biological, ecological, social, cultural, and economic conditions in the subproject area.
3. Alternative Analysis: Evaluate all potential alternatives for the subproject to ensure optimal outcomes.
4. Impact Identification: Identify all significant environmental and social impacts associated with the subproject.
5. Impact Assessment and Mitigation: Assess the risks and impacts stemming from subproject interventions and propose measures to avoid, minimize, or mitigate negative effects while enhancing positive impacts.
6. Climate Risk Assessment: Integrate climate risk assessment and adaptation strategies at the design stage, aligning with the 2015 Paris Agreement and COP21 commitments.
7. Stakeholder Engagement: Conduct a stakeholder analysis to identify expectations, potential impacts, and

concerns. Engage in public consultation and ensure transparent disclosure of relevant information.

8. Environmental and Social Management Plan (ESMP): Develop and implement an ESMP in compliance with AIB safeguard policies to address identified risks and impacts.

9. Institutional Arrangements: Define roles and responsibilities across subproject, district, and state levels. Include mechanisms for grievance redressal, monitoring and evaluation plans with indicators, capacity-building needs for managing environmental and social issues, and a detailed ESMP budget.

The document focuses on substation and transmission line components under an EPC mode of implementation. While the substation designs and transmission alignments are in place, there are a number of activities that require to be finalized post-award of work to EPC Contractor. These include statutory clearances from vendors of sand, gravel, aggregate, etc., geotechnical investigations, assessment of RoW impacts, adhering to the local government procedures, and proximity to sensitive receptors, foundation types, tower placements and alignment, which are influenced by factors such as variable terrain, land use, infrastructure crossings, and the need for statutory clearances. and statutory clearances. These activities influence critical environmental and social data collection, including land ownership, Right of Way (RoW) impacts. The ESIA-ESMP ensures that these factors are adequately addressed to minimize adverse impacts and comply with regulatory requirements.

Transmission line involves a series of critical post-award activities, including detailed route surveys, profiling, and geotechnical investigations at each tower location. These activities play a pivotal role in determining tower placements, foundation types, and alignment, which are influenced by factors such as variable terrain, land use, infrastructure crossings, and the need for statutory clearances. As a result, key environmental and social data such as land ownership details, right-of-way (RoW) impacts, and proximity to sensitive receptors, become accessible only after the EPC contractor completes the detailed design and tower scheduling process.

1.4 Approach and key tasks for this ESIA study

The ESIA study aims to ensure that the subproject (substation and associated transmission lines) aligns with environmental and social standards while addressing the needs and aspirations of the community and beneficiaries. The study evaluates potential impacts on the physical, ecological, biological environment, and local populations during all project phases. The methodology employed for the ESIA includes the following steps:

1. Screening: This involves assessing compliance with national, state, international, and AIB legal policies. Based on the EIA Notification of MoEF&CC, environmental clearance is not required. The project is classified as "Category B" under AIB's Environmental and Social (E&S) policy, necessitating an ESIA and Environmental and Social Management Plan (ESMP) as per the approved Environmental and Social Management Planning Framework (ESMPF).

2. Scoping: A reconnaissance survey was conducted within a 2 km radius of the subproject footprint and extended to 10 km from the substation boundaries to evaluate potential environmental and social sensitivities, including ecological conditions. Sensitive receptors such as schools, hospitals, offices, religious structures, and settlements were mapped within 500 meters of the substation site and proposed transmission lines to identify site-specific risks. This step helped define the study area, guide data collection, and support impact identification.

3. Baseline Data Collection: Comprehensive data on physical environmental resources and social-economic aspects were collected within the project footprint (2 km radius) and extended to 10 km for biodiversity assessment. Secondary data was gathered in December 2024, while primary data collection occurred during site visits on January 3rd and 8th, 2026. Environmental and Social Specialists from PMC, along with present Baghchap substation officials of AEGCL, conducted these visits. A detailed inventory and mapping of sensitive receptors within 500 meters of the substation site and proposed transmission lines were also performed to inform risk assessment and mitigation planning.

4. Stakeholder and Public Consultations: Consultations with key stakeholders and the public were held on January 3rd and 8th, as well as February 7th and 10th, 2026, regarding the substation and transmission line project. These meetings covered the villages of Baghchap, Junbil, Bangthaigaon, Kharbeel, Bangfor, and Tegheria to incorporate community feedback into the assessment process.

5. Impact Assessment: The identification, prediction, and evaluation of impacts were carried out using data from primary and secondary sources as well as insights from stakeholder consultations.

6. Environmental and Social Management Plan (ESMP): Practical mitigation measures, along with a management plan, monitoring framework, budget allocation, and institutional arrangements, were developed in accordance with the approved in line with approved Environment and Social Management Planning Framework (ESMPF) for Phase II of the Project.

1.5 Key Tasks under this ESIA study

The following tasks were undertaken by the PMC team for this study, and assisted by AEGCL E&S Team:

Table 1: Tasks undertaken for preparation of the ESIA-ESMP report

Sl.No.	Task	Details
1	Desk study/literature review	A comprehensive desk study and literature review was carried-out to gather secondary information specific to the subproject prior to the site visit for screening purposes.
2	Site reconnaissance	Following this, the PMC team carried out a site reconnaissance visit to the proposed 220/132kV (2X160 MVA) AIS Substation at Morigaon and associated transmission lines. This visit was part of the screening and scoping exercises required for the Environmental and Social Impact Assessment (ESIA) study. Details of the reconnaissance checklist can be found in Appendix 1 .
3	Site Visit and Consultations	The PMC along-with AEGCL-PMU team conducted site visits on January 3 and 8 and February 7 and 10, 2026, to gain an in-depth understanding of the subproject area and its surrounding environment through a thorough physical assessment. During these visits, stakeholder and public consultations were organized with local communities in the villages within the study area. Further details regarding stakeholder consultations are provided in Chapter 10 .
4	Baseline data collection	The baseline data collection primarily utilized qualitative methods, incorporating secondary data from desk research and literature reviews, as well as primary data obtained through environment quality monitoring tests, physical observations, stakeholder and public discussions, and photography conducted during site visits.
5	Impact assessment	After identifying potential impacts, a comprehensive assessment was carried out to formulate appropriate mitigation measures aimed at minimizing these impacts effectively.

Sl.No.	Task	Details
6	Analysis of Alternatives	In alignment with AIIB's Environmental and Social Framework (2024), an analysis of alternatives for the proposed subproject location was conducted. The "without project" scenario was deemed unfeasible due to persistent issues such as overloading, poor power quality, and limited integration of renewable energy sources. The site selection process adhered to criteria prioritizing AEGCL's existing land, government land, proximity to roads, and the avoidance of environmentally sensitive areas. The allocated land, provided by the Government of Assam, was deemed suitable following thorough environmental and social due diligence. The transmission lines, viz., the 220kV 4 CKT Baghjap LILO Line and the 220kV D/C Tata Line were finalized out of 3 alternatives each, on the basis of environmental considerations (avoiding sensitive areas such as wetlands, forests, wildlife habitats, and protected zones), social impacts (minimizing displacement of communities, avoiding cultural or heritage sites, and reducing conflicts with existing land use), topography and terrain, technical feasibility and accessibility.
7	Development of an Environmental & Social Management Plan (ESMP) and Monitoring Plan (ESMoP)	The Environmental and Social Management Plan (ESMP) and Environmental and Social Monitoring Plan (ESMoP) are critical tools for ensuring the effective management and oversight of environmental and social impacts associated with a project. The ESMP provides a comprehensive framework for addressing these impacts throughout the project's lifecycle, including the design, construction, and operational phases. It specifies mitigation measures, responsibilities, and timelines to minimize adverse effects. In parallel, the ESMoP serves as a structured approach to monitor and evaluate the implementation and effectiveness of the mitigation measures outlined in the ESMP. This plan establishes key performance indicators, monitoring schedules, and reporting mechanisms to ensure compliance and facilitate adaptive management. Together, the ESMP and ESMoP play a vital role in promoting sustainable project development and aligning with environmental and social best practices.
8	Institutional Arrangements	The institutional arrangements for the project have been structured in alignment with the organization framework recommended in the Environmental and Social Management Planning Framework (ESMPF) for Phase II of the AIIB-funded AISTS-EP. These arrangements were carefully considered to establish an effective implementation mechanism and to define roles and responsibilities at the subproject level.
9	Grievance Redressal Mechanism	Additionally, a multi-tiered Grievance Redress Mechanism (GRM) has been developed to address concerns related to the subprojects. Detailed information regarding these GRMs can be found in Chapter 11.

1.6 Limitation of the ESIA study

This Environmental and Social Impact Assessment (ESIA) report has been prepared based on established scientific principles and professional judgment, applied to the specific facts and circumstances of the subproject.

The findings and interpretations presented rely on the information currently available, within the defined scope of work, project details, secondary data, stakeholder feedback, budget constraints, and project schedule. The baseline assessment for the subproject site in Morigaon, has been developed using secondary data accessible in the public domain and primary data through field visit and consultations. Additionally, AEGCL's prior experience with similar projects in Assam has been leveraged to supplement this baseline information.

Stakeholder consultations conducted during site visits were limited to those individuals and groups available at the time, including members of the local community and relevant stakeholders (Questionnaire used in the field is attached in **Appendix 2**).

Environmental and Social Standards (ESS 2) Involuntary Resettlement: The project involves involuntary restrictions on land use, especially for tower footing, the Right of Way (RoW) and for temporary access roads for both the transmission lines. Consequently, an Abbreviated Resettlement Action Plan (ARAP) will be prepared to address these impacts for associated transmission lines. As the proposed substation will be constructed within AEGCL's own existing Baghjap campus, so the ARAP will not require for substation.

Environmental and Social Standards (ESS 3) Indigenous Peoples: ESS 3 is considered when Indigenous Peoples are present in or have a collective attachment to the project area. In this case, a screening was conducted for the Substation and the 220kV 4 CKT Baghjap LILO Line and the 220kV D/C Tata Line. The IP Screening checklist is attached in **Appendix 3**. The findings indicate that affected individuals, as a result of the transmission lines belong to mixed Assamese population groups including the Tiwa community that are Scheduled Tribe (ST) Plains community. This ST community does not exhibit substantive socio-cultural characteristics of Indigenous Peoples as per ESS 3. They have separate customary institutions, but follow the same administrative and social systems as the dominant society, they communicate primarily in Assamese without a distinct indigenous language. Specifically, they are socially and culturally integrated with the mainstream population. Furthermore, the project area is not within a Sixth Schedule area under the Indian Constitution.

Based on this assessment, it is noted that the applicability of ESS 3 requires further verification. Accordingly, ESS-3 will be assessed in detail following the identification of landowners for tower footing locations and the Right of Way (RoW) of the transmission line, and upon completion of the census survey of affected persons.

1.7 Report Structure

This ESIA-ESMP report is structured as follows:

Executive Summary: A concise summary of the entire report.

Chapter 1: Introduction: Provides the project background, purpose, objectives, scope, methodology, key tasks, limitations, and structure of the report.

Chapter 2: Project Description: Offers a detailed technical description of the subproject, covers profile of the project route, overview of project site, overview of activities during different phases of the project, land requirement and allotment process.

Chapter 3: Policy, Legal, and Institutional Framework: Outlines applicable constitutional provisions, policies, regulations of Assam and India, and AIIB's Environmental and Social Standards (ESSs) relevant to the project.

Chapter 4: Description of Environmental & Social Baseline Conditions: Details the baseline environmental and social aspects, including location characteristics, physical environment, ecological and biological environment (flora and fauna), and socio-economic conditions.



Chapter 5: Analysis of Alternatives: Analyzes different site selection options considering design, environmental, social, and economic factors, with justification for the selected site. Further, this chapter elucidates detailed analysis about different options of TL alignment with considering design, environmental, social and economic aspects. The selection of final alignment with their justification is reflected in this chapter.

Chapter 6: Assessment of Potential Environmental and Social Impacts and Mitigation Measures: Identifies potential risks and impacts on physical, ecological, biological, and social environments based on baseline environmental features of the project during design, construction and operation phases and mitigation measures for all identified adverse impacts. Proposes mitigation measures to address these risks.

Chapter 7: Environmental and Social Management Plan (ESMP) & Monitoring Plan (ESMoP) and Budget: This chapter outlined the ESMP for identified impacts and the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored. This chapter also outlines: (i) the Environmental and Social Monitoring program for the project, and (ii) budgetary allocation for implementation of different activities of the ESIA.

Chapter 8: Climate Risk Adaptation & Vulnerability Assessment: Assesses climate risks, adaptation measures incorporated in the design phase, and recommendations to enhance climate resilience.

Chapter 9: Institutional Arrangement for Monitoring and Reporting: Describes the institutional framework and capacity-building measures required for implementing the ESMP and ESMoP. Defines roles and responsibilities of stakeholders.

Chapter 10: Stakeholder & Public Consultation and Information Disclosure: Outlines strategies for engaging stakeholders and the public, including stakeholder identification, mapping, consultation processes, and continuous participation.

Chapter 11: Grievance Redress Mechanism: Establishes a system for addressing grievances during project implementation to ensure affected parties can voice concerns and seek resolutions.

Chapter 12: Gender Action Plan: Focuses on equitable benefits for both men and women through specific strategies to address gender disparities in access to resources, employment, training, and decision-making.

Chapter 13: Summary, Recommendations, and Conclusion: Summarizes impacts, mitigation plans, management strategies, and provides recommendations along with concluding remarks.

Appendices: Contains supporting documentation related to the project.

Chapter 2: Project Description

2.1 General

The AISTSEP Phase-II project focuses on augmenting the electricity transmission capacity within the state by constructing new power substations, including a 220/132 kV (2x160 MVA) AIS Substation at Morigaon, as part of Package E. Additionally, the initiative encompasses the development of associated transmission lines and complementary infrastructure. The primary objectives are to improve energy accessibility for industries and businesses, minimize transmission losses, and support economic growth and sustainability. This chapter outlines a comprehensive overview of the proposed subproject including its associated TLs, detailing its location and the scope of related infrastructure enhancements.

2.2 Subproject description

The proposed AIS at Morigaon site is situated within the premises of AEGCL's existing 132/33KV Baghjap Grid Sub Station at Baghjap in Morigaon district, with geographic coordinates 26°10'7.50"N and 92°13'24.44"E. Baghjap is a village located in Mayong sub-division of Morigaon district in Assam, India. It is situated approx. 65km away from sub-district headquarter Mayong and approx. 19km away from Morigaon, the district headquarters. As per constitution of India and Panchyati Raaj Act, Baghjap village is administrated by Sarpanch (Head of Village)³ who is the elected representative of the village. The village spans a total geographical area of 195.24 hectares, and Jagiroad is the nearest town for all major economic activities, which is approx. 7km away.

Baghjap is well connected via multiple modes of transportation. It is located approx. 62km from the State Capital, Guwahati that can be accessed via., NH27 (AH1) (Guwahati to Jagiroad) and NH715A (Jagiroad to Morigaon). The nearest railway station is at Jagiroad which is a significant station under the Guwahati-Lumding section of the Northeast Frontier Railway. It operates as a double-line, fully electrified station.

Table 2: Sub-project location and details

SS Aspects	Description
Name of the Substation	New 220/132kVAIS at Baghjap (Package E)
Coordinates	26°10'09"N., 92°13'28"E
Location Village/ Town	Village Baghjap, Tehsil Mayong
District	Morigaon
Name of the T&T Division	Narengi
S/S Land Status	SS land owned by AEGCL
Area (Ha)	25 Bigha (3.34 Ha) in Baghjap Village; 10 Bigha (1.34 Ha) in Jun Beel Village; Total= 35 Bigha Land (4.68 ha)
Terrain	Plain

³ The Sarpanch/Head of the Village is an elected head of the Gram Panchayat and principal representative responsible for village-level administration and local governance under the Panchayati Raj system.

SS Aspects	Description
Current Land-use	Partly built-up (staff quarters), grass and shrub cover with number of small and large tree, overhead water tank and pumphouse; AEGCL acquired Government land in 1984, to establish the existing 132 kV Baghjap Grid substation, which was constructed in around 1990.
Entry/Exit Gate	At the present level of planning, the existing entry/exit gate will be used to access both the existing and proposed sub-stations.

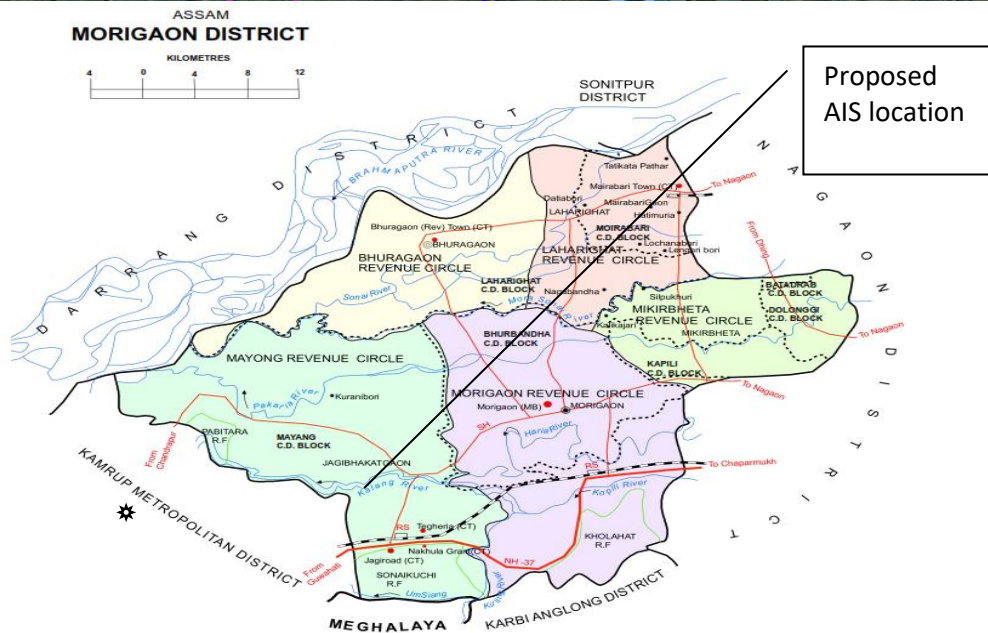


Figure 1: Proposed 220/132kV AIS at Morigaon and Existing 132/33kV Grid Substation site

In addition, Environmental and Social Management Plan (ESIA-ESMP) includes the two associated Transmission Lines, viz., the 220kV 4 CKT Baghjap LILo Line and 220kV D/C Tata Line.

The Right of Way (RoW) required for the transmission line is 35m (17.5m on each side of the transmission line route) which is approx. 19ha and 29ha respectively for the 220kV 4 CKT Baghjap LILO Line and 220kV D/C Tata Line. The tower base area required varies from 31-45 sq.m for DA type towers, 37-53 sq.m for DB type towers, 41-61 sq.m for D/C type towers, and 47-70 sq.m for DD type towers.

Based on the assessment, for the 220kV 4 CKT Baghjap LILO Line, temporary access roads will be required for 9 out of 21 tower foundation locations, while the remaining sites can be accessed via existing rural roads and paddy fields. For the 220kV D/C Tata Line, temporary access roads for 19 out of 33 tower locations will be required, while the remaining tower locations can be accessed via existing rural roads and paddy fields. The final status of accessibility to the towers will be ascertained after the check survey. Most of these tower foundation sites are located in paddy fields, and temporary cart track may impact paddy fields and standing crops, depending on the season.

The above-mentioned TLs, i.e., 220kV 4 CKT Baghjap LILO Line and 220kV D/C Tata Line are located in the Mayong Kaliabor of Morigaon district in the State of Assam.

Map showing the location of the proposes 220/132kV AIS at Morigaon and the associated Transmission lines are shown in **Figure 2** and a brief description of the Transmission Line corridor is given in

Table 3.

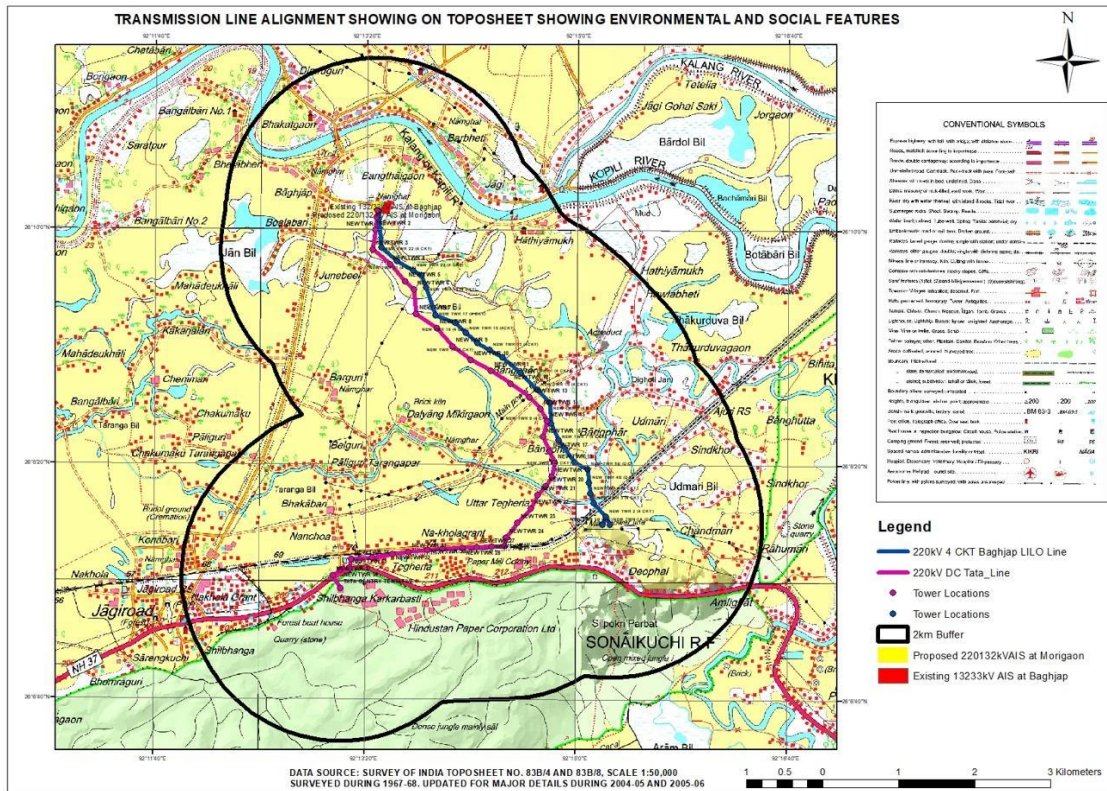


Figure 2: Map showing proposed Subproject on Sol Toposheets

Table 3: Brief Description of Transmission Line corridor

Sl. No.	Particulars	Description	
		220kV 4 CKT Baghjap LILO Line (5.43 km approx.)	220kV D/C Tata Line (8.31 km approx.)
1	Location Coordinates of TL (start and end)	Starting: 26°10'6.67"N and 92°13'24.17"E Ending: 26°8'7.58"N and 92°13'3.69"E	Starting: 26°10'6.67"N and 92°13'24.17"E Ending: 26°7'26.54"N and 92°13'6.98"E
2	Project affected Village	Baghjap, Junbil, Bantaigaon, Kherbil, Bangfor	Baghjap, Junbil, Bantaigaon, Kherbil, Bangfor, Tegheria
3	Tehsil	Mayang	Mayang
4	District Name / State	Morigaon / Assam	Morigaon / Assam
5	Capacity of Transmission line	220 kV	220kV
6	Power Evacuation	The transmission line will evacuate power from proposed 220/132kV SS at Morigaon.	The transmission line will evacuate power from proposed 220/132kV SS at Morigaon
7	Climatic zone	Subtropical Humid	Subtropical Humid
8	Elevation	Morigaon district: approx. 60m MSL	Morigaon district: approx. 60m MSL
9	Site Conditions	Mostly flat agricultural land and paddy fields and water bodies are prominent in the RoW of transmission line.	Mostly flat agricultural land and paddy fields and water bodies are prominent in the RoW of transmission line.
10	Road Accessibility	Site could be accessed through NH-27 and NH715A which connects to village roads of the project area.	Site could be accessed through NH-27 and NH715A which connects to village roads of the project area.
11	Road crossing	<ul style="list-style-type: none"> ● Railway: No ● National Highway: Yes, 1 location ● State Highway: Nil ● Existing TL: Yes, 1 location ● Village Roads/cart track: 10 locations ● Canal/ stream: Yes, 1 location 	<ul style="list-style-type: none"> ● Railway: Yes; 1 location ● National Highway: Yes, 1 location ● State Highway: Nil ● Existing TL: Yes, 3 locations ● Village Roads/cart track: 12 locations ● Canal/ stream: Yes, 1 location
12	Nearest Airport	Lokpriya Gopinath Bordoloi International Airport, located in Guwahati, approximately 80 kilometers away.	Lokpriya Gopinath Bordoloi International Airport, located in Guwahati, approximately 80 kilometers away.
13	Nearest Railway Station	Nearest Railway station is at Jagiroad.	Nearest Railway station is at Jagiroad.
14	Railway crossing	Nil	Yes
15	River/canal/small stream/pond crossing	<ul style="list-style-type: none"> ● River: Nil ● Small stream/ Canal: Yes ● Pond/ Water body: Nil 	<ul style="list-style-type: none"> ● River: Nil ● Small stream/ Canal: Yes ● Pond/ Water body: Nil
16	Number of Powerline (66 kV and above) crossing	Yes, 1 location	Yes, 3 locations
17	Reserved Forest/ Protected areas (WLS/ NP/ TR etc.)	Nil	Nil
18	Land Requirement	● Transmission Corridor (approx. 19ha has been considered with	● Transmission Corridor (approx. 29ha has been considered with

Sl. No.	Particulars	Description	
		220kV 4 CKT Baghjap LILO Line (5.43 km approx.)	220kV D/C Tata Line (8.31 km approx.)
		<p>35m RoW width and approx. 5.43km length of Transmission Corridor)</p> <ul style="list-style-type: none"> • Tower Base Area: DA type towers 35-51 sqm, DB type towers 47-66 sqm, DC type towers 50-70 sqm and DD type towers 57-79 sqm. • The tower base area for 21 numbers of towers will require an area of approx. 0.131ha of land. 	<p>35m RoW width and approx. 8.31km length of Transmission Corridor)</p> <ul style="list-style-type: none"> • Tower Base Area: DA type towers 35-51 sqm, DB type towers 47-66 sqm, DC type towers 50-70 sqm and DD type towers 57-79 sqm. • The tower base area for 33 numbers of towers will require an area of approx. 0.184ha of land.
19	Land Availability	RoW permission to be obtained from the District Administration.	RoW permission to be obtained from the District Administration.
20	Access Road	The project shall primarily use the existing roads in the area. In addition to this, temporary access routes shall be built during the transmission line construction phase.	The project shall primarily use the existing roads in the area. In addition to this, temporary access routes shall be built during the transmission line construction phase.
21	Water Requirement during Construction Phase	The transmission line generally requires about 50cum of water for casting of foundations for each tower, which shall be sourced from local sources through tankers.	The transmission line generally requires about 50cum of water for casting of foundations for each tower, which shall be sourced from local sources through tankers.
22	DG sets	DG Set (5 kVA)	DG Set (5 kVA)
23	Soil Characteristics	Alluvial soil is mostly loamy and consists of a mixture of clay and sand in varying proportions, ranging from pure sand on the banks of the Brahmaputra to sticky clay content depending on location.	Alluvial soil is mostly loamy and consists of a mixture of clay and sand in varying proportions, ranging from pure sand on the banks of the Brahmaputra to sticky clay content depending on location.
24	Seismic Zone	Seismic Zone V – Earthquake Hazard Zone.	Seismic Zone V – Earthquake Hazard Zone.
25	Highest Flood Level	On Kopili River at the Dharamtul Guage, Morigaon - Danger level - 56.00m; HFL - 58.09m recorded in the year 2004	On Kopili River at the Dharamtul Guage, Morigaon - Danger level - 56.00m; HFL - 58.09m recorded in the year 2004
26	Wind zone	The Project area falls in a Very High Damage Risk Zone A ($V_b = 47-50$ m/s).	The Project area falls in a Very High Damage Risk Zone A ($V_b = 47-50$ m/s).

Source: Various, including Assam Disaster Management Plan, Google Earth cross check and visual observation during site visit

2.2.1 Subproject component features

The proposed 220/132kV Air Insulated Substation (AIS) at Morigaon will be developed on a 3.34ha land parcel located within the Baghjap Grid Substation in Baghjap village in Morigaon district, Assam. The substation layout design is depicted in **Appendix 4** of the report. The project area is enclosed by a boundary wall, encompassing both the existing Baghjap Grid Substation, as well as the New 220/132kV AIS in the existing AEGCL campus, where all substation components will be systematically arranged following

standard engineering practices. Landscaping and plantation activities are planned in non-electrified zones, primarily along the perimeter and other safe areas within the premises. A detailed list of the key electrical components can be found in **Table 4**.

Table 4: Sub-project Components

Sl.No.	Equipment	Nos./ Length	Details
1. Inter Connecting Transformers (ICTs)			
a	Power/Auto Transformer: 2x160MVA, 3-ph Auto Transformer, 220/132/33kV (with Loaded Tertiary)		
2. 220kV Bays			
a	Transformer Bays	2 Nos.	ICT
b	Line Bays	6 Nos.	for 220kV 4 CKT Baghjap LILO Line Tapping at Karbi Langpi-Sonapur Transmission Line, and for 220kV D/C TATA Transmission Line to TATA Semiconductor Substation
c	Bus Coupler Bay	1 Nos.	
d	PT Bays	2 Nos.	
3. 220kV Connectivity			
a	220kV 4 CKT Baghjap LILO Line Tapping at Karbi Langpi-Sonapur Transmission Line	approx. 5.43km	
b	220kV D/C TATA Transmission Line to TATA Semiconductor Substation	approx. 8.31km	

The technical details along with layout, design and other parameters of the towers (different type) and conductors etc., are given, yet need to be firmed-up. Detailed methodology for installation of towers and stringing of conductors would also be firmed-up once the EPC Contractor is onboard.

Details of other project resources requirements including construction/workers camps, material supply and storage, access roads etc. are as follows:

Resources

Manpower involves 15-20 people during construction of tower foundation and tower erection and 10-15 people would be involved in tower erection and 20-30 people would be involved in stringing

Worker camps - Worker camp(s) would be set-up on high ground. Finding a suitable spot which has suitable access connectivity and close to the line. Two labor camps may be required to be established within the substation premises to accommodate workers. Additional camps will be set up at required locations along the transmission line alignment. Approximately 120 workers (40 each) are expected to be deployed in the substation and along both the transmission lines. Proper illumination will be provided along-with emergency communication system, Fire Extinguishers & Fire Buckets and First-aid box. Adequate hygiene condition will be maintained at the workers camps.

Material supply and Storage – The materials would be supplied from approved vendors only. EPC would establish a centralized storage facility for storing all the items. Cement will be stored indoor to avoid damage by the elements. Construction materials would be shifted from the centralized store, as and when

required through tractors or small trucks to the temporary stores areas at the sites. Usually, a temporary storage area or shed would be established near to the tower locations. The following shall be considered while choosing storage areas at site:

- Ensure that there are no overhead line above the temporary storage area/ work area;
- Proper approach road is available or made at site/Store for material handling;
- There will be no waterlogging;
- Ground conditions are levelled for material movement and storage.

Access roads

Access roads will be typically 12–20 feet wide, but can be wider to accommodate turns. Contractor representatives can work with landowners to find the most practical location for the access road and maximum efforts will be made to use/widening of existing village tracts. They need to be built through environmentally and socially non-sensitive areas.

Table 5: Components of the transmission lines

Sl. No.	Particulars	Description	
		220 kV 4 CKT Baghjap LILO Line	220kV D/C Tata Line
1	Length of TL route	5.43km	8.31km
2	No. of Transmission Towers	21	33
3	Circuit type	Double Circuit	Double Circuit
4	Type of conductor	ACSR Zebra 85°	ACSR Zebra 85°
5	Type of tower	220 kV DA, DB, DC, DD - series Tower	220 kV DA, DB, DC, DD - series Tower
6	Insulator used	Porcelain Insulators	Porcelain Insulators
7	No. of Angle Points (AP)	approx. 22	approx. 20
8	Span	20 to 374 m	20 to 374 m
9	Ground coverage area	Average- 238 sqm.	Average- 238 sqm.
10	Height of tower	A-34.4m, B, C-33.85m, D-34.3m	A-34.4m, B, C-33.85m, D-34.3m
11	Design of tower	A, B, C, D series towers	A, B, C, D series towers
12	RoW of transmission line	35m	35m
13	Tower Accessories	Danger plates, number plates, phase plates, circuit plates, anti-climbing plates etc.	Danger plates, number plates, phase plates, circuit plates, anti-climbing plates etc.
14	Minimum ground clearance	7.015m	7.015m
15	Access Road	Existing village roads and cart tracks will be used during the construction phase; In addition to this, access through agricultural lands for equipment and personnel movement will be developed in consultation with stakeholders and local people as per requirement.	Existing village roads and cart tracks will be used during the construction phase; In addition to this, access through agricultural lands for equipment and personnel movement will be developed in consultation with stakeholders and local people as per requirement.

Standard Transmission Line specification:

- ☞ Crossing another power line: 66kV - 3.05m, 132kV and 220kV - 4.58 m; 400kV - 5.49 m;
- ☞ Telecommunication line: 3.050 m;
- ☞ Minimum ground clearance above rail level of the lowest portion of any conductor under condition of maximum sag: 17.9 m;
- ☞ Major roads: 12.2 m;
- ☞ Minimum ground clearance from power conductor: 7.05 m;
- ☞ Minimum vertical midspan clearance between power conductor and earth wire in still air: 8.5 m;

2.2.2 Subproject Linked activities and access road

Construction materials for the substation like sand, aggregates, bricks, etc. will be sourced from nearby government-approved suppliers. These sources will have valid statutory approvals such as Environmental Clearance (EC), Consent to Establish and Consent to Operate by Assam State Pollution Control Board, ensuring compliance with applicable environmental regulations. Final selection of material sources will be made by the EPC contractor upon mobilization and will be subject to verification and approval by the PIU and PMU. All sourcing activities will adhere to the prevailing state regulations, including payment of applicable royalties as per Assam Government norms. The estimated earthwork requirement for site development and leveling would be approx. approximately **38,000** cubic meters for 220/132kV kV AIS at Morigaon.

The proposed substation site is well connected by all-weather motorable roads, ensuring year-round accessibility. It is located approximately 61km from Guwahati City via Jagiroad through a combination of National Highways NH 27 and NH 715A.

2.2.3 Existing facilities of the Project

The proposed 220/132kV AIS at Morigaon is not related or connected to any existing facilities, except that it shares a common premises as the 132/33kV Baghjap Grid Substation. Amongst the two transmission lines, the 220kV D/C Tata Line does not have any existing facilities, while the 220kV 4 CKT Baghjap LILO Line connects to an existing 220kV Karbi - Langpi - Sarusajal Line in village Deusal. This subproject under AISTSEP Phase-II focuses solely on strengthening the intra-state transmission system by constructing a new 220/132 kV AIS substation and associated transmission lines at Morigaon. An E&S audit was conducted for the existing 132/33 kV GIS Baghjap Grid Substation and the audit findings are provided in **Appendix 5**.

According to AIIB's Environmental and Social Framework (ESF) 2024, associated facilities are defined as activities that are not included in the description of the Project set out in the Legal Agreements governing the Project (not financed by the project), but a redetermined to: (a) directly and materially related to the Project; (b) carried out, or planned to be carried-out, contemporaneously with the Project; and (c) necessary for the Project to be viable and would not be carried out if the Project did not exist. As per the AIIB's ESF, 2024 the subproject does not encompass any associated facilities.

2.2.4 Man-power requirement for the subproject

EPC contractor shall be responsible for the overall engineering, procurement, supply, construction, erection, installation, commissioning of the project. Sub-contractors may be engaged to carry out specific

components of the work, as required. During the construction phase of the proposed subproject, the estimated number of workers would vary based on the nature and stage of activities being undertaken.

AEGCL has already deployed security personnel at its substation in compliance with the **ASEB Security Service Regulation, 1975, Private Security Agencies (Regulation) Act, 2005 (PSARA)**, and **CEA Safety and Electric Supply Regulations, 2023**. Therefore, **no additional security staff is required for this project**. Details of the security personnel are given in **Section 4.4.6**, and the **complete security management plan is included in Appendix No. 13**.

Within the substation, the following activities would be undertaken, viz., initial site assessment and evaluation, site access and clearing, grading and earthwork, foundation and structural preparation, drainage systems and stormwater management, grounding systems installation, underground utilities and infrastructure, stone surfacing and pavement, fencing and security infrastructure, final site preparation and commissioning support. Foundation and civil works will require the larger labor force, with an estimated 50–60 workers. Structural erection, including installation of equipment structures and gantries, will engage around 25–30 workers. Electrical equipment installation will necessitate approximately 15–20 workers, while cable laying and termination, as well as the earthing and lightning protection system, will each require about 10–15 workers. Additionally, around 20–25 workers will be involved in switchyard graveling, and the construction of internal roads and drainage systems.

Likewise, for tower erection, site preparation, access and vegetation clearance, tower foundation works, tower assembly and transmission stringing works shall be undertaken. For this purpose, about 2 Gangs of workers shall be engaged, in which each gang would comprise of 20 workers, totaling 40 workers.

These estimates are indicative and subject to variation depending on actual site conditions and subproject requirements during construction works.

2.2.5 Land requirement for the subproject

The land identified for the construction of the proposed 220/132kV (2X160 MVA) AIS Substation at Baghjap in Morigaon belongs to AEGCL, and is within the same compounded premises of the existing Baghjap Grid Substation, and free of any form of encroachment. AEGCL owns about 35 bigha⁴ (4.68 Ha), out of which 10 bigha (1.34ha) is dedicated to the existing grid substation, while the remaining 25 bigha (3.34ha) has been diverted for the development of the new substation under Phase-II. The land related documents are appended in **Appendix 6**. The terrain is flat. Satellite imagery of the site, physical visual inspection and discussions with the Resident Engineer confirms that the site is free from any kind of claims or encroachment.

Two transmission lines are proposed to be erected as part of this subproject, viz., the 220kV 4 CKT Baghjap LILO Line and the 220kV D/C Tata Line. The transmission corridor or the RoW for the 220kV lines would be 35m (i.e., 17.5m on either side of the central line of the alignment). The 220kV 4 CKT Baghjap LILO Line is about 5.43km in length; thus, an estimated approx. 19ha of land would be considered within the RoW width. Likewise, an estimated area of approx. 29ha would be considered within the RoW for the 220kV D/C Tata Line, which measures approximately approx. 8.31km in length.

⁴ In Assam State, 1 bigha = 0.13378ha

The following tower type would be used - DA type towers that occupies 35-51 sqm, DB type towers 47-66 sqm, DC type towers 50-70 sqm and DD type towers occupy a base area of 57-79 sqm. The type of tower to be used is unknown at this instance, thus, for calculation purpose, an average of the smallest and the largest base area have been considered for estimating the area required for tower base. The 220kV 4 CKT Baghchap LILO Line and the 220kV D/C Tata Line would have about 21 and 33 towers respectively, thus requiring an estimated approx. 0.131ha and approx. 0.184ha of land at the tower base area.

2.2.6 Land Allotment Process

For the construction of the 220/132 kV AIS, land is already available within the premises of the existing Baghchap Grid Substation and belongs to AEGCL. The available land is adequate for the proposed AIS and comprises open areas as well as portions presently occupied by dilapidated AEGCL staff quarters. Accordingly, no new land acquisition is required for the substation.

On the other hand, for the transmission lines, RoW permission has been obtained in-line with the requirements of the Electricity Act, 2003, the Indian Telegraph Act 1885, MoP Guidelines for Payment of Compensation Towards Damages in regard to RoW, October 2015 and Assam Government Power (Electricity) Department, Dispur, Guwahati-6 and new guideline of Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) & Government of Assam Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024 and as per the requirement of the ESS-2, RAP/ARAP will be prepared for the two transmission lines.

Electricity Act, 2003:

Section 67 (3&4)

- (1) A licensee shall, in exercise of any of the powers conferred by or under this section and the rules made thereunder, cause as little damage, detriment and inconvenience as may be, and shall make full compensation for any damage, detriment or inconvenience caused by him or by anyone employed by him.
- (2) Where any difference or dispute [including amount of compensation under sub-section
- (3) Arises under this section, the matter shall be determined by the Appropriate Commission.

Section 68 (5&6)

- (1) Where any tree standing or lying near an overhead line or where any structure or other object which has been placed or has fallen near an overhead line subsequent to the placing of such line, interrupts or interferes with, or is likely to interrupt or interfere with, the conveyance or transmission of electricity or to interrupt or interfere with the conveyance or transmission of electricity or the accessibility of any works, an Executive Magistrate or authority specified by the Appropriate Government may, on the application of the licensee, cause the tree, structure or object to be removed or otherwise dealt with as he or it thinks fit.
- (2) When disposing of an application under sub-section
- (3) an Executive Magistrate or authority specified under that sub-section shall, in the case of any tree in existence before the placing of the overhead line, award to the person interested in the tree such compensation as he thinks reasonable, and such person may recover the same from the licensee.

Explanation - For purposes of this section, the expression tree shall be deemed to include any shrub, hedge, jungle growth or other plant.

The Indian Telegraph Act, 1885, Part-III, Section 10 ("e"):

"Section 110 - The telegraph authority may, from time to time, place and maintain a telegraph line under, over, along, or across, and posts in or upon any immovable property, Provided that

- a) The telegraph authority shall not exercise the powers conferred by this section except for the purposes of a telegraph established or maintained by the [Central Government], or to be so established or maintained;
- b) The [Central Government] shall not acquire any right other than that of user only in the property under, over, along, across in or upon which the telegraph authority places any telegraph line or post; and
- c) Except as hereinafter provided, the telegraph authority shall not exercise those powers in respect of any property vested in or under the control or management of any local authority, without the permission of that authority, and
- d) In the exercise of the powers conferred by this section, the telegraph authority shall do as little damage is possible, and, when it has exercised those powers in respect of any property other than that referred to in clause (c), shall pay full compensation to all persons interested for any damage sustained by them by reason of the exercise of those powers."

Ministry of Power (MoP) Guidelines for Payment of Compensation Towards Damages in regard to RoW, October 2015

- ☞ Ministry of Power (MoP), Government of India (GoI) vide notification no. 3/7/2015-Trans dated 15.10.2015 has issued 'Guidelines for payment of compensation towards damages in regard to Right of Way for transmission lines. It is to be noted that the guidelines have proposed compensation to be paid for the base area in between the transmission tower (between four legs) and towards diminution of land value in the width of the RoW corridor due to laying of transmission line @ 85 % and 15 % respectively of the land value as determined by the District Magistrate or any authority based on circle rate/ guideline value/ stamp value/stamp act.
- ☞ Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024), has notified guidelines for compensation related to Right of Way (RoW) for transmission lines, including urban areas, ensuring uniformity in payments to affected landowners.

Compensation Structure:

- ☞ Tower Base Compensation: 200% of land value for the area enclosed by the four legs of the tower at ground level, plus a one-meter extension on each side.
- ☞ RoW Corridor Compensation: 30% of land value for land within the RoW corridor, as per Schedule VII of the Central Electricity Authority.

Assam Government Power (Electricity) Department, Dispur, Guwahati-6

No.PE1.219/2015/91: The Governor of Assam is pleased to notify the following rates for payment of

compensation towards damages in regards to Right of Way for transmission lines. In accordance with the Guidelines of Ministry of Power, Govt of India, vide Ref No. 03/07/2015 Trans, dated 15.10.2015 for maintaining uniformity in compensation payment to the affected land owners during construction of transmission lines, it has been decided that a similar payment methodology towards compensation shall also be adopted in the state of Assam. The guidelines of payment methodology of compensation towards “damages” as stipulated in Section 67 & 68 of the Electricity Act, 2003 read with Section 10 and 16 of Indian Telegraph Act 1885 shall be in addition to the compensation towards normal crop and tree damages. This amount will be payable only for transmission lines supported by tower base of 66kV and above and not for sub-transmission and distribution lie below 66kV.

The following steps would be taken for payment of compensation for RoW of the transmission line (refer **Table 6**).

Table 6: Steps wise Procedure for payment of compensation of RoW

Procedure for payment of compensation as per the SOP of RoW for TL Projects in Assam, Dated: 18.10.2024	
Sl.No.	Steps and Procedure
1.	The department finalized the required land and sent a proposal to the jurisdictional District Commissioner.
2.	A joint inspection will be conducted by the Revenue Circle Officer, Forest Officer, and representatives of the requisitioning department to map and measure the land and immovable properties.
3.	The concerned Collector will issue a general notice to landowners regarding the RoW of the proposed land.
4.	Preparation of the landowners’ list after verification of actual ownership.
5.	The list of landowners shall be published on the district website and notice boards of the District Commissioner, Co-District Commissioner, Circle Officer, and requisitioning department for intimation.
6.	A public hearing may be conducted to address landowners’ grievances, objections, and compensation matters.
7.	A formal GRM will be established to handle grievances related to compensation, valuation, and land acquisition.
8.	An ESIA shall be prepared to identify and mitigate environmental and social impacts of the proposed transmission line in accordance with Articles 48A and 51A of the Indian Constitution and the Environmental Protection Act, 1986.
9.	Compensation for land and damages shall be assessed by the Collector as per Government of Assam guidelines.
10.	Land valuation shall be based on zonal rates and notified guidance prices, following the latest compensation guidelines issued by the Ministry of Power, Government of India (14.06.2024) for tower footing and transmission line RoW.
11.	District Commissioner shall requisition necessary fund from the requiring department.
12.	The time from receipt of the proposal to communication of compensation to the requisitioning department shall not exceed 30 working days.
13.	The District Commissioner shall issue RoW within 30 working days after receipt of full and final compensation from the requisitioning department.

Source: Guideline of the Government of India, Ministry of Power (F. No. 3/4/2016 Trans-Part (4) dated 14.06.2024).

The following process will be complied:

- RoW of transmission Line passing through private lands, the clearance shall be obtained by EPC contractor in liaising with concern revenue department and other line departments for determining the Land compensation and zirat value.
- The Land compensation amount will be paid directly by AEGCL to project affected person as per the assessment of the district administration.
- Moreover, the zirat⁵ compensation will be paid by EPC contractor for which the reimbursement of the same shall be made by the AEGCL.
- The documents required to be obtained from the landowners for disbursement of Compensation for tower footing, RoW and zirat compensation, etc. shall be Aadhar card/Voter ID/or other valid identity card, Bank details as per UID, Jamabandi⁶ copy/ Khajana⁷ receipt, next to kin certificate (where required), NOC for land use, etc.
- Further, PIU need to communicate to all stockholders/departments for providing various government rates for compensation of crop damage, plantation damage, tree cutting, trimming, utilities, etc. that will be damaged during construction works.
- EPC to obtain all statutory clearance if any required, such as Railway crossing, NHA etc. & any clearance require from Power Grid etc.

2.2.7 Costs and implementation schedule

The total cost for the construction of the proposed 220/132kV (2X160 MVA) AIS substation at Baghjap in Morigaon would be INR 229.38 Crore⁸ (2293.8 million), which encapsulates INR 167.25 Crore [1672.5 million] for construction of substation and INR 62.13 Crore [621.3 million] for the installation of Transmission Towers and associated infrastructure. The tentative implementation schedule for the construction of the proposed AIS substation and associated transmission lines is provided in **Table 7** and **Table 8** respectively.

⁵ **Zirat** refers to the enumeration and valuation of standing crops, trees, houses, and other structures present on a piece of land. It acts as a comprehensive list to determine the compensation for damages or assets on land. **Zirat rates** are specifically notified by the Government of Assam agriculture department for compensation.

⁶ **Jamabandi** is a crucial land record in India, functioning as the Record of Rights (RoR) to document ownership, cultivator details, land area, and liabilities

⁷ **Khajna** refers to the **land revenue** or **land tax** paid annually by landowners to the state government. It is a compulsory payment required to maintain legal ownership records (mutation) and confirm active possession of the land.

⁸ 1 Crore = 10 million

Table 7: Tentative Implementation schedule for construction of 220/132kV AIS at Morigaon

Sl. No.	Job Description	Time Scale															
		Y0		Y1				Y2				Y3				Y4	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1	Land Identification																
2	Environmental and Social Screening and Scoping																
3	Stakeholder and Public Consultation																
4	Forest Clearance (If required)																
5	Land Acquisition (If required)																
6	Land Compensation (If required)																
7	Development of sub-project specific ESIA- ESMP, RAP and TPDP (If applicable)																
8	Invitation of Bid																
9	Opening of Bid and Technical Evaluation																
10	Approval of Technical Evaluation by AEGCL and AIIB																
11	Opening of Price Bid and Evaluation																
12	Approval of Price Evaluation by AEGCL and AIIB																
13	Signing of Contract Agreement																
14	Design/Drawing approval																
15	Civil Works																
16	Testing & Inspection of Equipment																
17	Transportation to Site																
18	Erection of Equipment																
19	Cable laying and Termination																
20	Testing and Commissioning																
21	Monitoring of ESMP Implementation and reporting																
22	Stakeholder and Public Consultation																
24	Taking over by AEGCL																

Table 8: Tentative Implementation schedule for construction of Transmission lines

Sl.	Job Description	Time Scale
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No.		Y0			Y1				Y2				Y3				Y4	
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1	Tendering for Route survey, evaluation and award																	
2	Submission and finalisation of the Route Survey Report																	
3	Environmental and Social Screening and Scoping																	
4	Stakeholder and Public Consultation																	
5	Forest Clearance (If required)																	
6	Obtaining RoW permission																	
7	Invitation of Bid																	
8	Opening of Bid and Technical Evaluation																	
9	Approval of Technical Evaluation by AEGCL and AIIB																	
10	Opening of Price Bid and Evaluation																	
11	Approval of Price Evaluation by AEGCL and AIIB																	
12	Signing of Contract Agreement																	
13	Check survey, Route/Alignment and tower design approval																	
14	Testing of Tower (Prototype)																	
15	Sub-project specific ESIA- ESMP, RAP and TPDP (If applicable)																	
16	Payment for Temporary Land use, Zirat/Crop Damage, access road, etc.																	
17	Tower Foundation and other civil works																	
18	Testing of conductor, accessories etc. and transportation																	
19	Erection of Tower																	
20	Stringing of conductor																	
21	Testing and commissioning																	
22	Monitoring of ESMP Implementation and reporting																	
23	Stakeholder and Public Consultation																	
24	Taking over by AEGCL																	

Chapter 3: Legal and Regulatory Framework

This chapter provides an overview of the existing policies, legislation, and regulations that are relevant to the implementation of the Environmental and Social Management Plan (ESMP). It outlines the key requirements for managing environmental and social (E&S) risks and impacts associated with the proposed subproject. The review identifies pertinent frameworks from the Government of India (GoI), the Government of Assam (GoA), and relevant international conventions. Additionally, given that the subproject is financed by the Asian Infrastructure Investment Bank (AIIB), its policies and guidelines are thoroughly addressed as part of this analysis.

The applicable legal and regulatory frameworks are critical for the effective management of environmental and social considerations. These frameworks encompass requirements related to site selection criteria, environmental pollution control measures, institutional mechanisms, occupational and community health and safety standards, efficient resource utilization, as well as cultural and social factors.

3.1 Constitutional Provisions

The Constitution of India, through its various provisions, underscores the importance of environmental protection and social safeguards. Articles 48A and 51A, introduced as part of the 1976 amendment following the UN Conference on the Human Environment (1972), explicitly address environmental concerns. **Article 48A** mandates that the State shall endeavor to protect and improve the environment and safeguard forests and wildlife. Complementing this, **Article 51A(g)** outlines the duty of every citizen to protect and improve the natural environment, including forests, lakes, rivers, and wildlife, while fostering compassion for living creatures.

These provisions are integrated into the Directive Principles of State Policy and Fundamental Duties, emphasizing both governmental and individual responsibilities toward environmental conservation. Additionally, Article 21, guaranteeing the Right to Life, has been interpreted by the Supreme Court to encompass the right to live in a clean and healthy environment, further strengthening the legal framework for environmental protection.

Social safeguards are similarly embedded within the Constitution's Preamble and various Articles. The Preamble promotes Justice—Social, Economic, and Political—alongside Liberty, Equality, and Fraternity, ensuring Dignity and Unity for all citizens. Fundamental Rights and Directive Principles collectively safeguard health, safety, and livelihood within this broader framework. Specific provisions addressing social safeguards are articulated in Articles such as 14, 15, 17, 23, 24, 25, 46, 330, and 332.

3.2 Policies and Regulations of GoI and GoA

Applicable policies and regulations pertaining to the protection of environment, social and community health, and health and safety is elucidated in **Table 9**.

Table 9: Environmental and Social Policies and Regulatory Framework (National and Assam State Regulation) for Substation and Transmission Line

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
A. ENVIRONMENTAL REGULATIONS					
1.	The Electricity Act, 2003	The Indian Electricity Act, 2003, is a comprehensive legislation aimed at reforming the power sector in India. It consolidates laws related to electricity generation, transmission, distribution, trading, and use. The Act promotes competition, efficiency, and investment in the electricity sector while protecting consumer interests. It facilitates the development of renewable energy sources and ensures reliable and affordable electricity supply. Key provisions include the establishment of regulatory commissions, open access to transmission and distribution networks, and measures to curb electricity theft. It also emphasizes rural electrification and encourages private sector participation in power generation and distribution.	Applicable; Power Substation and Transmission Line Construction Projects fall under the jurisdiction of the Electricity Act, 2003. Specifically, Sections 67 and 68 of the Act outline the requirements for licensing entities responsible for the construction, operation, and maintenance of such projects.	Central Electricity Authority, Regulatory Commissions and establishment	EPC Contractor/ PMC/ AEGCL
2.	EIA Notification, 2006 and subsequent amendments	The EIA (Environmental Impact Assessment) Notification, 2006, issued under the Environment (Protection) Act, 1986, serves as a regulatory framework to assess the environmental impacts of proposed projects or activities before granting them approval. It categorizes projects into different types based on their potential environmental impact and mandates a detailed assessment for projects that could significantly affect the environment. The notification outlines	Not Applicable; The construction of substations and transmission line projects is not governed by the EIA Notification 2006 and its subsequent amendments. However, any associated activities, such as the creation of a borrow area for the project, will require prior environmental clearance.	MoEF&CC or State EIA Authority (SEIAA)	



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>procedures for obtaining environmental clearance, including screening, scoping, public consultation, and appraisal stages.</p> <p>Subsequent amendments to the EIA Notification have introduced changes to streamline processes, address emerging environmental concerns, and update regulatory requirements. These amendments often aim to balance economic development with environmental protection by refining project categories, modifying clearance timelines, and enhancing stakeholder participation. However, they have also drawn criticism from environmentalists for potentially diluting safeguards in some cases.</p>			
3.	National Environment Policy (NEP), 2006	The National Environment Policy (NEP) of 2006 is a comprehensive framework aimed at addressing environmental challenges in India while promoting sustainable development. It emphasizes the integration of environmental concerns into all development activities and policies. Key objectives include the conservation of critical environmental resources, ensuring equitable access to environmental benefits, and promoting environmental governance. The policy outlines strategies for pollution control, biodiversity conservation, climate change mitigation, and sustainable use of natural resources. It	Applicable; Should adhere to NEP conservation of environmental resources and abatement of pollution.	MoEF & CC / Central State Pollution Control Board (CPCB) / Pollution Control Board (PCB), Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		also encourages public participation, capacity building, and partnerships between government, private sectors, and communities to achieve its goals.			
4.	The National Green Tribunal Act, 2010	The National Green Tribunal Act, 2010, was established to provide for the effective and expeditious disposal of causes related to environmental protection, conservation of forests, and other natural resources. It aims to enforce legal rights related to the environment and provide relief and compensation for damages to persons and property. The Act led to the creation of the National Green Tribunal (NGT), a specialized body equipped with expertise in environmental matters. The NGT has jurisdiction over all civil cases where a substantial question related to the environment arises, including enforcement of legal rights or obligations under specific environmental laws. It ensures a balance between development and environmental conservation while providing speedy justice.	Applicable; Respected, the designated area must be carefully managed to ensure that development activities do not cause harm to the environment or property.	National Green Tribunal (NGT)	EPC Contractor/ PMC/ AEGCL
5.	Environment Protection Act, 1986 and subsequent Amendments and rules	The Environment Protection Act, 1986, is an important legislation in India aimed at safeguarding and improving the environment. It was enacted in response to the Bhopal Gas Tragedy of 1984 and provides a framework for the protection and preservation of the environment. The	Applicable; Power Substation and Transmission Line Construction Projects are non-polluting in nature and do not involve any disposal of solid waste, effluents and hazardous substances on land, air and water, so	MoEF&CC/CPCB	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>Act empowers the central government to take measures to protect and improve environmental quality, control pollution, and restrict hazardous activities that harm the environment.</p> <p>The Act includes provisions for setting standards for emissions, discharges, and handling hazardous substances. It also allows the government to regulate industrial operations, conduct inspections, and impose penalties for non-compliance. Over time, various amendments and rules have been introduced under this Act to address emerging environmental challenges, such as waste management (e.g., E-Waste Rules, Plastic Waste Management Rules) and climate change mitigation.</p> <p>In essence, the Environment Protection Act, 1986, serves as a comprehensive legal framework to ensure sustainable development while protecting natural resources for future generations.</p>	<p>limited requirements of Environment (Protection) Act,1986 are applicable (minor to moderate air emission is expected from the subproject construction phase).</p>		
6.	Eco-Sensitive Zone Notifications	Eco-Sensitive Zone (ESZ) Notifications are issued by the Ministry of Environment, Forest and Climate Change in India to protect the environment around national parks, wildlife sanctuaries, and other protected areas. These zones act as a buffer to minimize human impact on critical ecosystems. Activities in ESZs are	<p>Not Applicable;</p> <p>None of the subproject activity falls within declared ESZ.</p>	Department of Environment and Forest, Assam and MoEF & CC, New Delhi	-



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>regulated to ensure sustainable development while conserving biodiversity. Permissible activities include agriculture, horticulture, and eco-tourism, while prohibited activities may include mining, large-scale industrial operations, and deforestation. The extent of an ESZ typically varies from area to area, depending on ecological significance and surrounding land use patterns.</p>			
7.	<p>The Forest (Conservation) Act, 1980 and subsequent amendments and rules</p>	<p>The Forest (Conservation) Act, 1980, was enacted in India to provide for the conservation of forests and regulate the diversion of forest land for non-forest purposes. Its primary objective is to ensure environmental stability and maintain ecological balance. Under the Act, prior approval from the central government is mandatory for the use of forest land for any non-forest activities, such as industrial projects, mining, or infrastructure development.</p> <p>Subsequent amendments and rules have strengthened the Act, introducing provisions for compensatory afforestation, penalties for violations, and mechanisms to monitor forest conservation efforts. These changes aim to promote sustainable development while safeguarding forest resources. The Act also empowers authorities to take necessary measures to prevent deforestation and protect</p>	Not Applicable;	<p>Department of Environment and Forest, Assam, IRO-MoEF & CC, Guwahati.</p>	



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		biodiversity.			
8.	National Forest Policy, 1988	The National Forest Policy of 1988 in India emphasized the sustainable management and conservation of forests. It aimed to increase forest cover to at least one-third of the total land area, prevent deforestation, and ensure ecological balance. The policy prioritized the environmental stability of forests over commercial exploitation and encouraged the involvement of local communities in forest management through joint forest management programs. It also focused on the protection of wildlife and biodiversity, soil and water conservation, and meeting the basic needs of rural and tribal populations for fuelwood, fodder, and other forest products.	Not Applicable;	Department of Environment and Forest, Assam, IRO-MoEF & CC, Guwahati.	
9	Assam Forest Policy	The Assam Forest Policy focuses on the sustainable management and conservation of forest resources in the state. It aims to protect biodiversity, enhance forest cover, and promote ecological balance while addressing the needs of local communities. The policy emphasizes afforestation, wildlife conservation, sustainable utilization of forest produce, and climate change mitigation. It also encourages community participation, eco-tourism, and the equitable sharing of benefits derived from forest resources.	Not Applicable;	Department of Environment and Forest, Assam, IRO-MoEF & CC, Guwahati.	



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
10.	Wildlife Protection Act, 1972 and Subsequent Amendments	<p>The Wildlife Protection Act, 1972, is a comprehensive legislation enacted in India to protect and conserve the country's wildlife and their habitats. The act prohibits the hunting of endangered species, regulates the trade of wildlife products, and establishes protected areas such as national parks, sanctuaries, and reserves. It also provides for the legal framework to punish offenders involved in poaching, illegal trade, and habitat destruction.</p> <p>Subsequent amendments to the act have strengthened its provisions. For instance, the 2002 amendment introduced stricter penalties for violations and expanded the list of protected species. The 2006 amendment focused on the establishment of the National Tiger Conservation Authority (NTCA) and the Tiger and Other Endangered Species Crime Control Bureau to enhance tiger conservation efforts. Over the years, these amendments have aimed to address emerging challenges in wildlife conservation and align the act with international conventions like CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).</p>	<p>Not Applicable;</p> <p>Subproject is not located within or in the vicinity of any Wildlife Sanctuary, National Park, Wildlife corridors, etc. The district houses the Pobotira Wildlife Sanctuary, which is about 18km aerial distance from the SS.</p>	<p>Department of Environment and Forest, Assam, SBWL, and NBWL- MoEF&CC, New Delhi</p>	-



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
11.	<p>Biological Diversity Act, 2002</p> <p>Assam Biodiversity Rules, 2010</p>	<p>The Biological Diversity Act, 2002, is an Indian legislation aimed at conserving biological diversity, ensuring sustainable use of its components, and fair and equitable sharing of benefits arising from the use of biological resources and associated knowledge. It establishes the National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), and Biodiversity Management Committees (BMCs) at local levels to implement these objectives. The act also regulates access to biological resources and traditional knowledge to prevent exploitation and promote conservation.</p> <p>The Assam Biodiversity Rules, 2010, were formulated under the framework of the Biological Diversity Act, 2002, to address state-specific biodiversity concerns. These rules provide guidelines for the establishment and functioning of Biodiversity Management Committees in Assam, detailing their roles in documenting biodiversity, preparing People's Biodiversity Registers, and promoting conservation efforts at the grassroots level. The rules aim to align with the national act while addressing Assam's unique ecological and cultural diversity.</p>	Not Applicable;	National Biodiversity Authority (NBA), Assam State Biodiversity Board (ASBB) and Biodiversity Management Committees (BMCs)	



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
12.	The Compensatory Afforestation Fund Act, 2016	The Compensatory Afforestation Fund Act, 2016, is an Indian legislative measure aimed at promoting afforestation and ensuring the sustainable management of forest resources. The Act establishes a dedicated fund, known as the Compensatory Afforestation Fund, which collects monetary contributions from entities that divert forest land for non-forest purposes. These funds are utilized for afforestation, wildlife conservation, and forest-related ecological services. The Act also provides for the establishment of National and State-level authorities to oversee the management and utilization of these funds, ensuring accountability and transparency in their implementation.	Not Applicable; No notified forest land involved within the subproject area.	Department of Environment and Forest, Assam and MoEF&CC, New Delhi.	-
13.	The Assam Compensatory Afforestation Fund Rules, 1994	The Assam Compensatory Afforestation Fund Act, 1994, is a legislative framework aimed at promoting afforestation and ecological restoration in the state of Assam. The Act primarily focuses on compensatory afforestation measures to mitigate the environmental impact caused by deforestation or diversion of forest land for non-forest purposes. It establishes provisions for collecting funds from entities responsible for forest land diversion and ensures these funds are utilized for afforestation, wildlife conservation, and sustainable forest management. The Act emphasizes maintaining ecological balance and addressing environmental concerns	Not Applicable; No notified forest land is involved within the subproject area.	Department of Environment and Forest, Assam	-



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		while supporting developmental activities in the region.			
14.	Assam (Control of Felling & Removal of trees from Non-Forest Land) Rules 2002 and subsequent amendment	The Assam (Control of Felling & Removal of Trees from Non-Forest Land) Rules, 2002, along with its subsequent amendments, outline the regulations for the felling and removal of trees from non-forest areas in Assam. These rules aim to ensure sustainable management and conservation of tree resources while allowing for necessary tree removal under specific conditions. The provisions include obtaining prior permissions, adhering to guidelines for tree felling, and ensuring compensatory plantation to mitigate environmental impacts. The amendments further refine these rules to address emerging concerns and improve implementation efficiency.	Applicable; There are approx. 50-60 trees within the proposed sub-station premises, which would be required to be felled.	Department of Environment and Forest, Assam	EPC Contractor/ PMC/ AEGCL
15.	The Assam Trees Outside Forest (Sustainable Management Rules), 2022	The Assam Trees Outside Forest (Sustainable Management Rules), 2022, outlines regulations and guidelines for the sustainable management, preservation, and utilization of trees located outside designated forest areas in Assam. The rules aim to balance ecological conservation with economic benefits, promoting responsible tree management practices while ensuring environmental sustainability.	Applicable; Approx. 79 trees, including both timber and fruit-bearing varieties, will need to be felled for the construction of the subproject.	Department of Environment and Forest, Assam.	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
16.	Wetland (Conservation and Management) Rules, 2010	The Wetland (Conservation and Management) Rules, 2010, were introduced to ensure the protection and sustainable management of wetlands in India. These rules aim to prevent the degradation of wetlands by regulating activities such as industrial development, construction, waste dumping, and other activities that could harm these ecosystems. They emphasize the ecological importance of wetlands in maintaining biodiversity, supporting livelihoods, and mitigating climate change. The rules also outline the responsibilities of central and state authorities in identifying, notifying, and managing wetlands, while promoting community participation in conservation efforts.	Not applicable; Subproject activity does not fall within declared wetland areas.	Central Wetlands Regulatory Authority (CWRA)	-
17.	Air (Prevention and Control of Pollution) Act, 1981 and subsequent amendments The Air (Prevention & Control of Pollution) Assam Rule, 1991	The Air (Prevention and Control of Pollution) Act, 1981, was enacted to address and manage air pollution in India. Its primary objective is to prevent, control, and reduce air pollution and to establish boards at the central and state levels to oversee its implementation. The act empowers these boards to set standards for emissions and air quality, monitor air pollution levels, and take necessary action to curb pollution from industrial and vehicular sources. The act also provides for penalties for non-compliance and encourages the use of	Applicable; The construction of the sub-project will involve Civil-works, such as boundary wall erection, digging and foundation erection for switch yard, and other buildings, drainage and storm water systems, cable trenches, etc.; inward and outward movement of vehicles, equipment and materials, will lead to dust and fugitive emissions. Implementing measures to mitigate air pollution from project activities; construction facilities.	State Pollution Control Board, Assam. Consent to Establish (CTE) and Consent to Operate (CTO) to be obtained by contractor for operation of DG set and procurement of construction materials.	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>cleaner technologies. Subsequent amendments have strengthened its provisions to enhance enforcement and address emerging challenges related to air quality.</p> <p>The Air (Prevention & Control of Pollution) Assam Rule, 1991, was formulated to implement the provisions of the act specifically in the state of Assam. It lays down rules and regulations tailored to address the unique environmental concerns of the region, ensuring effective control and prevention of air pollution within the state.</p>			
18.	<p>Water (Prevention and Control of Pollution) Act, 1974 and subsequent amendments</p> <p>The Water (Prevention & Control of Pollution) Assam Rule, 1977</p>	<p>The Water (Prevention and Control of Pollution) Act, 1974, is a comprehensive legislation enacted to prevent and control water pollution in India. It aims to maintain or restore the wholesomeness of water by regulating the discharge of pollutants into water bodies. The Act establishes the Central and State Pollution Control Boards to oversee implementation, set standards for water quality, and monitor pollution levels.</p> <p>The Assam Rule, 1977, serves as a state-specific adaptation of the Act, focusing on implementing its provisions within Assam. It outlines procedures, responsibilities, and guidelines for pollution control in the state, ensuring alignment with the national</p>	<p>Applicable;</p> <p>Construction phase will witness a gamut of activities that will involve use and disposal of water, from labour camp and construction areas. To manage liquid effluent discharges from construction and or from domestic activities, robust measures to mitigate water pollution should be implemented.</p>	<p>State Pollution Control Board, Assam.</p> <p>Prevention of water pollution due to project activities.</p>	<p>EPC Contractor/PMC/ AEGCL</p>



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>framework while addressing regional concerns. Subsequent amendments have strengthened the Act by incorporating stricter penalties, expanding regulatory mechanisms, and addressing emerging environmental challenges.</p>			
19.	<p>Noise Pollution (Regulation and Control Act) 2000 and subsequent amendments</p>	<p>The Noise Pollution (Regulation and Control) Act, 2000, was introduced to regulate and control noise levels in order to mitigate its harmful effects on human health and the environment. The Act specifies permissible noise levels for different areas, such as industrial, commercial, residential, and silence zones, during both daytime and nighttime. It also provides guidelines for the use of loudspeakers, public address systems, and fireworks to ensure compliance with noise limits.</p> <p>Subsequent amendments have strengthened the Act by introducing stricter penalties for violations, enhancing monitoring mechanisms, and empowering local authorities to take action against offenders. The amendments also emphasize public awareness campaigns to educate citizens about the adverse effects of noise pollution and the importance of adhering to prescribed noise standards.</p>	<p>Applicable;</p> <p>Construction phase will witness running and operation of different construction equipment and machinery, and vehicles which would result in noise emission. A robust noise level controls need to be implemented.</p>	<p>Central Pollution Control Board & State Pollution Control Board, Assam</p>	<p>EPC Contractor/ PMC/ AEGCL</p>



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
20.	Hazardous & Other Waste (Management and Transboundary Movement) Rules, 2016	The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, were introduced to regulate the management, handling, and movement of hazardous and other wastes in India. These rules aim to ensure environmentally sound management of such wastes, minimize waste generation, and promote recycling or reuse. They also establish guidelines for the import, export, and disposal of hazardous materials, ensuring compliance with international conventions like the Basel Convention. The rules define responsibilities for waste generators, recyclers, and authorities while emphasizing the importance of proper storage, transportation, and disposal to protect human health and the environment.	Applicable; There are 10 Nos. of structures, that are proposed to be demolished for the construction of the new AIS. It is confirmed to be free of asbestos and other hazardous materials. In case of other hazardous materials, AEGCL will seek authorization for disposal of hazardous waste from concerned State Pollution Control Board (SPCB), Assam as and when required. The transformer oil can be auctioned to authorized/registered re-refiners and information to the respective SPCB.	State Pollution Control Board, Assam, Local Municipal Board (MCB) and other Local Bodies. Contractor needs to submit plan for reuse or safe disposal.	EPC Contractor/ PMC/ AEGCL
21.	Manufacture Storage, & imports of Hazardous Chemicals Rules, 1989 And subsequent amendments	The Manufacture, Storage, and Import of Hazardous Chemicals Rules, 1989, along with its subsequent amendments, provide a regulatory framework to ensure the safe handling, storage, and transportation of hazardous chemicals in India. These rules are designed to prevent chemical accidents and mitigate risks to human health, property, and the environment. They outline the responsibilities of manufacturers, importers, and handlers of hazardous chemicals, including proper labeling, safety measures, risk assessments, and emergency preparedness.	Applicable; Use of SF6 as insulator in the transformers.	State Pollution Control Board, Assam.	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		plans. The amendments over the years have further refined these regulations to address emerging concerns and enhance safety standards.			
22.	Construction and Demolition Waste Management Rules, 2016	The Construction and Demolition Waste Management Rules, 2016, were introduced to address the proper handling, recycling, and disposal of construction and demolition waste in India. These rules aim to ensure environmental sustainability by minimizing waste, promoting resource recovery, and reducing pollution. They mandate waste generators to segregate materials like concrete, wood, metal, and bricks for recycling or reuse. Local authorities and waste processors are required to establish collection and processing facilities. The rules also emphasize the importance of creating awareness and enforcing compliance to achieve effective waste management practices.	Applicable; Construction and demolition waste generated due to the demolition of 10 structures from the subproject activities shall be managed and disposed as per the rule.	State Pollution Control Board, Assam, Local Municipal Board (MCB) and other Local Bodies. Contractor needs to submit plan for reuse or safe disposal.	EPC Contractor/ PMC/ AEGCL
23.	Solid Waste management Rules, 2016	The Solid Waste Management Rules, 2016, were introduced to improve waste management across India. These rules emphasize the segregation of waste at the source into biodegradable, non-biodegradable, and hazardous categories. They mandate local authorities, waste generators, and producers to take responsibility for proper waste disposal and recycling. The rules also promote	Applicable; Construction activities will generate various types of solid waste. These have to be managed within the purview of this legislation, and a Waste Management Plan prepared by the Contractor.	The State Pollution Control Board, Assam, and the Local Municipal Board (MCB) require the contractor to submit detailed plans for the safe disposal or burial of waste.	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		composting, waste-to-energy initiatives, and the reduction of plastic usage. Additionally, they encourage public participation and awareness to ensure effective implementation and a cleaner environment.			
24.	Plastic waste management Rules, 2016	The Plastic Waste Management Rules, 2016, were introduced to address the growing concerns of plastic waste in India. These rules emphasize the responsibilities of various stakeholders, including local bodies, manufacturers, and consumers, in managing plastic waste effectively. They promote the reduction of plastic usage, proper segregation, recycling, and environmentally sound disposal methods. The rules also mandate extended producer responsibility (EPR), requiring producers and brand owners to establish a system for collecting and managing plastic waste. Additionally, the rules aim to minimize the use of non-recyclable and single-use plastics to reduce environmental pollution.	Applicable. Plastic waste generation from proposed subproject activities. Safe disposal as per this rules.	State Pollution Control Board, Assam, Local Municipal Board (MCB) and other Local Bodies.	EPC Contractor/ PMC/ AEGCL
25.	E-waste Management Rules, 2016	The E-waste Management Rules, 2016, aim to regulate the management, disposal, and recycling of electronic waste in an environmentally friendly manner. These rules emphasize the responsibility of producers, manufacturers, and consumers in proper e-waste handling. Key provisions include the Extended Producer Responsibility (EPR), which mandates producers to collect and recycle e-waste	Applicable; But limited to the consumers that generate significant quantities of e-waste.	Central Pollution Control Board & State Pollution Control Board, Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		generated from their products. The rules also encourage authorized recycling facilities and promote awareness among stakeholders about the importance of sustainable e-waste management.			
26.	Batteries (Management and Handling) Rules, 2001	<p>By notification dt. 16th May 2001 under Sections 6, 8 and 25 of the Environment (Protection) Act 1986, the MoEF&CC has put certain restrictions on the disposal and handling of used batteries under this rule.</p> <p>The Batteries (Management and Handling) Rules, 2001, were established to regulate the management and handling of lead-acid batteries in India. These rules aim to ensure the environmentally sound management of used batteries and promote recycling.</p> <p>This rule emphasizes shared responsibility among stakeholders to minimize environmental hazards associated with improper battery disposal.</p>	<p>May be Applicable;</p> <p>Batteries may be used for Power back-up.</p>	State Pollution Control Board, Assam	EPC Contractor/ PMC/ AEGCL
27.	Central Motor Vehicle Rules, 1989	The Central Motor Vehicle Rules, 1989, serve as a comprehensive framework for the regulation of motor vehicles in India. These rules were established under the Motor Vehicles Act, 1988, and outline	<p>Applicable;</p> <p>Especially during transportation of manpower and construction material and equipment.</p>	Commissionerate of Transport (District Transport Offices, Assam)	EPC Contractor/ PMC/ AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>various provisions related to vehicle registration, licensing, traffic regulations, safety standards, and environmental norms.</p> <p>This rule is periodically updated to address advancements in technology, evolving transportation needs, and public safety concerns.</p>			
28.	The Mines and Minerals (Development and Regulation) Act, 1957	The Mines and Minerals (Development and Regulation) Act, 1957, governs the regulation of mines and the development of minerals in India. This legislation provides the framework for the systematic and scientific exploitation of mineral resources, ensuring their sustainable use. It outlines the procedures for granting mining leases, prospecting licenses, and reconnaissance permits. The Act also addresses the roles and responsibilities of the central and state governments in mineral development, emphasizing environmental protection and the welfare of local communities affected by mining activities. Amendments over the years have aimed to enhance transparency, promote private sector participation, and ensure equitable sharing of benefits from mineral resources.	<p>Applicable;</p> <p>Permission or consent for mining minerals such as stones, aggregates, sand, and earth from riverbeds or quarries needs to be in place granted as required for construction works.</p>	Directorate of Geology and Mining, Assam and Department of Environment and Forest, Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
29.	Assam Minor Mineral Concession Rules, 2013 and subsequent amendment, 2021	<p>The Assam Minor Mineral Concession Rules, 2013, establish a framework for the regulation of minor minerals in the state of Assam. These rules cover aspects such as granting mining leases, quarry permits, and other concessions for minor minerals like sand, gravel, and clay. The rules aim to ensure sustainable mining practices, protect the environment, and generate revenue for the state.</p> <p>The subsequent amendment in 2021 introduced updates to streamline procedures, enhance transparency, and address challenges faced in implementing the original rules. This amendment likely included provisions for stricter environmental safeguards, improved monitoring mechanisms, and measures to curb illegal mining activities while promoting fair practices in the allocation of mineral resources. These changes reflect the state's commitment to sustainable development and resource management.</p>	<p>Applicable;</p> <p>Permission and consent for mining of minerals such as stones, aggregates, sand, and earth from riverbeds or quarries will be required, and the necessary royalties for these materials needs to be paid.</p>	Directorate of Geology and Mining, Assam and Department of Environment and Forest, Assam	EPC Contractor/ PMC/ AEGCL
30.	Disaster Management Act, 2005	The Disaster Management Act, 2005, is an Indian law enacted to establish a systematic and coordinated approach to disaster management. It focuses on the preparation, mitigation, response, and recovery from disasters. The Act led to the formation of the National Disaster Management Authority (NDMA) as the apex body responsible for policy-making,	The proposed subproject area falls under the seismic zone V and possibly in the flood prone zone and hence any construction activities/ interventions will be under purview of this act.	Assam State Disaster Management Authority (ASDMA)	EPC Contractor/ PMC/ AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		planning, and execution of disaster management efforts. It also mandates the creation of State and District Disaster Management Authorities to ensure effective implementation at regional levels. The Act emphasizes the importance of disaster risk reduction, preparedness, and capacity building while outlining penalties for non-compliance with its provisions.			
31.	Assam State Disaster Management Policy 2010	The policy provides measures to be adopted for prevention and mitigation of disaster; mitigation measure to be integrated with development plans and projects; build capacity and preparedness measure; and specify roles and responsibilities to each Department in relation to adopted measure.	Applicable for preparedness, response and recovery during all stages of the subproject implementation for the timely and effective response to disaster.	Assam State Disaster Management Authority (ASDMA)	EPC Contractor/ PMC/ AEGCL
32.	Energy Conservation Act, 2001	The Energy Conservation Act, 2001, was enacted to promote energy efficiency and conservation in India. It provides a legal framework for setting energy consumption standards, establishing the Bureau of Energy Efficiency (BEE), and implementing measures to reduce energy use across industries, commercial buildings, and appliances. The Act also encourages the adoption of energy-efficient technologies and practices to reduce energy intensity and mitigate environmental impacts.	Applicable; All project activities involve use of energy efficient equipment.	Inspectorate of Electricity (IEC), Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
33.	National Building Code, 2016	The National Building Code (NBC) of India, 2016, is a comprehensive set of guidelines for the planning, design, construction, and maintenance of buildings. It ensures safety, sustainability, and efficiency in building practices. The code addresses various aspects such as structural safety, fire safety, building services (lighting, ventilation), and energy efficiency. It promotes environmentally sustainable construction practices and provides provisions for green building certification.	Applicable; To the design and construction of substation buildings and associated infrastructure.	Approval building plan from appropriate agency	EPC Contractor/ PMC/ AEGCL
34.	Guidelines to Regulate and Control Ground Water Extraction in India, 2019	These guidelines were introduced to address the over-extraction of groundwater and ensure its sustainable use. They mandate the registration of groundwater extraction structures, impose restrictions on overexploited areas, and encourage the adoption of water-saving technologies. The guidelines also emphasize rainwater harvesting, water reuse, and compliance with environmental regulations to protect groundwater resources for future generations.	Applicable. Proper consent/NOC is required for ground water extraction for subproject construction activities.	Central Ground Water Board (CGWB)	EPC Contractor/ PMC/ AEGCL
B. SOCIAL REGULATIONS					
1.	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013	The Act seeks to provide equitable compensation to landowners while ensuring transparency in the land acquisition process. It also emphasizes the rehabilitation and resettlement of individuals affected by such acquisitions.	Not Applicable as the proposed substation will be constructed within AEGCL's own existing 132/33 kV (2X50 MVA) AIS substation campus and therefore, involuntary land acquisition is not required. Also, will not be applicable to the	State Revenue Department/ District Administration	AEGCL



Sl. No.	Relevant Acts and Policies of Gol and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
			associated transmission line, as ownership of the land will remain with the affected persons, with only a restriction on land use within the RoW and tower footing areas.		
2.	The Indian Telegraph Act, 1885, Part-III, Section 10 ("e"):	Section 110 - The telegraph authority may, from time to time, place and maintain a telegraph line under, over, along, or across, and posts in or upon any immovable property	Applicable for T/L project.	Central Telegraph Authority	EPC contractor / PMC / AEGCL
3.	Ministry of Power, Govt. of India Guidelines for Payment of Compensation Towards Damages in regard to RoW, October 2015 And new guideline of MoP, Gol (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) & Government of Assam Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024.	Guidelines for payment of compensation towards damages in regard to Right of Way for transmission lines.	Applicable for T/L project.	Ministry of Power, Govt. of India	EPC contractor / PMC / AEGCL
4.	Rights of Persons with Disabilities Act, 2016	The legislation enforces the principles of full participation and equality for persons with disabilities. It guarantees their right to equality, dignity, and respect for personal integrity, ensuring they are treated equally alongside others.	Applicable. For the proposed subproject where Persons with Disabilities are present and affected.	Ministry of Social Justice & Empowerment/ Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
5.	Right to information Act, 2005	The Act establishes a practical framework for citizens to access information held by public authorities. This initiative aims to enhance transparency, promote accountability, and curb corruption in the functioning of public institutions.	The subproject activities come under the preview of Right to Information Act and any citizen can obtain any information about any aspect of the proposed subproject. All documents pertaining to the subproject would be disclosed to public.	Directorate of Economics and Statistics, Government of Assam	EPC Contractor/ PMC/ AEGCL
6.	Forest Right Act, 2006/ Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	This document outlines key legislative provisions and policies aimed at recognizing and safeguarding the rights of forest-dwelling Scheduled Tribes (ST) and other traditional forest dwellers. It highlights the framework established for recording forest rights, ensuring access, use, and ownership of forest resources, biodiversity, and benefit-sharing mechanisms for these communities. The Act acknowledges the historical occupancy of these groups in forest lands and addresses the lack of prior documentation regarding their rights.	Not Applicable - no notified forest land within the subproject area.	Department of Environment and Forest, Assam and District Administration	-



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
7.	Direct Purchase Policy, 2023	In the State's policy on Direct Purchase of land, land, immovable assets, and other property attached to the land are assessed by the District Level Direct Purchase Committee (DLLPC) in accordance with Sections 26 to 30 and Schedule I of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act, 2013. The compensation includes a multiplication factor specific to Assam, alongside an incentive of 25%, which encompasses Rehabilitation and Resettlement (R&R) benefits. This incentive is provided to landowners who voluntarily agree to participate in the project, ensuring fair valuation and compensation for their assets.	Not Applicable as the proposed substation will be constructed within AEGCL's own existing 132/33 kV (2X50 MVA) AIS substation campus and therefore, involuntary land acquisition is not required.	Revenue & Disaster Management (LR) Department, Govt. of Assam	AEGCL
8.	The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010, serves to amend provisions related to the protection, preservation, and management of ancient monuments and archaeological sites in India. It emphasizes stricter regulations to safeguard heritage structures. The Act aims to stop the rampant encroachment and construction around the monuments and other sites of archaeological importance. As per the Act, construction is prohibited in a radius of 100 meters from a protected monument and is regulated in a radius of >100-300 meters	Not applicable. No notified Archaeological site is located within 300m of the subproject.	Archaeological Survey of India (ASI), GoI	-



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		from a protected monument. Permission of the National Monuments Authority needs to be taken in case of repair/renovation in the prohibited area or regulated area.			
9.	Government of India Act, 1935 (6 th Schedule)	<p>The Government of India Act, 1935 (6th Schedule), pertains to provisions for the administration of tribal areas in certain northeastern states of India, granting them autonomy to preserve their cultural and administrative practices.</p> <p>The Sixth Schedule under Article 244(2) and 275(1) provides for the formation of autonomous administrative divisions — Autonomous District Councils (ADCs) that have some legislative, judicial, and administrative autonomy within a state⁴⁹</p>	Not Applicable.	District Autonomous council	EPC Contractor/ PMC/ AEGCL
10.	The Lalung (Tiwa) Autonomous Council Act 1995	<p>The act extends to the whole of the State of Assam.</p> <p>The Act aims to provide maximum autonomous for the social, economic, educational, ethnic, and cultural advancement of the Tiwa and other Scheduled Tribes within the council area.</p>	<p>Applicable</p> <p>Tiwa community does not resides within or near the SS area; however, along the TL, there are one to two villages inhabited by both mixed and Tiba families (Scheduled Tribes). The proposed substation expansion will remain within the existing AEGCL boundary and will not encroach upon Indigenous peoples' lands or affect their customary rights. However, along the TL, these Scheduled Tribe families may</p>	District Autonomous Council	EPC Contractor/ PMC/ AEGCL

⁹ <https://www.mea.gov.in/Images/pdf1/S6.pdf>



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
			<p>be affected or inconvenienced. Temporary land acquisition for tower locations could impact their livelihoods, which will be assessed and verified by the Circle Office.</p> <p>Shall be amended in accordance with the provisions outlined in the Act.</p>		
C. LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK					
1.	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 ensures the welfare of construction workers and regulates their employment conditions. The Workmen Compensation Act, 1923 provides compensation to workers for injuries sustained during employment. The Employees State Insurance Act, 1948 offers health insurance and social security to workers. The Child Labour (Prohibition & Regulation) Act, 1986 prohibits child labor and regulates working conditions for adolescents, with amendments strengthening its provisions.	Applicable to ensure safety and welfare measures for workers employed at construction sites. License, Safety and welfare measures for work force employed at construction sites are to be regulated in conformity with this act.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL
2.	Workmen Compensation Act, 1923	The Workmen's Compensation Act, 1923, is a legislation enacted in India to provide financial compensation to workers or their dependents in the event of injury, disability, or death caused by accidents arising out of and in the course of employment. The Act ensures that employers are liable to pay compensation for work-related injuries or occupational diseases, irrespective of fault. It outlines the method for calculating	<p>Applicable;</p> <p>Contractor/ Sub-contractor will engage a number of workers for various activities during construction phase. They will be liable to to pay compensation for work-related injuries or occupational diseases, or death, irrespective of fault.</p>	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		compensation based on the nature and severity of the injury, the worker's wages, and other factors. The Act also specifies the responsibilities of employers, rights of employees, and procedures for claiming compensation. It aims to safeguard the welfare of workers and provide them with financial security during unforeseen circumstances.			
3.	Employees State Insurance Act, 1948	The Employees' State Insurance Act, 1948 is a significant piece of social legislation in India designed to provide social security and health insurance to employees. It applies to non-seasonal factories and establishments with a certain number of employees, as specified by the Act. The Act establishes the Employees' State Insurance Corporation (ESIC), which administers benefits such as medical care, sickness benefits, maternity benefits, disablement benefits, and dependents' benefits. Both employers and employees contribute to the ESIC fund, and the Act ensures financial protection to workers during times of illness, injury, or other contingencies arising out of employment.	Applicable; Contractor will engage a number of workers for various activities during construction phase.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL
4.	The Child Labour (Prohibition & Regulation) Act, 1986 and subsequent Amendments	The Child Labour (Prohibition & Regulation) Act is aimed at regulating the employment of children and prohibiting the engagement of children in certain occupations and processes. It seeks to protect the rights of Children and ensure their well-being.	Applicable; Contractor to ensure no child below the age of 14 years is engaged in any project activity and adolescents (above 14 and less than 18 years) are not engaged in any hazardous activity.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
5.	Sexual Harassment of Women at the Workplace (Prevention, Prohibition and Redressal) Act, 2013 (POSH Act)	The Act is meant to serve as guidelines for the employees subject to the provisions of the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013. It aims to set out effective measures to avoid & to eliminate and & if necessary to impose punishment for any sexual harassment in the workplace.	May be Applicable. If women are engaged as un-skilled, semi-skilled or skilled workers at the project workplaces, the EPC, PMC and PMU/PIU will safeguard and protect women from Sexual Harassment. Other aspects, viz., GBV and SEA shall be included in this Act.	District Administration	EPC Contractor/ PMC/ AEGCL
6.	Contract Labour (Regulation & Abolition) Act 1970 along with the rules, 1971	The Contract Labour (Regulation and Abolition) Act, 1970, along with the rules of 1971, is an Indian legislation aimed at regulating the employment of contract labour and improving their working conditions. The Act seeks to prevent exploitation of contract workers and provides for the abolition of contract labour in certain circumstances. The Act applies to establishments and contractors employing 20 or more contract workers on any day of the preceding 12 months. Principal employers must register their establishments, and contractors must obtain licenses to engage contract labour. The Act mandates provisions for health, safety, welfare facilities (such as canteens, restrooms, drinking water), and working conditions for contract workers. The Act empowers the government to prohibit contract labour in specific processes or operations if deemed necessary.	Applicable; Contractors shall possibly engage sub-contractors who will employ work-force during the construction. The Act applies to the Principal Employer of an Establishment and the Contractor where in 20 or more workmen are employed or were employed even for one day during preceding 12 months as Contract Labour. Should comply As per the requirement of the Act.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		It ensures timely and fair payment of wages to contract workers, with the principal employer being held responsible in case of default by the contractor.			
7.	Minimum Wages Act, 1948 along with Central Rules, 1950 The minimum wages rules Assam 1952	The Minimum Wages Act, 1948, along with the Central Rules of 1950 and the Minimum Wages Rules of Assam, 1952, collectively aim to regulate the payment of minimum wages to workers in various scheduled employments. The Act ensures that workers are not exploited by guaranteeing a minimum standard of living through fair wages. It empowers both the Central and State Governments to fix, revise, and enforce minimum wages for different sectors and employment categories. The Assam-specific rules of 1952 provide additional guidelines tailored to the state's unique labor conditions and requirements.	Applicable; Contractor Shall be employing large number of workers during construction and they have to ensure that workers are paid at-least the stipulated minimum wages, as per the Act.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL
8.	Payment of Gratuity Act, 1972 The payment of gratuity rules Assam 1972	This act provides for a scheme for the payment of gratuity to employees engaged and completed 5 or more years of service with employer.	Applicable; Contractor should adhere to both the Gratuity Act and Rules.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL
9.	Employees Provident Fund and Miscellaneous Provision Act, 1952 along with EPF Scheme Rules and Forms	It is a beneficial piece of social welfare legislation aimed at promoting and securing the well-being of the employees.	Applicable; Contractors shall ensure all workers are covered under this Act and part of their salaries are deposited in their EPF account, which can be withdrawn at a later date.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
10.	Maternity Benefit Act, 1961 and subsequent amendment, 2017; Assam Maternity benefit Rules 1965	This act provides provision for maternity leave for women, during pregnancy and after giving birth and some other benefits to women employees, in case of medical recommendation of bed rest or miscarriage etc.	Applicable; In case the contractors engage women workers (unskilled, semi-skilled or skilled) and during the Construction Phase they conceive, this act safeguards the interest of all women employees and workers and the benefits under this Act shall be extended to them.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL
11.	The Bonded Labour (Abolition) Act 1976 Bonded Labour System (Abolition) Rules 1976	The Bonded Labour (Abolition) Act, 1976, is a significant piece of legislation in India aimed at eradicating bonded labour, a practice where individuals are forced to work to repay debts under oppressive conditions. The Act prohibits any form of bonded labour, declares all existing bonded labour agreements null and void, and frees bonded labourers from their obligations. It also makes the practice of compelling bonded labour a punishable offense. The law provides for the rehabilitation of freed bonded labourers and seeks to address the socio-economic issues that perpetuate this exploitative system.	Applicable; Contractors shall ensure that they or their subcontractors do not practice bonded labour.	Commissionerate of Labour, Government of Assam	EPC Contractor/ PMC/ AEGCL
12.	Code on Occupational Safety, Health and Working Conditions, 2020	The Occupational Safety, Health and Working Conditions Code, 2020, is a comprehensive legislation in India aimed at consolidating and streamlining various laws related to workplace safety, health, and working conditions. It seeks to ensure a safe and healthy work environment for employees across different sectors. The code amalgamates 13 existing labor laws,	Applicable; Contractor shall that they and their subcontractors provide a safe and healthy working environment in their working areas.	Commissionerate of Labour, Government of Assam	EPC Contractor/PMC /AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>including the Factories Act, Mines Act, and Contract Labour Act, among others. Key provisions of the code include:</p> <ul style="list-style-type: none"> ▪ Establishment of safety committees in workplaces with a specific number of employees to address occupational hazards. ▪ Mandatory health and safety standards for workers in hazardous industries. ▪ Provisions for annual health check-ups for certain categories of employees. ▪ Regulation of working hours, leave policies, and conditions for different types of workers. ▪ Enhanced focus on the welfare of contract workers, inter-state migrant workers, and gig workers. <p>The code also introduces a single registration mechanism for establishments, replacing multiple registrations under previous laws, simplifying compliance for employers. It emphasizes employer responsibility while promoting worker rights and well-being.</p>			
13.	National Institute of Occupational Safety and Health (NIOSH) Publication No. 98-126	NIOSH has laid down criteria for a recommended standard for occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Applicable, contractors are required to provide hearing-protection equipment and ensure exposures of workers to noise-generating activities are within allowed NIOSH standards.	Commissionerate of Labour, Government of Assam	EPC Contractor/PMC /AEGCL
14.	National Policy on Safety, Health and Environment at Work	The National Policy on Safety, Health and Environment at Workplace, 2009, aims to ensure the well-being, safety, and health of	Applicable; Contractor and their sub-contractors and	Commissionerate of Labour, Government of Assam	EPC Contractor/PMC /AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
	place, 2009	workers across all sectors in India. It emphasizes the creation of a safe working environment, prevention of occupational hazards, and promotion of sustainable work practices. The policy outlines responsibilities for employers, workers, and authorities to comply with safety standards, provide training, and implement risk management systems. It also focuses on strengthening enforcement mechanisms, developing a culture of safety, and integrating health and environmental considerations into workplace policies. The ultimate goal is to reduce workplace accidents and illnesses while fostering a positive and productive work environment.	adhere to this Policy.		
15.	Equal Remuneration Act, 1976 along with allied Rules	The Equal Remuneration Act, 1976, is an Indian law aimed at ensuring equal pay for equal work for both men and women and preventing gender-based discrimination in employment. The Act mandates that employers provide equal remuneration to male and female workers for performing the same or similar work. It also prohibits discrimination against women in matters of recruitment, promotion, training, or transfer. Key provisions of the Act include: Employers must ensure that male and female employees receive the same wages for similar work; Employers cannot discriminate on the basis of gender in recruitment or other employment conditions; The Act provides for the	Applicable; Contractor and their sub-contractors shall be liable to abide by the provisions of this Act and Rules.	Commissionerate of Labour, Government of Assam	EPC Contractor/PMC /AEGCL



Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Applicability	Competent Authority	Responsibility, Supervision, Monitoring
		<p>establishment of advisory committees to promote employment opportunities for women and ensure compliance; and Non-compliance with the provisions of the Act can lead to penalties, including fines or imprisonment.</p>			
16.	Inter-state Migrant Workers Act, 1979	<p>The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979, was enacted in India to regulate the employment and conditions of service for inter-state migrant workers. The Act aims to protect these workers from exploitation and ensure their rights and welfare. It applies to establishments and contractors employing five or more inter-state migrant workers. Key provisions include: 1. Employers are required to register their establishments, and contractors must obtain licenses to engage inter-state migrant workers; 2. Workers are entitled to wages similar to local workers, displacement allowances, journey allowances, and other benefits; 3. The Act mandates fair working conditions, timely payment of wages, and provision of suitable accommodation, medical facilities, and protective clothing; 4. GRM are established to address complaints and disputes related to employment conditions.</p>	<p>May be Applicable;</p> <p>In case Contractor/ Sub-contractor engages workers from other states (other than Assam) for this project.</p>	Commissionerate of Labour, Government of Assam	EPC Contractor/PMC /AEGCL

3.3 International Conventions and Treaties relevant to the project

India is a signatory to several international environmental conventions and treaties that aim to protect biodiversity, regulate hazardous substances, mitigate climate change, and promote sustainable development. Although these conventions are primarily applicable at the national policy level, their underlying principles are reflected in India's domestic environmental laws, guidelines, and standards. For power infrastructure projects relevance is typically assessed in terms of potential impacts on biodiversity, handling of hazardous materials (e.g., transformer oil), and broader environmental safeguards.

Table 10 presents a list of selected international treaties and conventions to which India is a party, along with their specific applicability or relevance to the proposed subproject.

Table 10: International Environment Conventions and Treaties

Sl.No	Conventions/ Treaties/ Declarations	Applicability to the Project
A. NATURE CONSERVATION (FORESTRY AND WILDLIFE)		
1	Ramsar Convention on Wetlands, 1971	No
2	CITES, 1973 (Convention on International Trade in Endangered Species of Fauna and Flora)	No
3	TRAFFIC, 1976 (The Wildlife Trade Monitoring Network)	No
4	Bonn Convention, 1979 (Convention on the Conservation of Migratory Species)	Yes, flyway involved but specific bird routes/ wintering sites not identified yet in Assam.
5	CAWT, 2005 (Coalition Against Wildlife Trafficking)	No
6	CBD, 1992 (Convention on Biological Diversity)	No
7	Commission on Sustainable Development, 1992	No
7	ITTA, 1983 (International Tropical Timber Agreement)	No
8	UNFF, 2000 (United Nations Forum on Forests)	No
9	IUCN-World Conservation Union, 1948 (International Union for Conservation of Nature and Natural Resources)	No
10	GTF, 1994 (Global Tiger Forum)	No
B. HAZARDOUS MATERIAL		
1	Cartagena Protocol on Biosafety, 2003	No
2	Nagoya Protocol, 2010	No
3	SAICM, 2006 (Strategic Approach to International Chemicals Management)	No
4	Stockholm Convention on Persistent Organic Pollutants (POPs), 2001	No
5	Basel Convention on the Control of Trans-boundary Movement of Hazardous Waste and Their Disposal, 1989	Yes, Use of Transformer oil
6	Rotterdam Convention on Prior Informed Consent (PIC) for certain Hazardous Chemicals and Pesticides in International Trade, 1998	No
C. ATMOSPHERIC EMISSIONS		
1	UNFCCC (United Nations Framework Convention on Climate Change), 1992	No
2	Kyoto Protocol, 1997	No
3	UNCCD (United Nations Convention to Combat Desertification), 1994	No

Sl.No	Conventions/ Treaties/ Declarations	Applicability to the Project
4	Montreal Protocol (on Ozone Depleting Substances), 1987	Yes, Use of SF ₆
D. MARINE ENVIRONMENT		
1.	IWC (International Whaling Commission), 1946	No

The International Labour Organization (ILO) has ratified six of the eight core/fundamental conventions. A brief description of these International Conventions that the nation is adopted is given in **Table 11**.

Table 11: International Labour Law Conventions

Sl.No.	International Labour Law Convention	Stipulation/Terms and Conditions
1	Forced Labour Convention, 1930 (No. 29),	All forms of forced labor are banned, defined as work performed under the threat of penalty without voluntary consent. Countries must criminalize forced labor and enforce strict penalties.
2	Abolition of Forced Labour Convention, 1957 (No. 105),	Forced labor cannot be used for political coercion, education, punishment for political or ideological views, economic development, labor discipline, strike participation, or discrimination based on race, social status, nationality, or religion.
3	Equal Remuneration Convention, 1951 (No. 100)	Emphasizes equal pay for work of equal value and addresses issues of gender discrimination in wages.
4	Discrimination (Employment and Occupation) Convention, 1958 (No. 111),	Prohibits discrimination in employment based on race, color, sex, religion, political opinion, or social origin. It calls for the repeal of discriminatory laws to ensure equal opportunities.
5	Minimum Age Convention, 1973 (No. 138)	Advocates for the progressive elimination of child labor by setting a minimum age for employment is 16 years to 18 years (may be employed for such work on condition that their health, safety and morals are fully protected and that they have received adequate specific instruction or vocational training).
6	Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour, 1999 (No. 182).	Prohibition Bans slavery, forced labor, and trafficking of children. It also prohibits the use of children in armed conflicts, prostitution, pornography, drug trafficking, and hazardous work.

3.4 AIIB's Environmental & Social Policies ^[10]

The AIIB functions as a global financial institution that promotes multilateral funding and investment opportunities to support infrastructure growth and enhance connectivity throughout Asia. It places significant emphasis on environmental and social sustainability, ensuring its efforts align with its core mission. To achieve this, the AIIB has implemented an Environmental and Social Framework (ESF) designed to assist its clients in attaining sustainable development outcomes.

Environmental and Social Standards (ESSs): The ESF comprises several components, including an

¹⁰ Source: https://www.aiib.org/en/policies-strategies/download/environment-framework/AIIB-Environmental-and-Social-Framework_ESF-June-2024.pdf

introductory overview, a Vision Statement, a mandatory Environmental and Social Policy (ESP), three mandatory Environmental and Social Standards (ESSs), and an Environmental and Social Exclusion List (ESEL). The three ESSs are as follows:

1. ESS 1: Environmental and Social Assessment and Management
2. ESS 2: Land Acquisition and Involuntary Resettlement
3. ESS 3: Indigenous Peoples

These Environmental and Social Standards (ESSs) are structured to guide borrowers, such as AEGCL, in managing project-related risks and impacts while enhancing their environmental and social performance. The ESSs adopt a risk- and outcomes-based approach, with specific objectives outlined for each standard. Borrowers are provided with clear requirements to help them achieve these objectives in ways that are proportionate to the project's scale, nature, and associated environmental and social risks.

Table 12: Environmental and Social Standards of AIIB

Environmental and Social Standards (AIIB)	Objective & Brief Description
ESS-1: Environmental and Social Assessment and Management	<p>ESS1 aims to ensure the sustainability and integrity of projects from an environmental and social perspective. It also promotes the integration of these factors into both decision-making and project execution. If a project is expected to pose social or environmental risks and impacts, ESS1 becomes applicable. The environmental and social assessment scope and management measures are proportional to the project's risks and impacts. ESS1 ensures high-quality assessment and management of these risks through effective mitigation and monitoring measures during project implementation. It outlines specific requirements, including Climate Risk Assessment, Greenhouse Gas (GHG) Reporting in line with the Paris Agreement 2015, Biodiversity Assessment, Project-level Grievance Redress Mechanisms (GRMs), Labor Management Relations, and others, for any project financed by the Bank.</p> <p>For the proposed 220/132kV AIS at Morigaon, which will be constructed within the existing Baghjap Grid Substation land is owned by AEGCL. However, the two transmission lines shall be erected on paddy fields where civil works may result in limited adverse environmental and social impacts. However, these impacts are not unprecedented and are would be confined within the project's existing boundaries. Thus, ESS1 is applicable.</p>
ESS-2: Land Acquisition and Involuntary Resettlement	<p>ESS2 applies if a project's screening process identifies the potential for Involuntary Resettlement, encompassing both physical displacement (e.g., relocation or loss of residence) and economic displacement (e.g., loss of land or livelihood resources). This could arise from involuntary land acquisition or restrictions on land use. ESS2 defines detailed requirements for a Land Acquisition and Resettlement Plan (LARP) or a Land Acquisition and Resettlement Planning Framework (LARPF), as applicable. For the Baghjap substation project, since it will be constructed on land already owned by AEGCL and no land acquisition is required, ESS2 is not triggered.</p> <p>However, the ESS 2 is applicable on the associated transmission line as there is involuntary permanent and temporary restrictions on land use for the tower footing as well as for RoW of the Transmission line despite ownership of land remaining with affected persons. Compensation for restricted/temporary use of land, tree / crop/structure (if any) damages will be paid to the individual landowners as per compensation procedures laid in Ministry of Power,</p>



Environmental and Social Standards (AIIB)	Objective & Brief Description
	<p>Government of India (MoP, GoI) guidelines for payment of compensation towards damages with regard to RoW, October 2015 and new guideline of Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) & Government of Assam Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024.</p>
<p>ESS-3: Indigenous Peoples</p>	<p>ESS3 applies if Indigenous Peoples are present in or have a collective attachment to the project area and are likely to be affected by the project. Indigenous Peoples are typically identified by traits such as self-identification as a distinct cultural group, attachment to specific territories, separate cultural or social institutions, and distinct languages. ESS3 outlines requirements for an Indigenous Peoples Plan (IPP) or Indigenous Peoples Planning Framework (IPPF), which can be submitted as a standalone document, an annex to the assessment report, or incorporated into it.</p> <p>For the Morigaon Substation project, no significant impacts on Indigenous Peoples are anticipated, as the substation is located within a secured and confined boundary area.</p> <p>For the associated transmission components—namely the 220 kV 4-Circuit Baghjap LILLO Line and the 220 kV Double Circuit Tata Line—a screening exercise was conducted. During the assessment and consultations with local villagers, it was observed that the affected population comprises Assamese communities, including the Tiwa community, which is classified as a Scheduled Tribe (ST) Plains group. However, this community does not demonstrate distinct socio-cultural characteristics typically associated with Indigenous Peoples as defined under AIIB’s ESS-3. Meaningful consultations have been carried out with the local communities, and the details are presented in Chapter 10.</p> <p>Furthermore, the project area does not fall within any Sixth Schedule areas as defined under the Constitution of India. Minor, temporary disturbances such as dust generation and increased traffic during construction activities may occur. Field surveys conducted in villages surrounding the substation site did not identify the presence of Indigenous Peoples as per ESS-3 criteria.</p> <p>Based on the current assessment, the applicability of ESS-3 requires further review and assessment. A detailed evaluation under ESS-3 will be undertaken after identification of landowners for tower footing locations and the Right of Way (RoW) for the transmission line, and upon completion of the census survey and verification of the Land Schedule.</p>

Environmental and Social Exclusion List: The Bank will not provide financing for projects that fail to comply with the Environmental and Social Policy (ESP) and the applicable Environmental and Social Standards (ESSs). Furthermore, the Bank will not knowingly fund any project that: (a) involves or results in forced evictions; or (b) includes activities or items listed in the Environmental and Social Exclusion List (refer **Appendix 7**).

Project categorization: The project has been classified as "**Category B**" by AIIB in accordance with the Environmental and Social Policy (ESP) based on the assessment that the environmental and social (E&S) risks and impacts are site-specific, temporary, and can be effectively mitigated through standard E&S management practices. This Environmental and Social Impact Assessment and Environmental and Social Management Plan (ESIA-ESMP) will outline measures to mitigate the subproject's E&S risks and impacts in a manner consistent with AIIB's ESP and Environmental and Social Standards (ESSs). A Rapid Environmental and Social Assessment (RESA) Checklist is included as **Appendix 1**, which served as a tool to preliminarily identify and evaluate potential environmental and social risks and sensitivities associated with the proposed subproject.

3.5 Gap Analysis between National and AIIB Policies and Standards

A Comparative Analysis of Indian Regulations and AIIB Guidelines is provided below. A detailed analysis reveals gaps between Indian regulations and the Environmental and Social Framework (ESF) of the Asian Infrastructure Investment Bank (AIIB).

Environmental Classification and Impact Assessment: Under India's Environmental Impact Assessment (EIA) Notification of 2006, Power Substation and Transmission Line Construction projects are classified as B2 projects. This designation exempts them from requiring an Environmental Impact Assessment (EIA). In contrast, AIIB's ESF categorizes such projects as Category B, recognizing their potential adverse environmental and social impacts. As a result, AIIB mandates the preparation of an Environmental and Social Impact Assessment (ESIA) report, accompanied by an Environmental and Social Management Plan (ESMP). This discrepancy highlights the need for stricter environmental assessments under Indian regulations.

Analysis of Project Alternatives: Indian regulations do not mandate an analysis of project alternatives for Power Substation and Transmission Line Construction projects. However, AIIB guidelines emphasize the importance of conducting a thorough alternatives analysis as part of the project's environmental and social assessment. This requirement ensures that the most environmentally and socially sustainable option is selected, minimizing adverse impacts.

Environmental and Social Management Plan (ESMP): In India, there is no mandatory requirement to prepare an ESMP or allocate a budget for its implementation for these projects. Conversely, AIIB guidelines necessitate the development of a comprehensive ESMP with adequate budgetary provisions. This ensures the effective implementation of mitigation measures to address environmental and social risks.

Public Consultation and Grievance Redress Mechanism: Indian regulations do not require public consultation or the establishment of a grievance redress mechanism for Power Substation and Transmission Line Construction projects. The EIA Notification does not mandate stakeholder engagement or mechanisms to address grievances from affected communities. On the other hand, AIIB guidelines prioritize meaningful public consultation and require the establishment of a grievance redress mechanism. This approach fosters transparency, inclusivity, and responsiveness to stakeholder concerns.

Public Disclosure of Information: Under Indian law, public disclosure of environmental and social information is not mandatory for these projects. In contrast, AIIB guidelines mandate timely and

transparent disclosure of relevant information to stakeholders during project preparation and implementation. This practice promotes accountability and informed decision-making.

Environmental Standards: there are no specific national guidelines prescribing minimum environmental standards for Power Substation and Transmission Line Construction projects. However, the International Finance Corporation's (IFC) Environmental, Health, and Safety (EHS) Guidelines for Electric Power Transmission provide clear minimum standards for air, water, noise, and soil quality. These standards should be integrated into project planning and implementation to ensure compliance with global best practices.

Compensation for Displaced Persons: Indian regulations do not guarantee compensation for all displaced persons, particularly those without legal titles, such as individuals occupying government land. In contrast, AIIB's social safeguard policies require compensation and assistance for all affected persons, regardless of their legal ownership or title status. This inclusive approach ensures equitable treatment and support for vulnerable populations.

Monitoring and Reporting Requirements: Indian standards do not impose mandatory environmental and social monitoring and reporting requirements for Power Substation and Transmission Line Construction projects. However, AIIB guidelines stipulate regular monitoring and reporting as integral components of the environmental and social management process. Continuous monitoring ensures that mitigation measures are effectively implemented and that potential risks are addressed promptly.

Conclusion: The analysis reveals gaps between Indian regulations and AIIB guidelines in addressing the environmental and social impacts of Power Substation and Transmission Line Construction projects. While Indian regulations provide a basic framework for project implementation, there are gaps in areas such as stakeholder engagement, compensation for displaced persons, monitoring and reporting requirements, and alignment with international environmental and social standards.

3.6 AEGCL's Environmental and Social Policy and Procedures

AEGCL has partnered with Multilateral Development Banks (MDBs), including the World Bank (WB) and the Asian Development Bank (ADB), to implement various initiatives. Through these collaborations, AEGCL has developed its Environmental and Social Policy and Procedures (ESPP)¹¹ and gained valuable experience in managing Environmental and Social (E&S) instruments in alignment with MDB requirements. Leveraging insights from ADB-funded projects, AEGCL has demonstrated proficiency in adhering to E&S standards. Furthermore, the organization's operational safety manual¹² highlights its commitment to occupational health, safety, and overall E&S responsibilities, showcasing its dedication to sustainable and responsible practices.

3.7 Involuntary Resettlement Policy

The project involves construction of a substation and associated transmission line facilities. The AIIB Environmental and Social Standard 2 (ESS-2): Involuntary Resettlement is applicable due to

¹¹ https://www.powergrid.in/sites/default/files/inline-files/ESPPF_ASSAM.pdf

¹² https://www.aegcl.co.in/wp-content/uploads/2020/12/Safety_Manual_AEGCL.pdf

permanent and temporary restrictions on land use arising from tower footing locations and the Right-of-Way (RoW) corridor of the transmission line, even though land ownership will remain with the respective landholders.

For the proposed substation, development will be undertaken entirely within existing land already owned and in possession of AEGCL; therefore, land acquisition is not anticipated, and involuntary resettlement will not be triggered for the substation component.

For the transmission line, land ownership will not be transferred. However, permanent restriction on land use at tower footing locations and temporary/restricted use within the RoW corridor shall occur during construction and operation. Compensation for loss or damage to crops, trees, and structures, and for restriction on land use, will be provided to affected landowners in accordance with applicable central and state RoW compensation guidelines.

Although involuntary resettlement involving physical displacement is not anticipated, unanticipated impacts such as crop loss, livelihood disruption, or temporary access restriction may arise during construction. Accordingly, this section establishes the applicable legal and policy framework and outlines principles for addressing any such impacts in compliance with national regulations and AIB ESS-2.

3.7.1 Applicability to Project Components

Substation Component:

The proposed substation will be established entirely within land already owned and in possession of AEGCL; therefore, no additional land acquisition, or loss of private assets is anticipated. As the project will be implemented within existing utility land and does not require acquisition of private land, the provisions of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 and the Assam Land (Requisition and Acquisition) Act, 1964 will not be triggered for the substation component

Transmission Line Component:

For the transmission line, land ownership will remain with landholders. Only restriction on land use for tower footing and RoW will occur. Therefore, full land acquisition legislation will not be triggered. Compensation for restriction on land use and damages to crops/trees/assets will be paid as per applicable RoW compensation guidelines and state notifications.

3.7.2 Applicable Legal and Policy Framework

Electricity Act, 2003

The Electricity Act, 2003 provides statutory authority for transmission utilities to construct, operate, and maintain transmission lines for public purpose. Under Sections 67 and 68, read with Section 164 of the Act, the Appropriate Government may confer upon a transmission utility the powers of a telegraph authority for placing transmission infrastructure. This enables installation of transmission towers and lines over private or public land without transfer of land ownership, while ensuring compensation for any damage caused to land, crops, trees, or structures during survey, construction, or maintenance. Compensation is assessed and determined by the District Commissioner or



competent authority in accordance with applicable central and state RoW guidelines.

Indian Telegraph Act, 1885 (as applicable to transmission lines)

When powers under the Telegraph Act are conferred through the Electricity Act, the transmission utility is authorized to place and maintain transmission lines and towers over land while ownership continues with the landholder. The Act provides the legal basis for Right-of-Way (RoW) access without formal acquisition of land. It requires payment of compensation for any damage sustained to land, crops, trees, or immovable property during installation and maintenance of transmission infrastructure, with disputes regarding compensation determined by the District Magistrate or other competent authority

Ministry of Power (GoI) and Government of Assam RoW Compensation Guidelines

The Ministry of Power, Government of India, issued updated guidelines (Ref. No. 3/4/2016-Trans-Part(4) dated 14.06.2024) establishing a uniform methodology for payment of compensation toward damages and land-use restrictions arising from transmission line construction where land ownership remains with the landholder. The Government of Assam, Power Department, through its notification dated 04.11.2024, has adopted this framework for the State, to be implemented for transmission lines of 66 kV and above through a Standard Operating Procedure administered by the District Commissioners as the competent authorities for compensation determination. Under these guidelines, compensation is payable for both the permanently affected tower base area and the Right-of-Way (RoW) corridor in addition to crop, tree, and structure damages. Specifically, compensation for the tower footing area is fixed at 200% of the land value for the area covered by the tower legs plus one metre on each side, while compensation for land falling within the RoW corridor is 30% of the land value to address restriction on land use and diminution of land value due to the presence of transmission infrastructure. Compensation for crops, trees, and other assets is assessed separately by Revenue authorities. Land ownership remains with the landholder, and compensation is paid as a one-time upfront payment, generally through digital modes. Since RoW involves restriction on land use rather than acquisition, provisions applicable to land acquisition—such as solatium or multiplication factor—do not apply, though an entry regarding the RoW is recorded in land records. These provisions apply to projects initiated on or after 14.06.2024 and will be followed for payment of compensation for tower footing, RoW restrictions, and associated damages under the project.

AIIB Environmental and Social Policy – ESS-2 (Involuntary Resettlement)

The Asian Infrastructure Investment Bank Environmental and Social Standard-2 (ESS-2) requires that involuntary resettlement impacts be avoided or minimized to the extent feasible and that affected persons are compensated at replacement value for loss of assets, income sources, or livelihood. The policy emphasizes meaningful consultation, disclosure of project information, livelihood restoration, and special attention to vulnerable groups. ESS-2 applies not only in cases of physical displacement but also where there is economic displacement or restriction on land use, even if land ownership is not transferred. Accordingly, the project will provide compensation for damages, crop and tree loss, and restriction on land use in line with ESS-2 principles and applicable national/state guidelines. In the event that unanticipated impacts requiring resettlement planning arise during implementation, an Abbreviated Resettlement Action Plan (ARAP)/ Resettlement Action Plan (RAP), as applicable, will



be prepared in accordance with ESS-2 requirements, disclosed, and made available in the public domain prior to implementation of the relevant project activities.

3.7.3 Resettlement Planning Approach

For the transmission line component, an ARAP/RAP will be prepared in accordance with the Asian Infrastructure Investment Bank Environmental and Social Standard-2 (ESS-2) after completion of the final check survey and confirmation of the land owners. The ARAP will be based on identification of affected landowners, land parcels, and assets within tower footing locations and the Right-of-Way (RoW) corridor, and will include a 100 percent census and socio-economic survey of all affected landowners, users, and any non-titleholders. The alignment has been selected to minimize impacts on private land and avoid residential structures to the extent feasible.

The ARAP will document permanent and temporary restrictions on land use, assess impacts on crops, trees, structures, and livelihoods, and define eligibility, entitlements, and compensation procedures in line with applicable central and state RoW guidelines and ESS-2. Consultations will be undertaken with affected persons to disclose impacts, compensation provisions, and grievance mechanisms. The finalized ARAP will be disclosed in the public domain prior to construction, and compensation will be fully disbursed before commencement of works in the affected tower and RoW sections. If any unanticipated impacts involving displacement or significant livelihood loss arise, the ARAP will be updated or a RAP prepared and implemented prior to initiation of the relevant works.

Chapter 4: Description of Environmental & Social Baseline Conditions

This Chapter outlines the current environmental and social conditions of the subproject area, derived from a thorough assessment utilizing both primary and secondary data sources. The evaluation incorporates literature reviews, on-site inspections, stakeholder engagements, and field data collection, complemented by advanced techniques such as remote sensing and GIS-based mapping for detailed analysis and visualization. The baseline study offers a holistic understanding of the physical, biological, and social aspects of the study area, serving as a critical foundation for assessing potential impacts and facilitating well-informed decision-making processes.

4.1 Study Area

To establish the baseline and evaluate potential impacts, a defined zone around the subproject site has been selected for assessing both environmental and social conditions, as well as the ecological and biological environment. While direct impacts will be confined to the project footprint area, indirect and induced impacts extend beyond it to the Project's Area of Influence (AoI), as outlined below:

- **Project Footprint Area:** Refers to the 3.34 ha area designated for the proposed substation, including the 1.34ha area occupied by the existing 132/33Baghjap Grid Substation, and along the entire length of the Right of Way (17.5m on either side) of the two transmission lines;
- **Project Area of Influence (AoI):** Encompasses areas that may be impacted by indirect or induced effects from the subproject activities. A 2km buffer zone has been identified for assessing environmental and social baselines, while a 10km buffer zone is designated for evaluating ecological and biological factors;
- Additionally, sensitive receptors, such as schools, hospitals, offices, religious sites, and residential areas, have been mapped within a 500m radius of the substation and along the transmission lines to identify specific environmental and social risks.

The study area map is depicted in **Figure 3**, depicting the 2km and 10km buffer zone showing AoI, while a topographic-sheet map highlighting the 2km buffer zone, around the existing and proposed substation location and the transmission lines is provided in **Figure 4**.

Moreover, as part of the ESIA, EQMT for Air, Noise, Water (drinking and ground) and Soil were also carried-out and analyzed. The location of the sampling sites is depicted in **Table 13** and **Figure 5**.

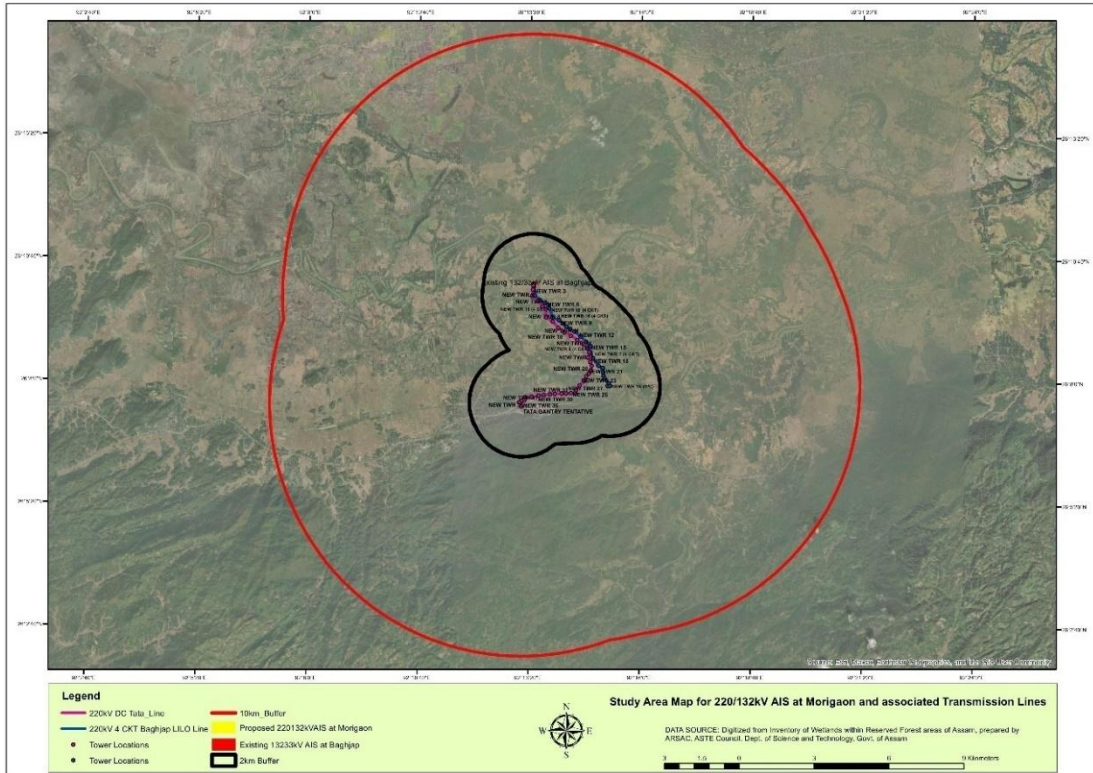


Figure 3 : Study Area Map showing 2km and 10km buffer zones along with AIS and Transmission Lines

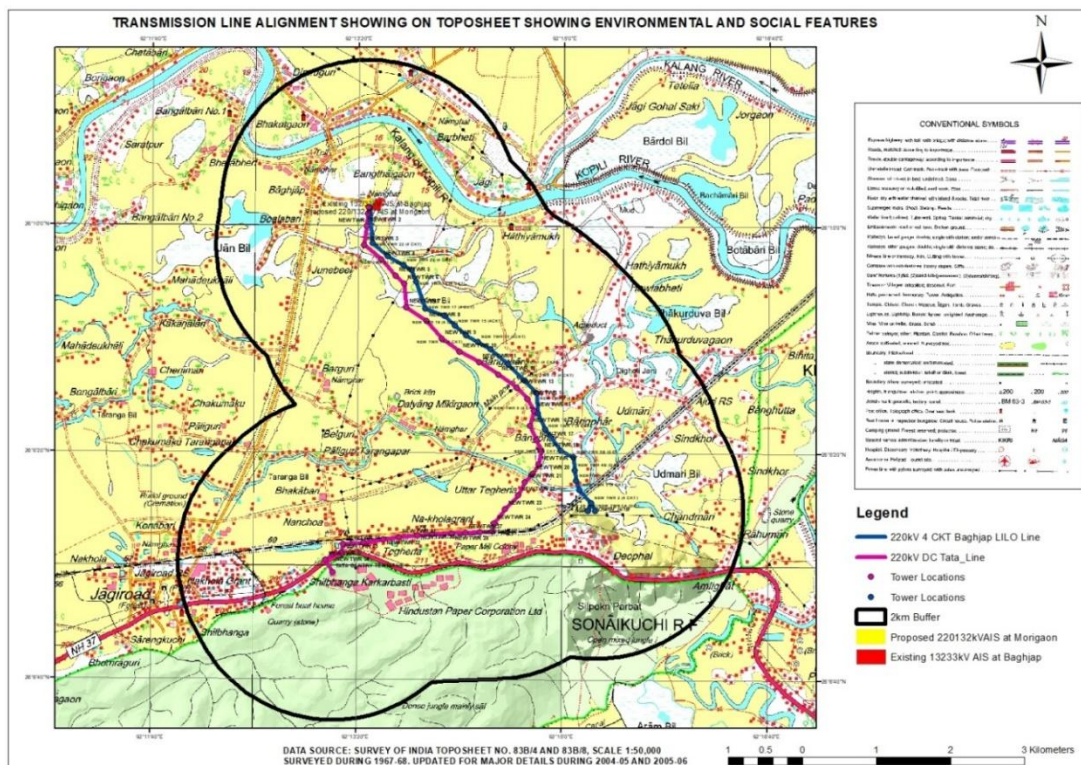


Figure 4: Topographic Map showing 2km buffer zone around the existing and proposed substations, and the two proposed transmission lines

Table 13: Sampling locations for water, soil, air and noise baseline EQMT

Sl. No	Location	Sample	Details
1.	Substation 26°10'9.20"N and 92°13'25.08"E	Water Sample	1 Nos. Ground water (GW); 1 Nos. Drinking water (DW)
		Soil Sample	1 Nos. Any place within SS
		Air Quality test	One time for 24 hrs
		Noise Level	One-time 24hrs at interval of 8 hrs (on-site)
2.	Transmission Line 220/132kV 4 CKT Baghjap LILO Line at New T-2 26° 8'10.81"N and 92°14'34.80"E	Water Sample	1 Nos. Surface water, otherwise, any 1 Nos. GW/DW
		Soil Sample	1 Nos.
		Air Quality test	One time for 24 hrs
		Noise Level	One-time 24hrs at interval of 8 hrs (on-site)
	220/132kV D/C TATA Line between T-30 and T-31 26° 7'37.81"N and 92°13'13.71"E	Water Sample	1 Nos. Surface water, otherwise, any 1 Nos. GW/DW
		Soil Sample	1 Nos.
		Air Quality test	One time for 24 hrs
		Noise Level	One-time 24hrs at interval of 8 hrs (on-site)

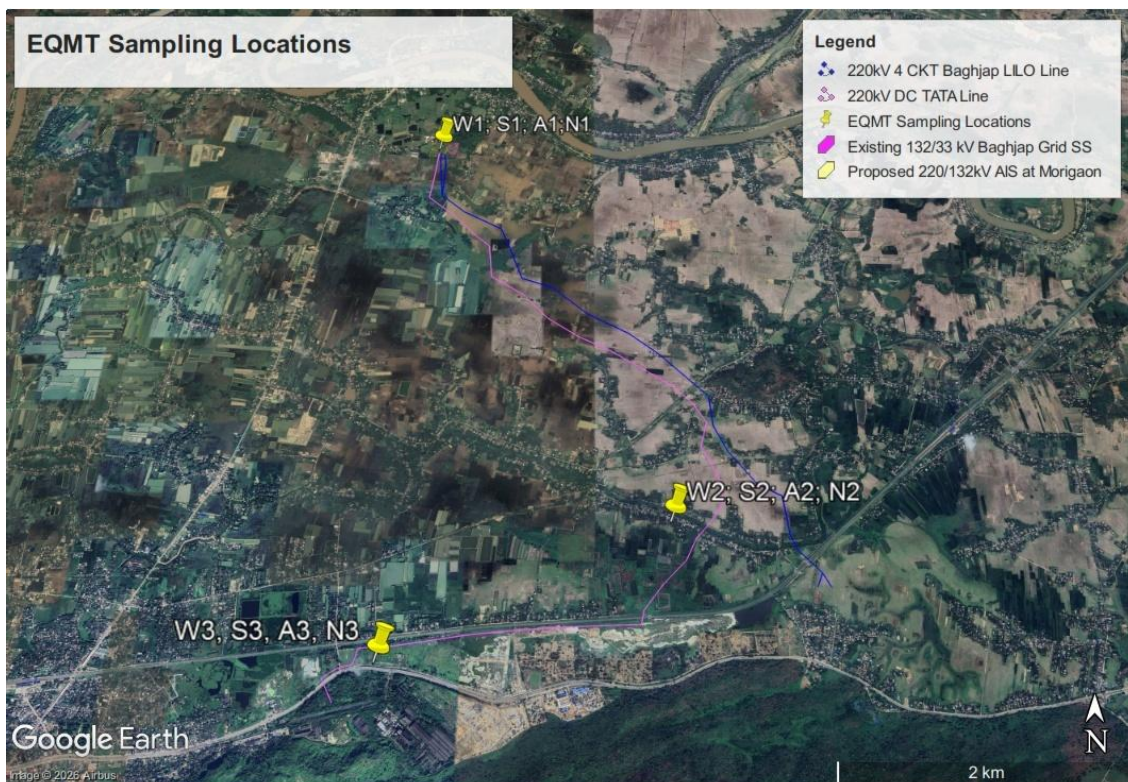


Figure 5: Sampling locations for water, soil, air and noise baseline EQMT

4.2 Physical Environment Baseline of the Study Area

4.2.1 Physiography and Terrain

Morigaon District, located in central Assam, India, spans an area of 1,450 square kilometers, positioned between latitudes 26°03' N to 26°30' N and longitudes 91°58'30" E to 92°34' E. The district headquarters, Morigaon town, lies at approximately 26°15' N and 92° E. Situated within the Brahmaputra Valley, it is about 73 km northeast of Guwahati via National Highway 27. The district is bordered by the Brahmaputra River to the north, districts of Karbi Anglong to the south, Nagaon to the east, and Kamrup to the west. The region's fertile alluvial floodplains, shaped by the Brahmaputra and its tributaries (Kolong, Killing, and Kopili rivers), make it agriculturally rich and accessible.

The project's footprint, within a 2km radius around the substation and transmission lines, consists of flat alluvial plains shaped by the Brahmaputra and its tributaries. The Kopili River flows near the site at a distance of 935 m. The area is predominantly agricultural, with extensive paddy fields accompanied with vegetable gardens and household plantations, and is moderately populated with settlements. The local economy relies heavily on agriculture, including two season (kharif and Rabi) paddy cultivation, seasonal vegetable farming, and some fisheries done in ponds. The terrain is generally flat with natural drains and *nallahs*. Water bodies, such as ponds, stagnant pools, natural drains and nallahs are covered with floating and rooted floating leaf plants such as hyacinth, water lilies and lotus, etc., are also present in the region.

The substation can be accessed from the NH 715A between Jagiroad and Bhakatgaon, while the transmission alignments can be accessed through various internal village roads connecting the NH-27 and the NH-715A.

4.2.2 Climate, Temperature and Rainfall Pattern

As Morigaon district does not host a major Indian Meteorological Department Class-I observatory, the district-level climatology is derived from nearest regional stations in the Brahmaputra valley (Guwahati / Tezpur / Jorhat). The climate in Morigaon is characterized by distinct wet and dry seasons. The wet season is hot, humid, and predominantly cloudy, while the dry season is warm and clear. Morigaon exhibits: a Pre-monsoon heat build-up between March and May, a Monsoon thermal stabilization due to cloud cover followed by a high night temperature during peak humidity and a Sharp winter cooling between December and January. Typical temperature limits reported for the district are: Summer Max between 37–39 °C, Winter Min between 6–7 °C. ^[13] The mean monthly maximum and minimum temperatures for Morigaon district is depicted in **Table 14** and shown in **Error! Reference source not found.**

¹³Source: (1) District Disaster Management Authority. (2025). *District Disaster Management Plan – Morigaon District*. Government of Assam. (2) Statistical Handbook of Assam. (2023–2024). Directorate of Economics and Statistics, Government of Assam. (3) India Meteorological Department (IMD). Climatological tables and regional observatory data (Assam stations).

Table 14: Mean Monthly Max and Min Temperature (°C) (2024)

Month	Mean Max (°C)	Mean Min (°C)
January	25.5	10.8
February	28.2	14.6
March	31.0	18.2
April	33.5	21.2
May	34.8	24.0
June	34.5	26.0
July	34.0	26.5
August	33.8	26.2
September	33.5	25.4
October	31.8	22.0
November	28.5	16.5
December	25.8	11.8

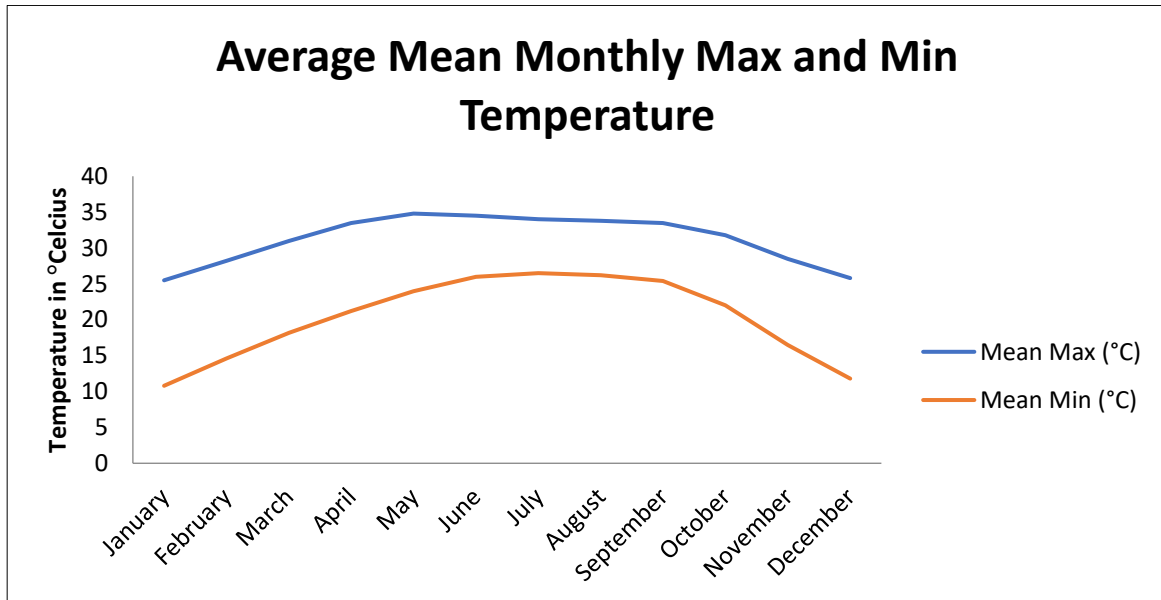


Figure 6: Average Mean Monthly Max. and Min. Temperatures

Precipitation patterns show significant variation, with the wetter season lasting from early April to early October. July is the wettest month, with an average of 23.3 days of precipitation and 10.4 inches of rainfall. Conversely, the drier season extends from early October to early April, with December being the driest month, averaging only 0.3 inches of rainfall.

The rainfall pattern underscores climatic variability, frequent flooding during wet months, and moisture stress in dry months. This necessitates effective flood control measures and water resource management strategies, ensuring resilience against extreme weather conditions. The average monthly rainfall in Morigaon district for the last 5 years (2018 to 2022) is depicted in **Table 15** and **Figure 7**.

Table 15: Average Monthly Rainfall (mm) in Morigaon District for last 5 years (2018 - 2022)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2018	0	5.8	17.2	142.6	90.2	307.3	210.9	164.5	105.4	50.2	0	25.6
2019	4.2	3.6	59.6	63.2	211.7	113.2	283.4	160.9	183.4	142.1	1.4	0
2020	9.4	24.6	0	119	139.4	217.9	97.5	214.4	264.4	208.8	0	0
2021	0	7.2	33.6	41.2	144.9	206	161.6	195.2	206.5	126.8	0	0.4
2022	32.5	22.1	10.7	119.9	183.4	282.6	195.4	84.3	75.9	156.1	0.5	0

Source: Customized Rainfall Information System (CRIS), Hydromet Division, India Meteorological Department, Ministry Of Earth Sciences, New Delhi ([https://hydro.imd.gov.in/hydrometweb/\(S\(f4cnqo451rzhdtzoqfikbj55\)\)/DistrictRaifall.aspx](https://hydro.imd.gov.in/hydrometweb/(S(f4cnqo451rzhdtzoqfikbj55))/DistrictRaifall.aspx))

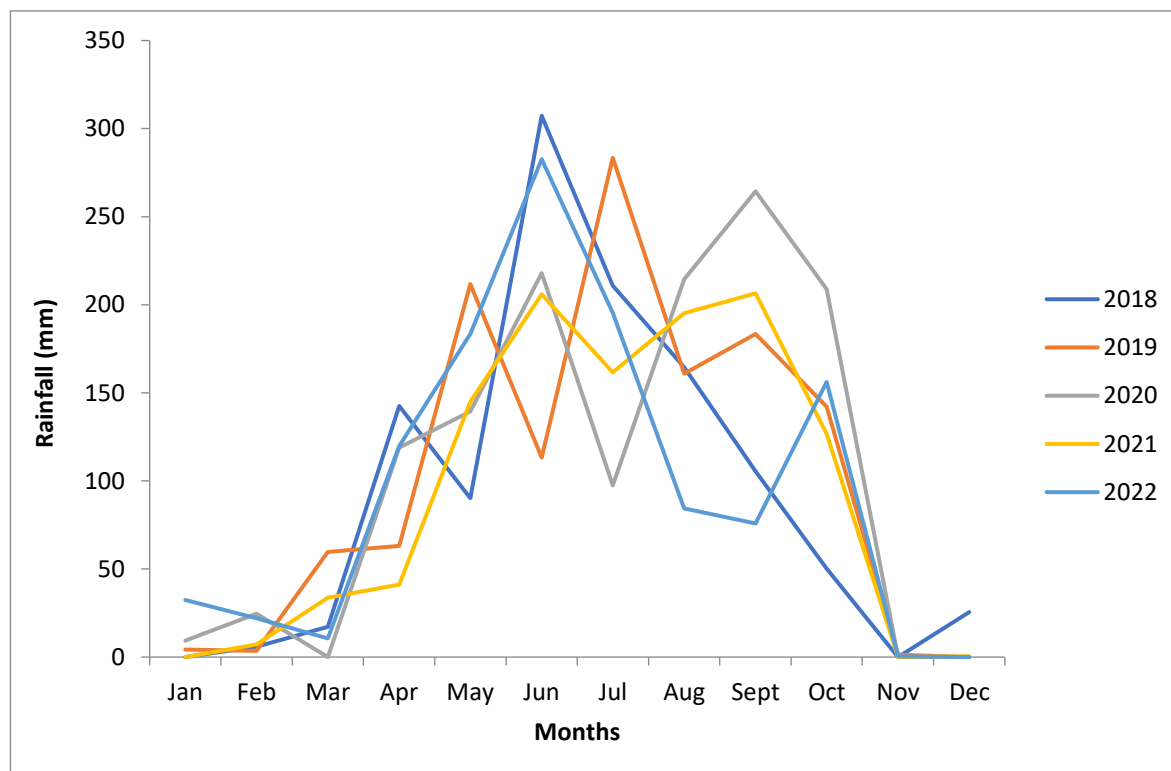


Figure 7: Average Monthly Rainfall (mm) in Morigaon District for last 5 years (2018 - 2022)

Humidity levels are notably high for most of the year, with a muggy period lasting from March 23 to November 25. January experiences the least humidity, with almost no muggy days.

Wind conditions in Morigaon exhibit mild seasonal variation. The windier period occurs from mid-February to mid-July, with April being the windiest month at an average speed of 4.4 miles per hour. The calmer period runs from mid-July to mid-February, with December being the calmest month at an average speed of 2.5 miles per hour. Wind direction alternates between predominantly westward from January end to mid-September and eastward from mid-September to January end.

4.2.3 Geology and Soil Type

Geology

Morigaon district lies in the central Brahmaputra valley and forms part of the extensive alluvial plains built by the Brahmaputra River and its tributaries. The district represents a **Quaternary alluvial depositional environment**, composed of unconsolidated sediments transported mainly from the eastern Himalayas and the Shillong Plateau. Present landforms are shaped by long-term river

deposition, erosion, and recurrent flooding. Geologically, the area is dominated by **recent and sub-recent alluvium**—sand, silt, clay, locally pebbly layers, and organic floodplain deposits—arranged in alternating layers formed through repeated flood cycles. Numerous wetlands (*beels*) occur in abandoned river channels. Structurally, the district lies within the tectonically active **Assam foreland basin**, influenced by Himalayan compression and plateau uplift, and falls within a high seismic hazard zone. Major geomorphic units include active floodplains, natural levees, back-swamps and wetlands, and older alluvial terraces. Overall terrain is flat to gently undulating. The stratigraphic succession generally includes:

Geological Age	Formation Type	Characteristics
Holocene (Recent)	New alluvium	Floodplain deposits, active channel sediments
Late Pleistocene–Holocene	Older alluvium	Slightly elevated terraces, compact silty clay
Local lacustrine deposits	Wetland sediments	Organic clay and peat (beel areas)

Mayong Revenue Circle, on the southern bank of the Brahmaputra, shares this alluvial setting but is marked by extensive wetlands, sandy levees, clayey back-swamps, and a high groundwater table. Proximity to active river channels leads to frequent sediment reworking, bank erosion, and rapid geomorphic change. Hard rock exposures are absent, and bedrock occurs at considerable depth. ^[14]

Soil Types

District soil resource mapping and classification have been conducted by **ICAR – National Bureau of Soil Survey and Land Use Planning (NBSS&LUP)** and **Soil & Land Use Survey of India (SLUSI)**. Morigaon district lies within the **Brahmaputra alluvial plains**, where soils are primarily derived from river-borne sediments transported from the Himalayas and surrounding uplands. These soils develop under high rainfall, frequent flooding, and poor drainage in low-lying areas. Soil formation is strongly influenced by: (i) Fluvial deposition and erosion, (ii) Waterlogging and wetland development, (iii) Acidic parent materials and (iv) Seasonal flooding.

Total geographical area of Morigaon district ≈ **155,000 ha** (approx.; official district statistics).

Soil Type	Characteristics	Area (ha)	% of District
Recent Alluvial Soil (Floodplain)	Sandy loam to silty loam, fertile, river deposited	72,850	47%
Old Alluvial Soil	More compact, clayey, relatively stable terraces	31,000	20%
Clayey Backswamp Soil	Poor drainage, water-logged, organic-rich	23,250	15%

¹⁴**Source:**

Geological Survey of India: "Geology and Mineral Resources of Assam"
 Central Ground Water Board: "Groundwater Information Booklet – Morigaon District, Assam"
 Assam State Disaster Management Authority (ASDMA): "District Disaster Management Plan – Morigaon"
 Das, P.J. & others "Studies on geomorphology and river dynamics of the Brahmaputra valley"
 District Census Handbook – Morigaon (Government of India): "Physical features and landform descriptions"

Sandy Levee Soil	Coarse texture, well drained near river channels	10,850	7%
Peaty and Marsh Soil (Wetland soil)	High organic matter, beel margins	9,300	6%
Mixed Alluvium with Gravel/Sand lenses	Localised channel deposits	7,750	5%
Total		155,000	100%

Mayong Revenue Circle is located on the **southern bank floodplain of the Brahmaputra**, near the Kopili river, and therefore exhibits strong wetland influence. Approximate geographical area of Mayong Revenue Circle is about 32,000 ha (derived from administrative land use and floodplain distribution).

Table 16: Soil Types in Mayong Revenue Circle (Estimated Distribution)

Soil Type	Dominant Location	Area (ha)	% of Revenue Circle
Recent Floodplain Alluvium	Brahmaputra and Kopili floodplain	12,800	40%
Clayey Backswamp Soil	Low-lying depressions, wetlands	8,640	27%
Sandy Levee Soil	Natural levees along channels	4,800	15%
Peaty Wetland Soil	Beels and marsh margins	3,520	11%
Mixed Alluvial Deposits	Transitional floodplain areas	2,240	7%
Total		32,000 ha	100%

Mayong shows higher wetland and clayey soil percentage than district average due to proximity to active river channels and low elevation. Soils vary from strongly acidic to alkaline with Low to medium soluble salts that have medium to high phosphate and medium to high potash content which is highly suitable for agriculture.

Soil Analysis: As part of the ESIA, soil samples were collected from the substation and along the 2 transmission lines; details of the soil sampling locations are shown in **Table 13** and **Figure 5**. The soil quality test report is appended in **Appendix 8**. A brief analysis is as under:

1. **Physical Properties:** Soil texture, structure, and grain size distribution are within acceptable ranges. No anomalies were detected in soil compaction or density measurements.
2. **Chemical Properties:** pH levels are within the ideal range for agricultural and engineering purposes. Organic matter content is adequate, supporting soil fertility. Electrical conductivity values indicate no salinity concerns.
3. **Nutrient Levels:** Primary nutrients (Nitrogen, Phosphorus, Potassium) are present in sufficient quantities. Secondary and micronutrient levels meet recommended thresholds for soil health.
4. **Contaminants:** No excessive levels of heavy metals or harmful substances were detected.
5. **Suitability for Use:** The soil is deemed suitable for its intended purposes, including agricultural applications and construction projects, as applicable.

4.2.4 Land-Use Pattern

The total geographical area of Morigaon district is 155,100 ha, with a significant proportion of land dedicated to cultivation (net sown area), which constitutes 48.94% of the total geographical area. Farmers in Morigaon cultivate 2 to 3 crops in a year; often paddy is cultivated twice a year. Fallow

lands (Current fallow and other than current fallow) comprise about 3.32% of the geographical area, and other cultivated lands excluding fallow lands (includes Permanent pastures and other grazing, Land under Misc. Trees groves etc. and Cultivable waste land constitutes 14.24% of the geographical area. Lands not available for cultivation (Land put to non-agricultural use, and Barren and uncultured land) constitutes 28.64% of the total geographical area. Forest area in Morigaon district covers 5.86% of its geographical area. The Land-use Pattern of Morigaon is provided in **Table 17** and shown in **Figure 8**.

Table 17: Land Use Pattern In Morigaon

Sl. No.	Classification	Area (ha)	(% to TGA)
1	Total Geographical area	1,55,100	
	Reporting Area for land utilization statistics	1,46,055	
2	Forest area	8,561	5.86
3	Land not available for cultivation	41,823	28.64
(a)	Land put to non-agricultural use	3,134	
(b)	Barren and uncultured land	38,689	
4	Other cultivated land excluding fallow land	20,798	14.24
(a)	Permanent pastures and other grazing	8,049	
(b)	Land under Misc. Trees groves etc. (not including net area)	10,277	
(c)	Cultivable waste land	2,472	
5	Fallow land	3,387	2.32
(a)	Fallow other than current fallow	1,340	
(b)	Current fallow	2,047	
6	Net area shown	71,486	48.94
7	Total cropped area	1,23,610	
8	Area shown more than once	52,124	

Source: Statistical Hand Book of Assam 2024

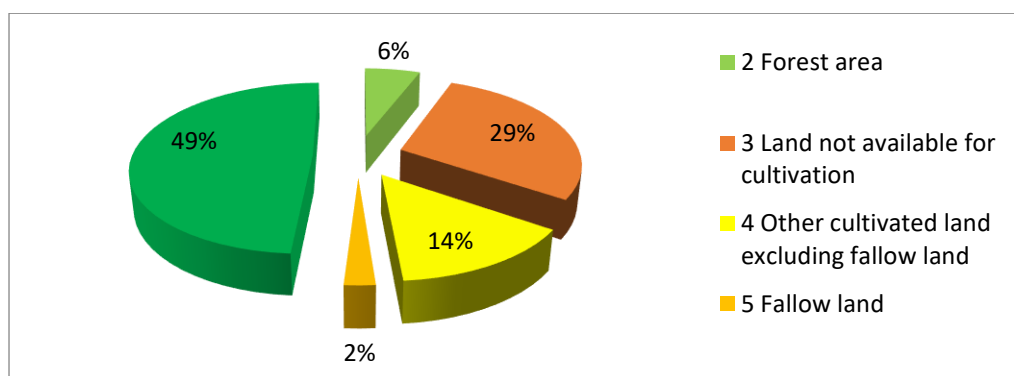


Figure 8: Land-use Pattern of Morigaon District

The Land Use/Land Cover (LULC) classification of the proposed subproject site has been carried out using Sentinel-2 satellite imagery, identifying key land cover classes such as built-up areas, agricultural land, vegetation cover, water bodies, and open spaces (refer **Figure 9**).

Based on the LULC analysis and site visit observations, the proposed substation site is located in

proximity to built-up areas and agricultural land. The site presently contains approximately 58 trees, along with six (6) buildings comprising 25 flats, of which 18 flats are occupied and 7 flats are vacant. In addition, a few small ancillary structures and one well are present within the site. The existing residential structures are observed to be in a deteriorated and structurally unsafe condition. As part of the proposed site preparation activities, these structures are planned to be demolished.

The proposed transmission line alignment predominantly traverses agricultural land, while avoiding built-up settlement areas to the extent feasible. The LULC map further indicates the presence of scattered water bodies and wet areas, along with green patches comprising thickets of bamboo, areca nut, and other fruit-bearing trees, reflecting the semi-rural character of the subproject surroundings.

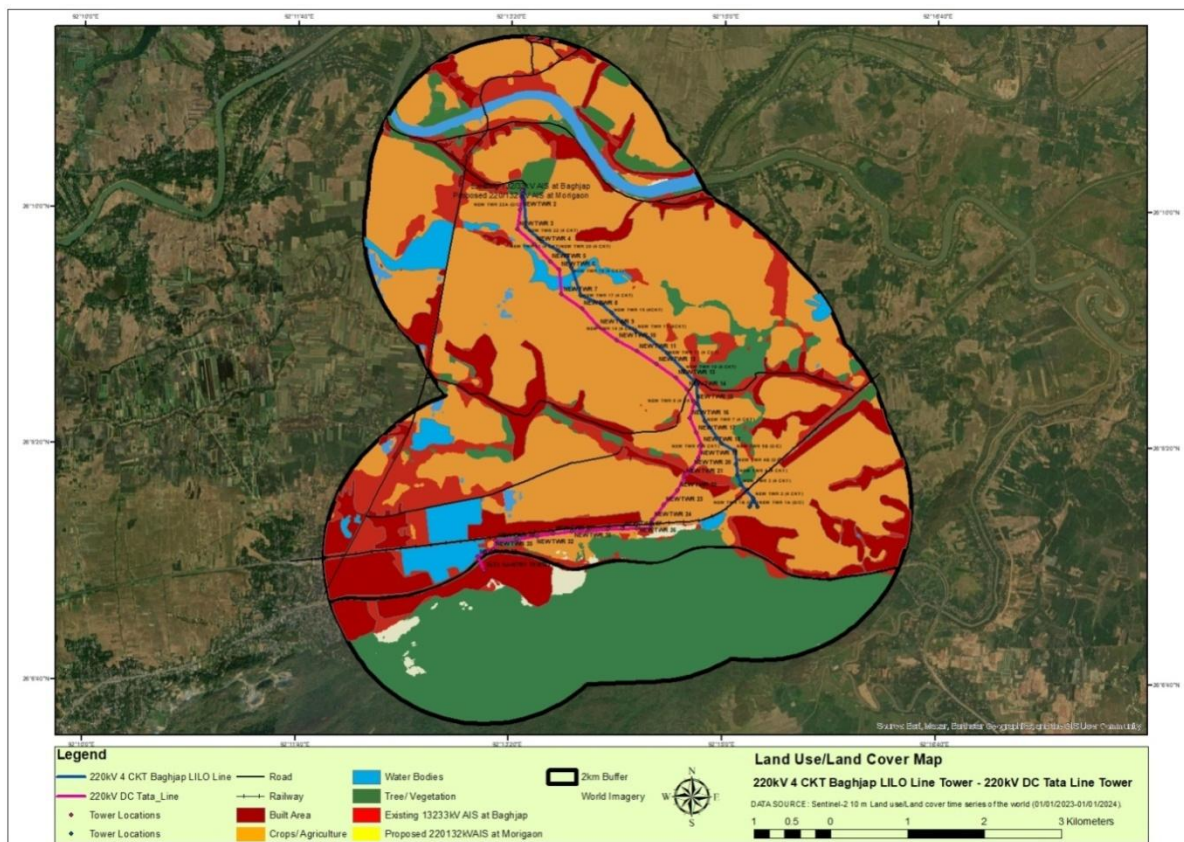


Figure 9: Land Use and Land Cover Map within 2km buffer zone around the proposed substation and associated transmission lines

Details of the Sensitive Receptors:

A detailed layout plotted on a Google Earth image has been developed to visually demarcate the proposed 220/132 kV AIS site, the transmission lines and its immediate surroundings. This visual representation clearly outlines the substation boundary and highlights the locations of sensitive receptors such as schools, offices, religious institutions, and healthcare facilities located within a 500-meter buffer zone. This spatial mapping aids in assessing potential environmental and social impacts, ensuring that appropriate mitigation measures are integrated into project planning and implementation to safeguard nearby communities and ecological features (refer Figure 10, and

Table 18).

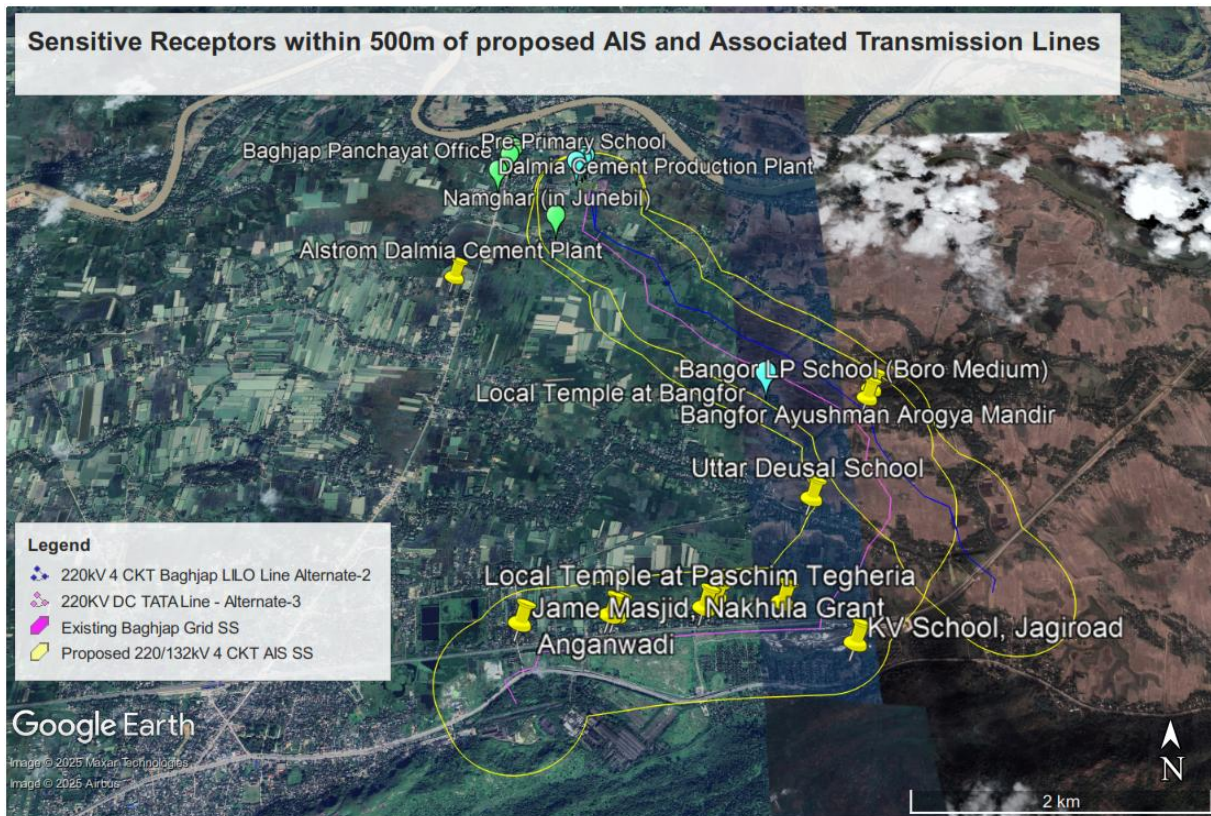


Figure 10: Map showing Sensitive Receptors within 500m buffer zone of the proposed AIS and associated transmission Lines

Table 18: Sensitive Receptors within 500m from the proposed AIS and associated transmission Lines

Sl.No.	Sensitive Receptor	GPS Coordinates	Aerial Distance
From the Proposed 220/132kV AIS at Morigaon within 500m buffer zone			
1.	Pre Primary School (Anganwadi) near SS	26°10'11.3"N 92°13'22.5"E	15.00 m
2.	Baghjap Playground	26°10'10.8"N 92°13'20.8"E	17.00 m
3.	Baghjap Ancholik Raas Mandir (Hindu Temple)	26°10'15.9"N 92°12'59.5"E	900.00 m
4.	Swahid Surya Bora Girls H.S. School, in Baghjap	26°10'17.5"N 92°12'57.6"E	950.00 m
5.	Baghjap Panchayat Office	26°10'13.0"N 92°12'58.2"E	770.00 m
6.	Residential Houses adjacent to the existing Substation boundary	26°10'12.3"N 92°13'23.9"E 26°10'12.6"N 92°13'04.0"E	between 10m to 400m
From the Proposed 220kV Lines within 500m Buffer zone			
7.	Namghar at Junbeel village	26°09'47.7"N 92°13'14.3"E	266m from 220kV D/C TATA Line and 378m from 220kV 4 CKT Baghjap LILO Line
8.	Local Temple at Bangfor Village	26°14'74.19' 92°23'81.73	271m from 220kV D/C TATA Line and 482m



Sl.No.	Sensitive Receptor	GPS Coordinates	Aerial Distance
			from 220kV 4 CKT Baghjap LILO Line
9.	Bangor LP School (Boro Medium)	26°14'60.83' 92°24'58.22'	55m from LILO Line and 85m from 220kV D/C TATA Line
10.	Bangfor Ayushman Arogya Mandir	26°14'68.72' 92°24'62.78'	50m from 220kV D/C TATA Line and 188m from 220kV 4 CKT Baghjap LILO Line
11.	Uttar Deusal School	26°13'75.97' 92°24'04.42'	513m from 220kV D/C TATA Line and 1120m from 220kV 4 CKT Baghjap LILO Line
12.	Paschim Tegheria Shiv Temple	26°12'97.45' 92°23'75.29'	55m from 20kV D/C TATA Line
13.	Paschim Tegheria Anganwadi cum LP School	26°12'96.41' 92°23'25.51'	85m from 20kV D/C TATA Line
14.	Paschim Tegheria Namghar	26°13'02.57' 92°23'27.02'	155m from 20kV D/C TATA Line
15.	Local Temple at Paschim Tegheria	26°12'93.57' 92°23'18.29'	68m from 20kV D/C TATA Line
16.	Paschim Tegheria Mosque	26°12'88.61' 92°22'54.57'	83m from 20kV D/C TATA Line
17.	Paschim Tegheria Anganwadi	26°12' 87.5' 92°22'50.84'	83m from 20kV D/C TATA Line
18.	Jame Masjid, Nakhula Grant	26° 7'41.79"N 92°13'7.00"E	About 200m from 220kV D/C TATA Line
19.	Kendriya Vidyalaya, HPCL, Jagiroad	26° 7'36.79"N 92°14'32.71"E	About 320m from the 220kV D/C TATA Line

Photologue : Sensitive Receptors

Near the Proposed 220/132kV AIS at Morigaon



Pre Primary School adjacent to the SS boundary



Baghjap Playground near proposed SS



Baghjap Ancholik Raas Mandir (Hindu Temple)



Swahid Surya Bora Girls H.S. School, in Baghjap



Baghjap Panchayat Office

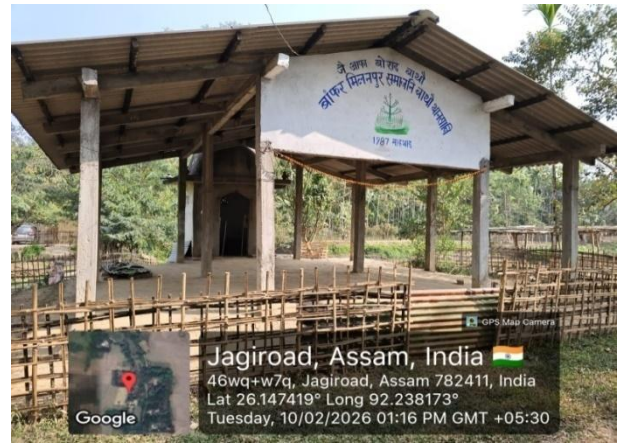


Residential houses adjacent to the SS boundary

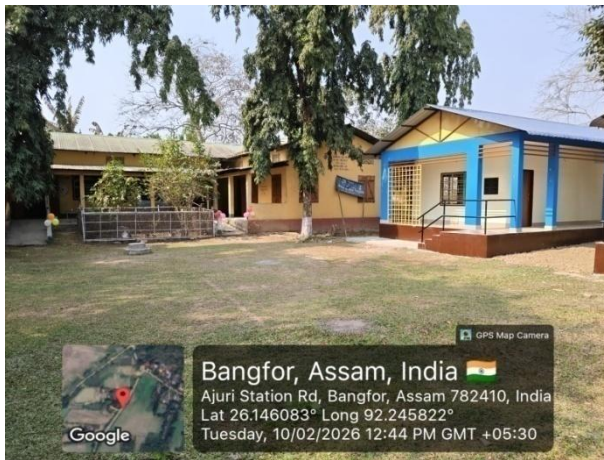
In the vicinity of the Transmission Lines



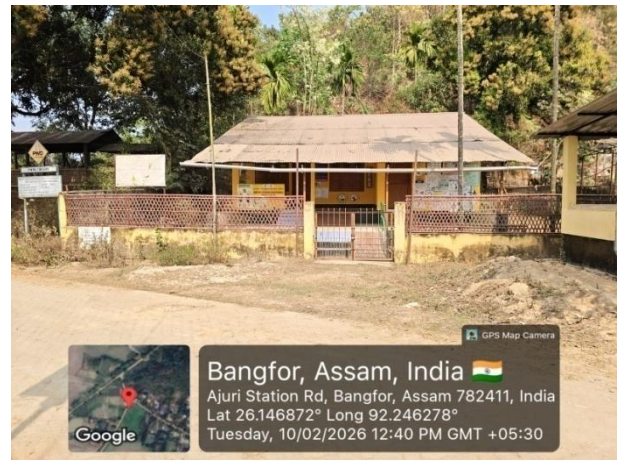
Namghar at Junbeel



Temple at Bangfor Milanpur



Bangfor LP School (Boro Medium)



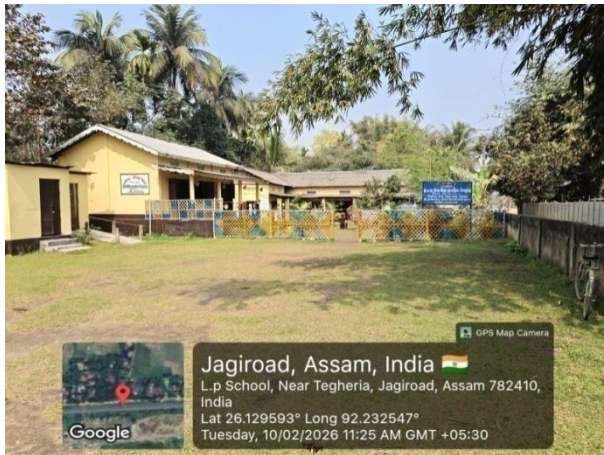
Bangfor Ayushman Arogya Mandir



Uttar Deusal School



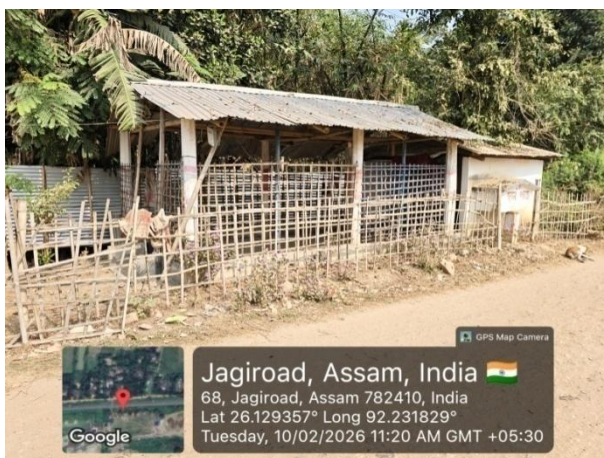
Shiv Temple at Paschim Tegheria



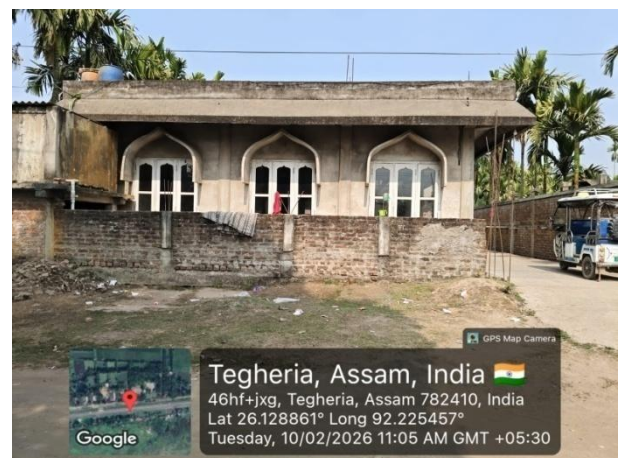
Paschim Tegheria Anganwadi cum LP School



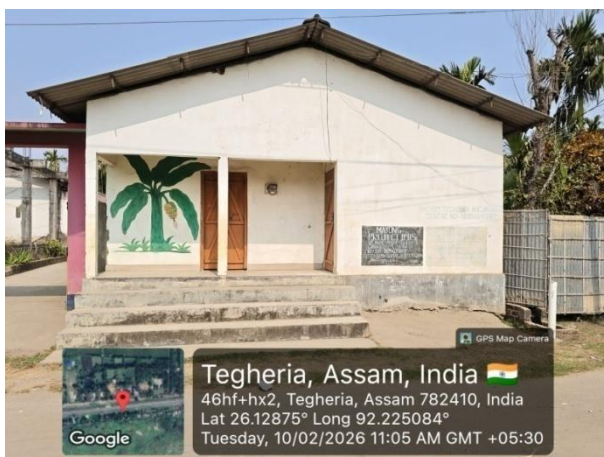
Namghar at Paschim Tegheria Village (behind LP School)



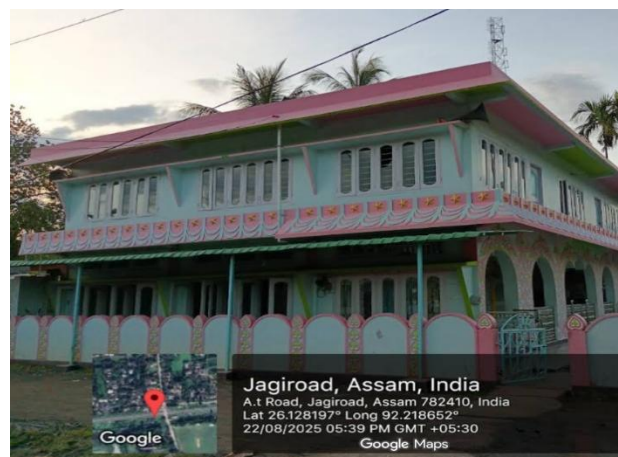
Local Temple at Paschim Tegheria



Mosque at Paschim Tegheria Village



Anganwadi at Paschim Tegheria Village



Jame Masjid, Nakhula Grant



Kendriya Vidyalaya, HPCL, Jagiroad

4.2.5 Hazards

Morigaon District is highly susceptible to a range of natural and man-made hazards, as outlined in the District Disaster Management Plan for 2024-2025. These include frequent occurrences of floods, and earthquakes, as well as issues like erosion, droughts, forest fires, and epidemic diseases. The region's geographical and climatic conditions contribute significantly to these recurring challenges, with natural disasters such as floods and storms impacting the area almost annually.

4.3.5.1 Flood Hazard

Morigaon, situated in the floodplains of the Brahmaputra River and its tributaries, including the Killing, Kollong, and Kapili rivers, is known for the severity and widespread impact of its floods. Floods have been a recurring and devastating natural disaster in Morigaon district, causing significant damage to life, property, agriculture, and infrastructure over the years. Below are the details regarding the occurrence of floods since 2014.

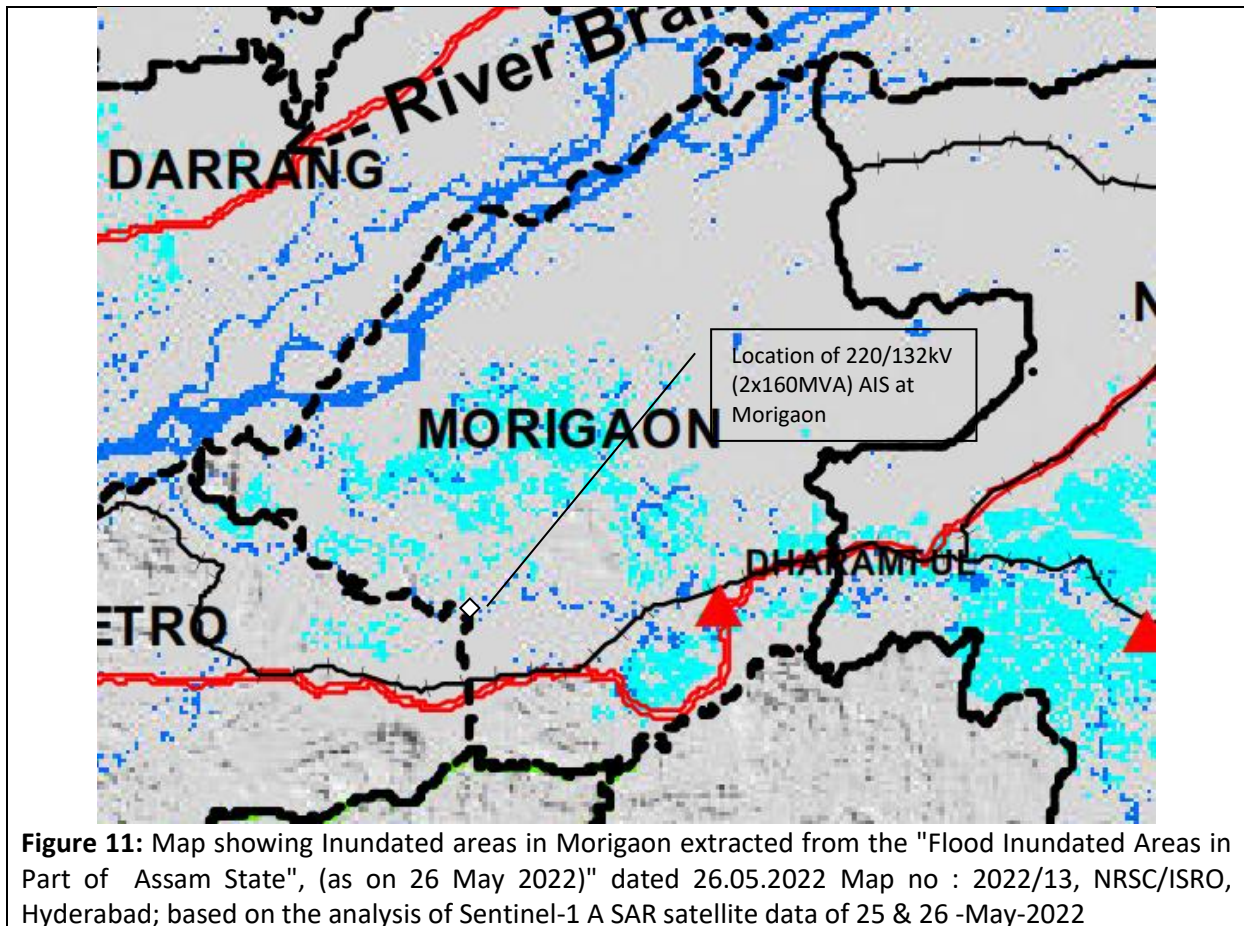
S.No.		2014	2015	2016
1	Date Of Onset Of Flood	1stWave:16/8/2014 2ndWave:23/9/2014 to 7/9/2014	11/6/2015 to 16/9/2015	1 st Wave:27/06/2016 to 29/6/2016 2 nd Wave:4/7/2016 to 7/8/2016
2	HIGHEST WATER LEVEL Of River Brahmaputra at Ulubari (DANGERLEVEL: 57.50 Mts)	58.93mts	59.09mts	59.07mts
		2017	2018	2019
1	Date Of Onset Of Flood	1stWave:03/07/2017 to 26/07/2017 2ndWave:12/08/2017 to 25/09/2017	NIL	1 ST WAVE FLOOD, 2019 (11 th July to 25 th July, 2019)



2	HIGHEST WATER LEVEL Of River Brahmaputra at Ulubari (DANGERLEVEL: 57.50 Mts)	59.65mts	57.96mts. On dt. 06/07/2018	59.26mts. on dt.15/07/2019
S.N.		2020	2021	2022
1	Date Of Onset of Flood	28th May,2020 to 27 th September,2020	08 th August,2021 to 19 th August, 2021	1 st Wave 16/05/2022 to 11/06/2022 2 nd Wave 17/06/2022 to 31/07/2022
2	HIGHESTWATER LEVEL Of River Brahmaputra at Ulubari (DANGERLEVEL: 57.50 Mts)	59.60 mts. On dt.13/07/2020	58.95 mts. Dt.05/07/2021	58.56 mts. Dt.20/06/2022
S.N.		2023	2024	
1	Date Of Onset of Flood	1 st Wave 15/07/2023 to 27/07/2023 2 nd Wave 28/08/2023 to 05/09/2023	1 st Wave01/06/2024 to 11/06/2024 2 nd Wave01/07/2024 to 25/07/2024	
2	HIGHESTWATER LEVEL Of River Brahmaputra at Ulubari (DANGERLEVEL: 57.50 Mts)	58.14 mts. Dt.15/07/2023	57.98 Dt.09/07/2024	

Source: District Flood Contingency Plan (2025-2026) For Morigaon District: District Disaster Management Authority, Morigaon

As per the Source: District Flood Contingency Plan (2025-2026) for Morigaon District: District Disaster Management Authority, Morigaon, the following villages of Mayong Revenue Circle: Bangfor, Baghjar, Bangthai Gaon, Khar Beel, Junbil, and Tegheria, fall under the **Low Risk Zone** of flooding. These are the villages in which the proposed AIS is planned and the transmission alignment traverses. This is further corroborated by the map extracted from the "Flood Inundated Areas in Part of Assam State; Based on the analysis of Sentinel-1 A SAR satellite data of 25 & 26 -May-2022 (refer **Figure 11**).



Field Observations and community consultations

Additionally, consultations with local residents indicated that the project villages are not susceptible to flooding. However, during the monsoon season, water tends to accumulate in low-lying areas. This water either flows into the Kopili River through natural drains and nallahs or remains stagnant for a few weeks before being absorbed into the ground. Residents also confirmed that they could not recall any recent instances of flooding in the area. Based on this information, it can be reasonably concluded that while the Morigaon district is generally prone to flooding, however, the proposed 220/132kV (2x160MVA) AIS and its associated transmission lines are not directly at risk.

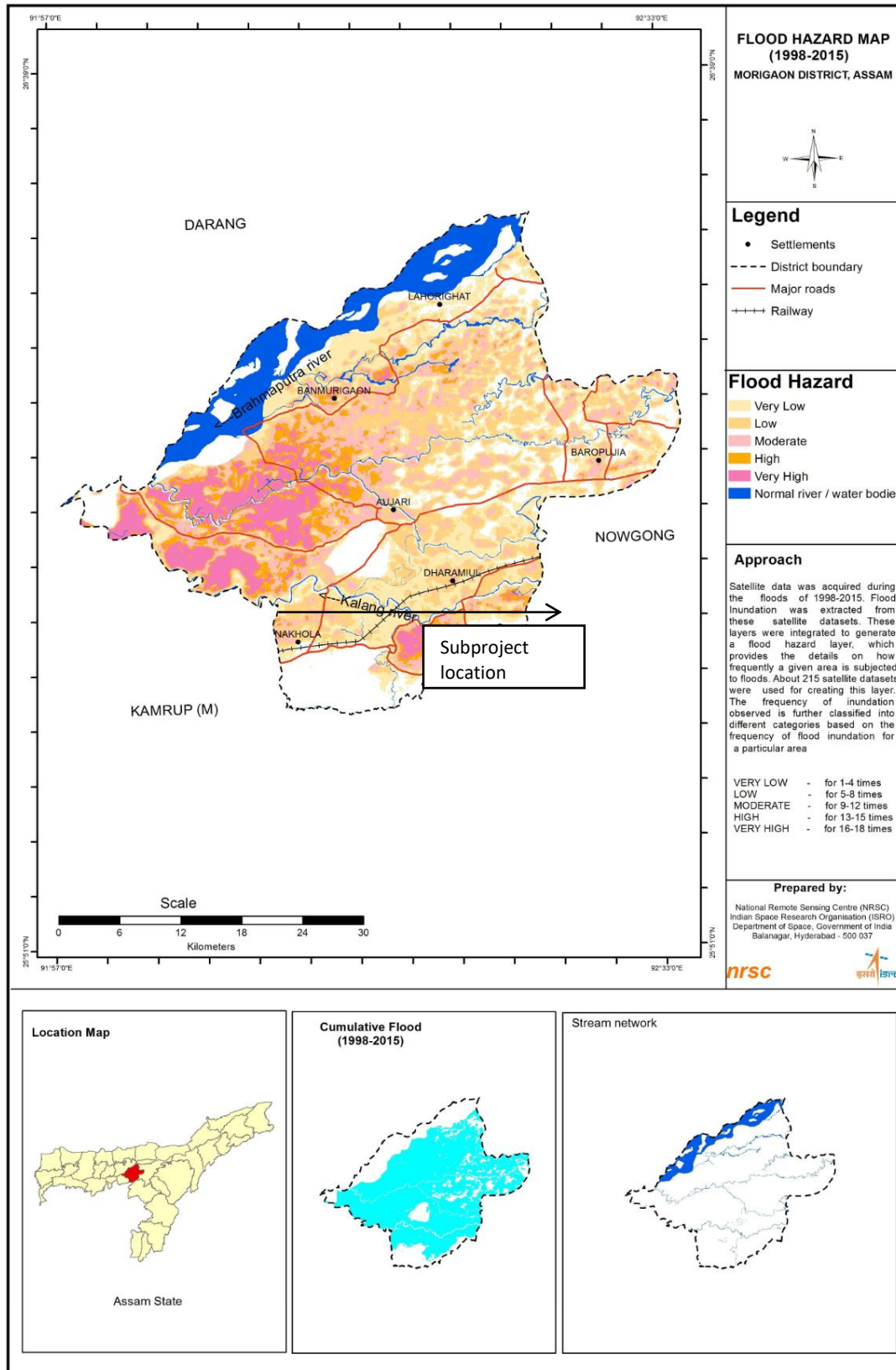


Figure 12: Flood Hazard Map showing the sub-project location in Very-low to Low risk zone

Source: Flood Hazard Map, District Morigaon: Assam State Disaster Management Authority

4.3.5.2 Erosion

As per the District Flood Contingency Plan (2025-2026) for Morigaon District: District Disaster Management Authority, Morigaon District faces severe and recurrent flooding annually, with its frequency and intensity escalating over the years. This has resulted in significant destruction, including damage to crops, infrastructure such as roads and bridges, human settlements, and the tragic loss of both human and animal lives. Additionally, large portions of the district experience inundation, and substantial areas of land are lost due to erosion, exacerbating the challenges faced by the region. Like floods, erosion is a severe problem in the district.

The referenced issues, including damaged sections, bank erosion, rain cuts, and seepage, have been observed in the T/dyke extending from Amlighat to Baghjap (left bank) within the Amlighat area of Jagiroad sub-division. This area is located approximately 1.5 km and 2.6 km southeast of the 220kV 4 CKT LILO and 220kV D/C TATA transmission lines respectively. However, discussions with local residents indicate that no occurrences of section breaks, bank erosion, rain cuts, or similar issues have been noted along the River Kopili. Therefore, it can be concluded that the sub-project study area and its related transmission lines remain unaffected by erosion in this region.

4.3.5.3 Wind and Storm Hazard

Storms have been an intermittent hazard in Morigaon district. The onset of the South West Tropical Monsoon is typically characterized by the presence of strong winds, overcast skies, and intermittent thundershowers, often accompanied by hailstorms and, on occasion, cyclones during the months of April and May. Afternoon thunderstorms, locally referred to as Bordoicila, are a common phenomenon during this period. The monsoon season intensifies in June with heavy rainfall becoming a regular occurrence. However, the cyclones that sometimes accompany this weather pattern can be particularly destructive, leading to significant loss of life and extensive damage to property. (Source: <https://asdma.gov.in/hazardous.html>)

According to the Wind Hazard Map of Assam, published in the BMTPC: Vulnerability Atlas - 3rd Edition by the Building Materials and Technology Promotion Council (BMTPC), the subproject location is situated within a Very High Damage Risk Zone – B, characterized by a Basic Wind Speed (Vb) of 50 m/s. This classification underscores the critical need for incorporating wind-resistant structural designs to ensure safety and resilience. The region's susceptibility to moderate to severe wind events is particularly pronounced during the pre-monsoon and monsoon seasons, which are frequently accompanied by convective storms. The specific location of the subproject, marked with a red dot, is illustrated in **Figure 13** for reference.

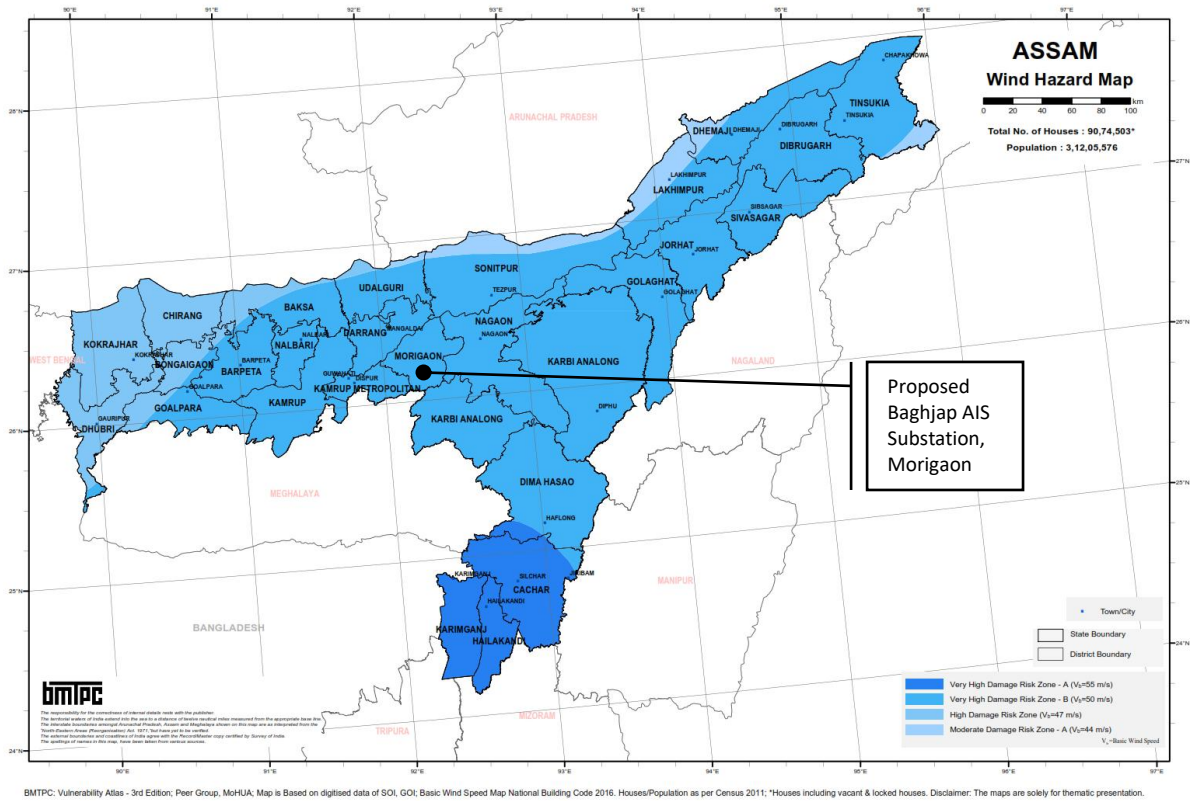


Figure 13: Wind Hazard Map

Source: Wind Hazard Map of Assam, published in the BMTPC: Vulnerability Atlas - 3rd Edition by the Building Materials and Technology Promotion Council (BMTPC)

4.3.5.4 Earthquake Hazard

Assam, located in the eastern most projection of the Indian Plate, lies in a geologically sensitive region where the Indian Plate is thrusting underneath the Eurasian Plate, forming a subduction zone and contributing to the rise of the Himalayas. This tectonic activity places Assam in Seismic Zone V, categorizing it as highly prone to earthquakes of moderate to severe intensity. Historical records highlight two significant earthquakes in the region, occurring in 1897 and 1950, with magnitudes of 8.7 and 8.5 on the Richter scale, respectively.

The earthquake hazard is further exacerbated by the vulnerability of Assam's urban centers. Rapid and unregulated urban growth has resulted in dense populations living amidst poorly constructed and inadequately maintained infrastructure. Many buildings fail to meet minimum safety standards, increasing the risk of structural failure during seismic events. Additionally, the lack of resilience in high-density urban societies further compounds the potential impact of earthquakes. Urban infrastructure design often neglects essential safety protocols, leaving these areas highly susceptible to damage and loss during seismic occurrences.

Addressing these challenges requires a comprehensive approach involving stringent enforcement of building codes, improved urban planning, and enhanced public awareness to mitigate risks associated with Assam's seismic vulnerability.

The Mayong Revenue Circle, despite not experiencing any major earthquakes in recent years,

remains highly susceptible to seismic activity due to its location within Seismic Zone V. Minor seismic events were recorded in both 2021 and 2022, impacting 18 villages and 589 households annually. According to the Earthquake Hazard Map of Assam, as outlined in the BMTPC Vulnerability Atlas (3rd Edition), the subproject area is classified as a Very High Damage Risk Zone (MSK IX or higher). Consequently, it is imperative to adhere strictly to earthquake-resistant design standards, particularly at the Baghjap substation site. The specific location of the subproject is highlighted on the corresponding map in **Figure 14** for reference.

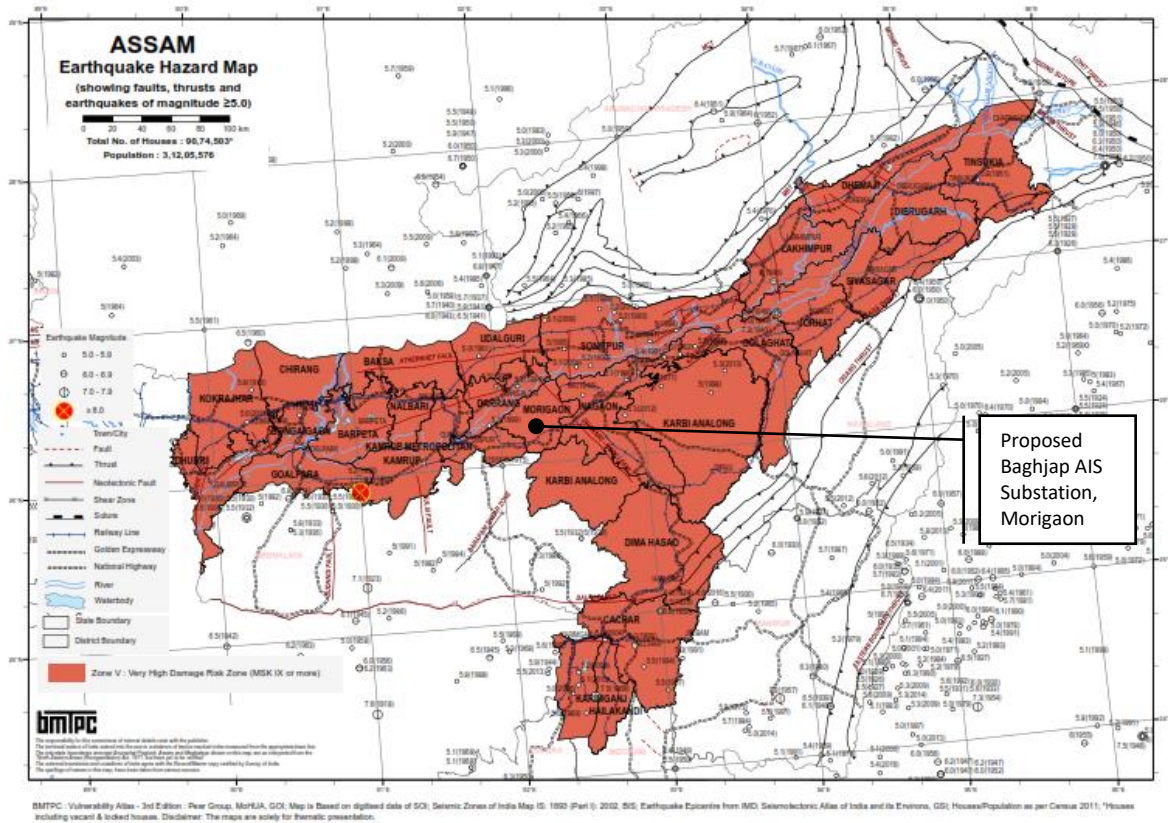


Figure 14: Earthquake Hazard Map

4.2.6 Water Resources

Surface water

Morigaon district, located in the state of Assam, India, is endowed with significant water resources, including rivers, surface water, and groundwater. The district is primarily traversed by the Brahmaputra River, one of the major river systems in the region. Additionally, tributaries such as the Kopili and Kolong rivers contribute to the surface water availability in the area. The district is drained by several perennial rivers flowing from south to north.

The Brahmaputra River flows along the northern boundary of Morigaon, influencing both the geography and hydrology of the district. The length of the Brahmaputra within the district can be estimated as part of its overall course through Assam, though specific measurements for Morigaon may require detailed hydrological surveys.

Surface water resources in Morigaon are further supported by numerous wetlands, locally known as

"beels," which play a crucial role in agriculture, fisheries, and biodiversity conservation. Prominent beels in the district include the Morikalang Beel. These water bodies cover significant areas and are vital for sustaining local livelihoods.

The river Kopili passes around the north of the propose substation, at a distance of about 900 to 1500m while the river is away from the transmission lines. In addition, the transmission lines cross natural drains and low-lying areas, that get inundated during the monsoon season. The sub-project area comprises low-lying, seasonally inundated terrain to the north, near the Kopili River. The transmission alignment passes through what appears to be the remnant of an old river channel (beel) located between Towers 17 and 18 of the 220kV 4 CKT Baghjap LILO line and Towers 6 and 7 of the 220kV D/C TATA line. Other areas are built-up settlements and agricultural fields.

Drainage

The district's drainage system is characterized by the presence of the Brahmaputra River along its northern boundary, with several tributaries and rivers contributing to the hydrology of the region. Key rivers include Kapili, Kalang, Kiling, and Sonai. Among these, Kapili and Sonai are tributaries of the Brahmaputra. Numerous beels, or wetlands, are remnants of old river channels, indicating past tectonic activity in the area.

Notable beels near the Kiling River include Arum, Kiling, Sikhora, and Bar Jalah, while those along the Kapili River include Sholmari, Dandua, Marakalang, Sara, Sarumanaha, Dekhal, Baral, Habari, Nakara-Maudubi, Goranga, Taranga, Donga, Jan, Khar, and Udmari. Adjacent to the Sonai River are Garajan-Khanagharia-Srikanda and Chilpi-Bhangamur-Goroimari-Goranga beels.

Figure 15 illustrates the drainage network within the 2 km buffer zone. This area is adequately supported by a natural system of drains and *nallahs*, which direct water into nearby rivers, including the Kopili, Kalang, and Killing. This comprehensive network facilitates the efficient flow of excess water into the rivers, thereby preventing waterlogging and stagnation in and around the sub-project and its associated transmission lines.

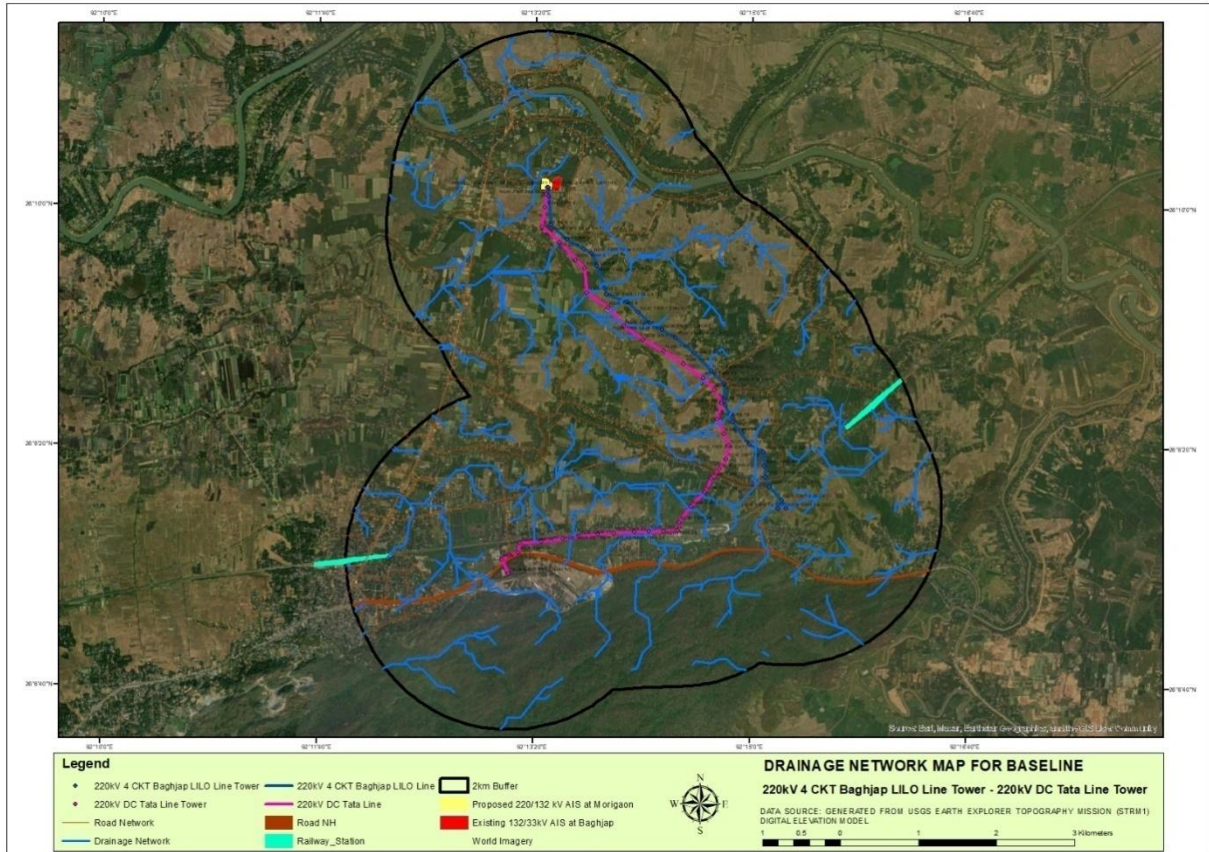


Figure 15: Map showing drainage network in the 2km buffer zone of the subproject

Ground water

Groundwater in Morigaon is another critical resource, with aquifers providing water for drinking and irrigation purposes. The district's groundwater table is generally accessible, although over-extraction or contamination could pose challenges in specific areas.

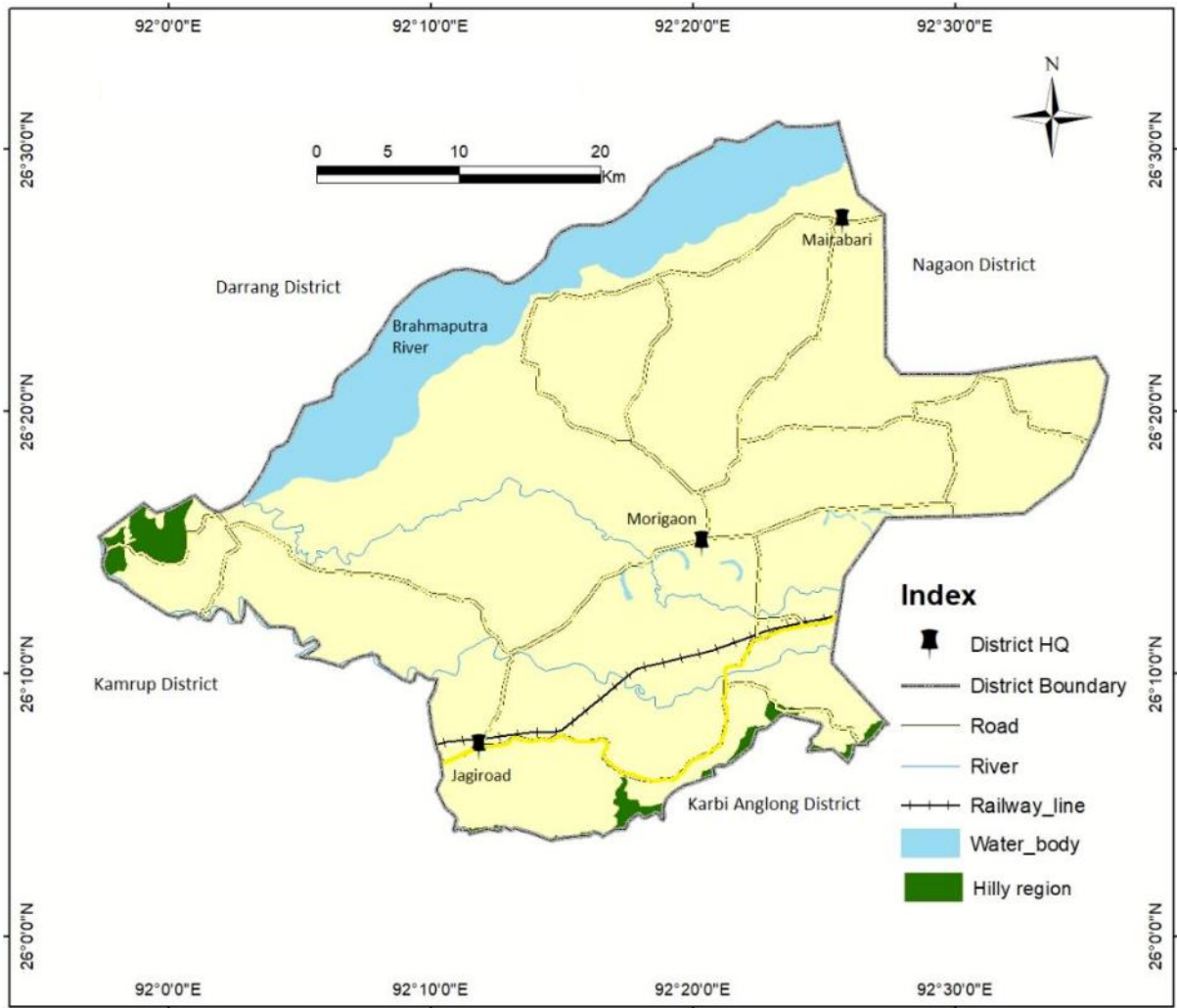


Figure 16: River/ Surface water Resource Map

Source: Central Ground Water Board, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti (Government of India) - Aquifer Mapping and Management of Ground Water Resources, Morigaon District, Assam

The district exhibits two distinct hydrogeological formations. The first formation, located in the southern foothill regions bordering the Karbi Anglong district, consists of older alluvium. This is primarily composed of clay, silt, and fine-grained sand, with clay being the dominant component. The second formation, which spans the majority of the district, is characterized by younger alluvium. This consists of sand ranging from fine to coarse grains, intermixed with gravels, pebbles, clay, and silt. The basin's gradient deepens progressively from south to north, as evidenced by exploratory well data: the basement was encountered at depths of 95 m in Jagiroad, 239.75 m in Dharamtul, and 254 m in Rajagaon. The principal aquifers in the district are depicted in **Figure 17**.

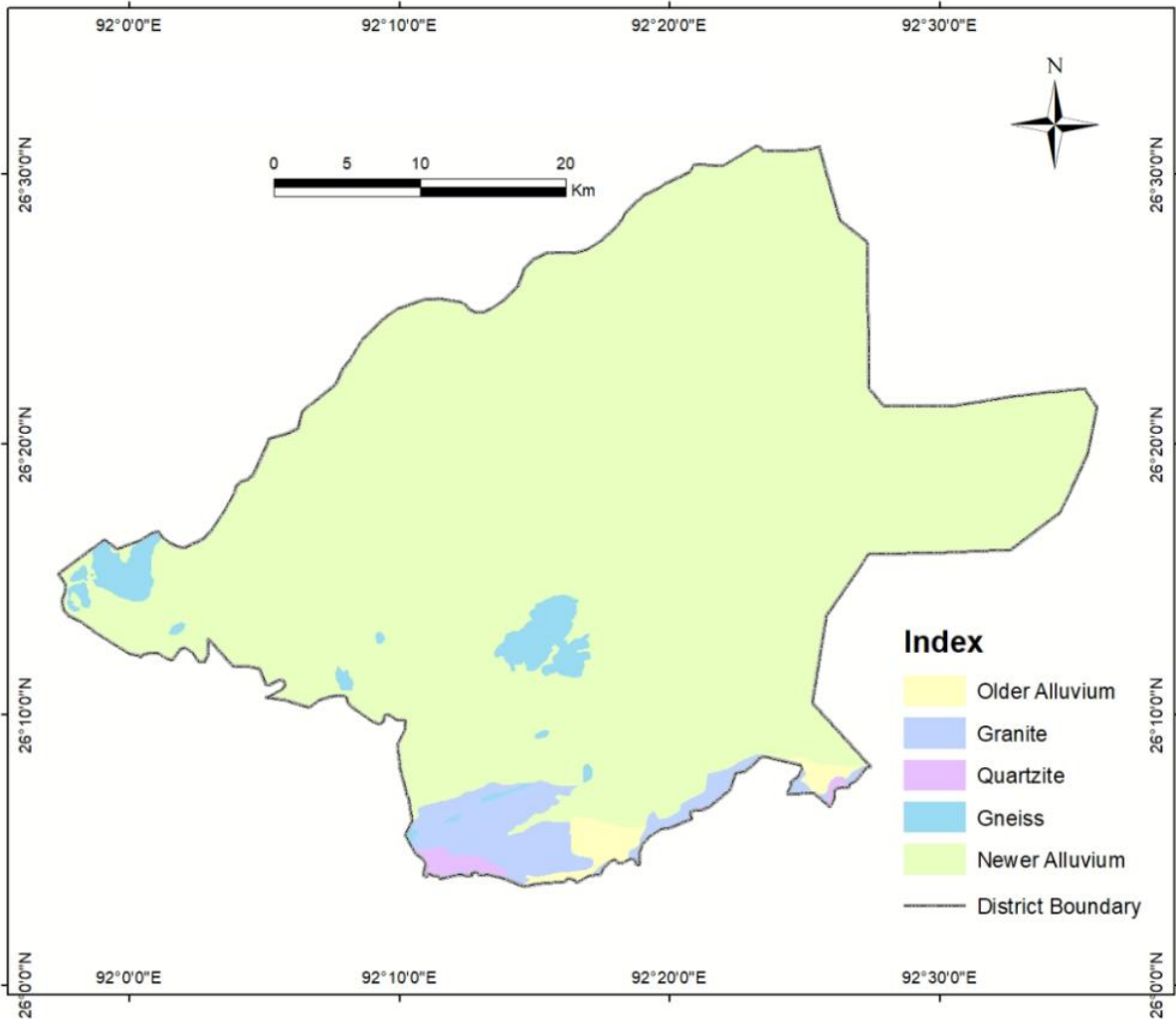


Figure 17: Principal Aquifer of Morigaon District

The water level trends and behavior in phreatic conditions were monitored across 42 dug wells across the district. During the pre-monsoon period, the deepest water level recorded was 13.44 mbgl at the Jagiroad monitoring station, while the shallowest was 0.25 mbgl at the Borbori monitoring station. Post-monsoon observations indicated the highest water level at 6.9 mbgl in Kathargaon and the lowest at 0.09 mbgl in Rajabari, with an average water level fluctuation of 2.70 meters. Additionally, exploratory wells in Morigaon district revealed water depths ranging from 1.369 mbgl to 4.665 mbgl. Water level contour maps are depicted in **Figure 18** and **Figure 19**.

As part of the ESIA, environmental quality monitoring tests for water quality was also conducted. The sampling locations along with the test assessment has been separately provided in Section 4.3.7.3.

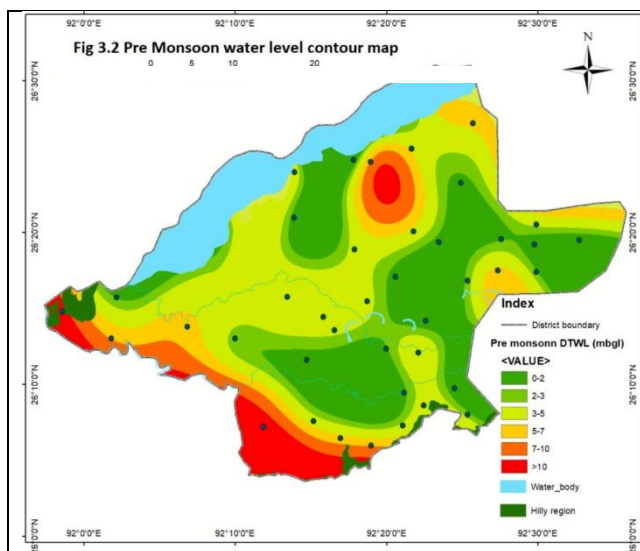


Figure 18: Pre-Monsoon Water Level Contour

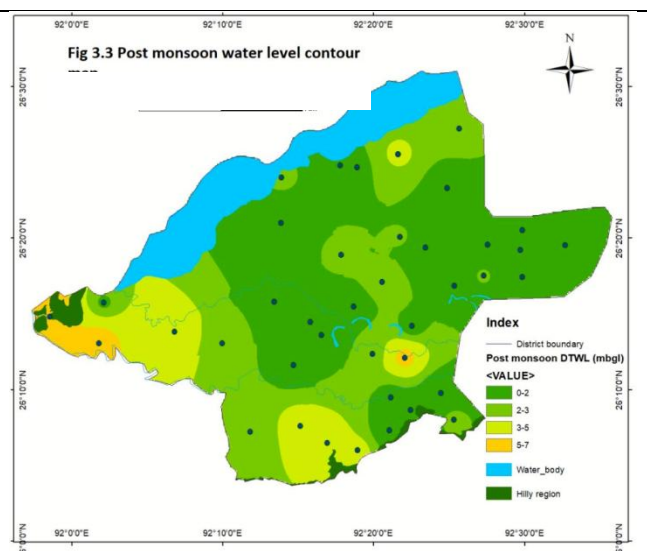


Figure 19: Post Monsoon Water Level Contour

Water Quality

Baseline water quality was also carried out on 7-Jan-2026, in the said locations. This assessment aimed to document existing water quality from drinking water and ground water sources as part of the ESIA studies. The primary objective of the analysis was to evaluate whether the tested parameters comply with established permissible limits as per relevant regulatory standards. The results of water quality tests are appended in **Appendix 9** for all 3 locations, which are elaborated in **Table 13** and **Figure 5**.

Interpretation of Results

1. Groundwater Quality

The analysis of groundwater samples indicates that all tested parameters fall within the permissible limits. This suggests that the groundwater is suitable for its intended uses, including domestic, agricultural, and industrial applications, without posing any significant health or environmental risks.

2. Drinking Water Quality

The drinking water samples were analyzed for physical, chemical, and microbiological parameters. The results confirm that all measured values are within permissible limits. This indicates that the drinking water is safe for human consumption.

3. Surface Water Quality

The surface water samples, including rivers, lakes, or reservoirs, were tested for various quality indicators such as pH, dissolved oxygen, turbidity, and pollutant levels. All parameters were found to be within acceptable limits. This indicates that the surface water is not significantly impacted by pollution and remains suitable for ecological balance and recreational activities.

Overall Assessment

The comprehensive evaluation of groundwater, drinking water, and surface water quality

demonstrates compliance with permissible standards across all tested parameters. This reflects positively on the current state of water resources in the assessed region and indicates effective management practices or natural conditions conducive to maintaining water quality.

4.2.7 Ambient Air Quality

Ambient air quality monitoring was conducted at the identified locations to establish baseline environmental conditions. Monitoring was carried out on 07 January 2026, and the report is appended as **Appendix 10**. A summary of the results is presented in the **Table 19**.

Table 19: Summary of Ambient Air Quality Test results

S.No	Parameters	Unit	Results at 220/132kV Morigaon AIS (26°10'9.20"N 92°13'25.08")	Results at 220kV 4CKT Baghjap LILO (26° 8'10.81"N 92°14'34.80"E)	Results at 220kV D/C Tata Line (26° 7'37.81"N 92°13'13.71"E)	Limits (NAAQS- 24 hours)	Limits (WHO Global Air Quality Guidelines, 2021)	Test Method
1	Particulate Matter (PM ₁₀)	µg/m ³	79.2	68.5	70.5	100	45	IS 5182(23)
2	Particulate Matter (PM _{2.5})	µg/m ³	43.0	37.2	32.6	60	5	IS 5182(24)
3	SO ₂	µg/m ³	6.3	5.2	6.7	80	40	IS 5182(2)
4	NO ₂	µg/m ³	18.5	16.7	16.2	80	25	IS 5182(vi)

The monitored parameters included PM₁₀, PM_{2.5}, SO₂, and NO₂. The results were compared with the National Ambient Air Quality Standards (NAAQS), 2009 prescribed by the Central Pollution Control Board (CPCB) and the WHO Global Air Quality Guidelines (2021).

Interpretation of Results

The monitored concentrations of PM₁₀ and PM_{2.5} at all three locations are within the permissible limits of NAAQS (24-hour standards). However, the recorded values exceed the more stringent WHO Global Air Quality Guidelines (2021) for particulate matter.

This variation reflects the difference in regulatory guidelines:

- **NAAQS (India)** considers national socio-economic conditions, background pollution levels, and technical feasibility.
- **WHO Guidelines** are purely health-based targets aimed at minimizing long-term morbidity and mortality risks.

The elevated particulate levels in the sub-project area can reasonably be attributed to the following factors:

- Vehicular emissions and re-suspended road dust from nearby busy corridors, including **NH-27**.

- Proximity to industrial activities such as the **Dalmia Cement plant (Alsthom Industries Limited)** located approximately 1.5 km from the existing substation.
- Activities near the Tata Semiconductor premises and associated developmental works.
- Localized biomass burning and construction activities typical of semi-urban settings.

Higher PM₁₀ and PM_{2.5} concentrations were particularly observed at sampling location A3, situated near the Tata premises and NH-27, which connects Guwahati to Nagaon and beyond. Heavy traffic flow, construction activities, and tire/brake wear emissions are likely contributors to the elevated suspended particulate matter (SPM) levels at this location.

In contrast, SO₂ and NO₂ concentrations are well within both NAAQS and WHO limits, indicating limited influence from major combustion-based industrial emissions at the time of monitoring.

4.2.8 Acoustic (Noise) Quality

Baseline noise level monitoring was carried out on 7-Jan-2026, in the said locations. This assessment aimed to document existing ambient noise levels prior to the commencement of construction activities. The selected location reflects typical sound conditions within the area. The noise level monitoring results are shown in **Table 20** and details are appended in **Appendix 11** for all 3 locations.

Table 20: Noise Level Test Analysis

Sl. No.	Parameters	Unit	Results at 220/132kV Morigaon AIS (26°10'9.20"N 92°13'25.08"E)	Results at 220kV 4CKT Baghjäp LILO (26° 8'10.81"N 92°14'34.80"E)	Results at 220kV D/C Tata Line (26° 7'37.81"N 92°13'13.71"E)	Method	WHO/CPCB Limit as per The Noise Pollution (Regulation and Control) Rules, 2000 Leq (dBA)
1	Leq (Day)	dB(A)	59.3	55.9	61.7	Ambient GEEC/SOP/AN/01 Issue Date 27/05/2017	WHO/CPCB Limit for Industrial Area: Day Time Leq<75 Night Time<70
2	Leq (Night)	dB(A)	36.2	34.1	42.2		

Interpretation of Results

The measured noise levels indicate compliance with national and international standards. The daytime Leq value of 59.3 dB(A) in the substation (N1), 55.9 dB(A) at N2 and 61.7 dB(A) at N3 are within the permissible limit of 75 dB(A) for industrial areas, as specified by the CPCB under the Noise Pollution (Regulation and Control) Rules, 2000, and aligns with WHO guidelines. However, readings noted at N1 and N3 are close to the limits, essentially owing to their nearness to substation noise generated by the equipment, and the highway (NH-27) in their vicinity, respectively.

The findings suggest that the ambient noise levels at N2 is low and consistent with the characteristics of the surrounding area, which is described as peaceful with minimal commercial or traffic-related noise sources.

These baseline measurements establish a reference point for assessing potential noise variations during the construction and operational phases of the substation, ensuring continued adherence to noise regulations.

4.3 Biological Environment

4.3.1 Forest Cover in Morigaon District

As per the India State of Forest Report, 2023 Volume-II by the Forest Survey of India, Ministry of Environment, Forest and Climate Change, the total geographical area of Morigaon district is 1,512sq.km. The total forest cover is reported as 195.70sq.km, which constitutes approx. 13% of the district's area.

Table 21: Forest Types in Morigaon district

District	Calculated Area by Sol	Very Dense Forest	Mod. Dense Forest	Open Forest	Total Forest Cover
Morigaon	1,512	16.03	54.21	125.46	195.70
% to Geo. Area	-	1.06	3.58	8.29	-
% to Forest Area	-	8.19	27.7	64.10	-

The data indicates that Open Forest is the predominant category within the district's forest landscape, comprising nearly 79% of the total forest area. Moderately Dense Forests constitute approximately 19%, while Very Dense Forests are minimal, covering only 7.47 square kilometers, which equates to just 1.8% of the forest area. Additionally, scrublands, spanning 5.85 square kilometers, represent ecologically degraded or regenerating forest zones that necessitate focused efforts for restoration and ecological improvement. These forest areas form part of the alluvial floodplain ecosystem of the Brahmaputra basin and support moist deciduous forests, wetlands and grassland habitats. The region has relatively limited but ecologically significant forest cover, in which the protected forests play a critical role in flood regulation, biodiversity conservation and maintenance of riverine ecological balance.

The district comprises of seven **Reserved Forests (RFs)**. Among these, Pobitora Reserved Forest has been notified as Pobitora Wildlife Sanctuary in 1998 under the provisions of the Wildlife (Protection) Act, 1972.

As per the spatial analysis conducted using authenticated forest boundary layers (refer **Figure 20**), the proposed subproject alignment **does not traverse or encroach upon any Reserved Forest within the district**. The entire subproject footprint is located outside notified forest land and does not involve diversion of forest land under the Forest (Conservation) Act, 1980.

However, analysis of the buffer zones indicates that:

- **Five (5) Reserved Forests** fall within the **10 km buffer** of the subproject area.
- **Sonai Kuchi Reserved Forest** falls within the **2 km buffer** and is located approximately **300 meters from the nearest Transmission Line**.

Despite the proximity of Sonai Kuchi RF, the proposed subproject site itself is entirely situated on non-forest land and remains free from any forest area involvement.

Table 22: Protected Forests/ Areas in Morigaon district

Sl.No.	Protected Forest/Area	Type	Key Characteristics/ Importance
1	Sunaikuchi Reserved Forest	Reserved Forest	Lowland alluvial forest with wetlands and grassland patches
2	Khulahat Reserved Forest	Reserved Forest	Mixed sal and moist deciduous vegetation; Gap plantation blocks recorded in forestry project reports.
3	Bura Mayong Reserved Forest	Reserved Forest	Floodplain forest with marshy zones
4	Pobitora Reserved Forest (Pobitora Wildlife Sanctuary in 1998)	Reserved Forest/Wildlife Sanctuary	Famous for high density of Indian one-horned rhinoceros
5	Tetelia Baghara Reserved Forest	Reserved Forest	Near Brahmaputra floodplain; Large plantation block area recorded in forest project documents
6	Baba Parbar Reserved Forest	Reserved Forest	Located within central Morigaon forest division
7	Killing Reserved Forest	Reserved Forest	Foothill fringe area; Near Karbi Anglong foothill transition zone

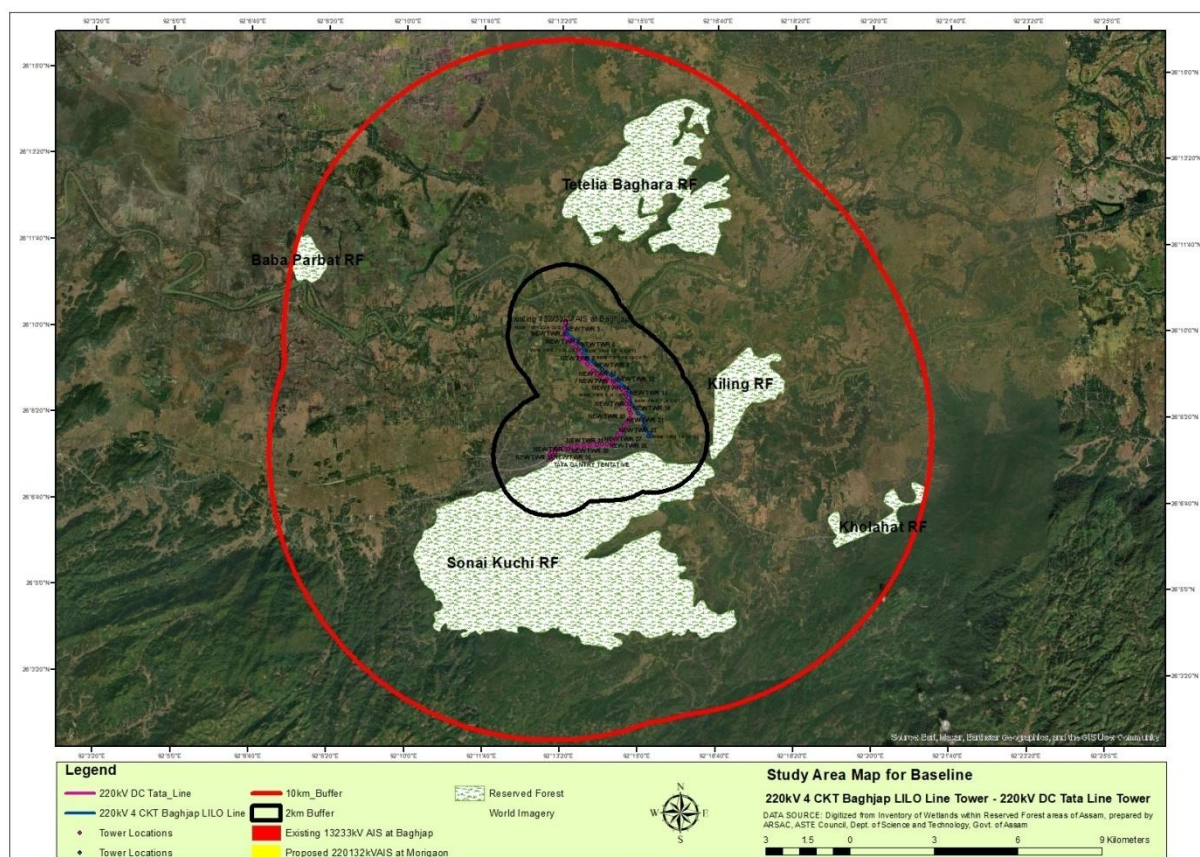


Figure 20: Reserved forests located with 2km and 10km buffer zone around the subproject and associated transmission lines

4.3.2 Tree Inventory and Vegetation Cover within the subproject area

Based on the site assessment of the proposed substation area, approximately 79 trees of various species are present, the majority of which are fruit-bearing. The site also supports several ornamental shrubs, medicinal plants, and patches of wild grass. With regard to the trees located

within the proposed substation site, they will need to be removed to create space for construction of the substation and its associated infrastructure. Prior permission from the Forest Department and/or relevant local authorities may be required before any tree felling is undertaken. Accordingly, AEGCL will need to coordinate with the competent authority and follow the prescribed procedures in this regard.

Assessment along the transmission line corridor indicates clusters of vegetation within the 500 m buffer zone, including areca-nut palms, coconut trees, bamboo, fruit-bearing trees, and other natural vegetation. In most stretches, the transmission line alignment avoids trees; however, in a few locations the lines pass over existing vegetation, which may require trimming of tree branches to maintain the necessary safety clearance. The exact extent of such trimming will be confirmed after completion of the check survey and finalization of the transmission line alignment and tower locations. Thus, if permissions for trimming are necessary, the EPC contractor will be required to get the trees enumerated with the help of the Forest Department and obtain the required approvals prior to commencing erection activities.

An inventory of trees assessed within the substation is provided below:

Table 23: List of Trees within the proposed 220/132kV AIS at Morigaon

Local Name (Assamese)	English/ Common Name	Botanical Name	Nos.	Enlisted under "The Assam Forest (Sustainable Management) rules, 2022"	IUCN Status
Aam	Mango Tree	<i>Mangifera indica</i>	3	Schedule-1	DD
Ahaot	Sacred Fig	<i>Ficus religiosa</i>	1	Schedule-1	LC
Amlokhi	Indian Gooseberry Tree	<i>Phyllanthus emblica</i>	4	Schedule-1	LC
Bakul	Spanish Cherry	<i>Mimusops elengi</i>	2	--	LC
Bel	Wood Apple Tree	<i>Aegle marmelos</i>	2	--	LC
Bhelo	Indian Cork Tree	<i>Millingtonia hortensis</i>	1	Schedule-1	NE
Bogori	Indian Jujube	<i>Ziziphus mauritiana</i>	1	--	NE
Dholunga	White Teak / Gamhar Tree	<i>Gmelina arborea</i>	3	--	LC
Dimouru	Cluster Fig	<i>Ficus racemosa</i>	1	--	LC
Jamun	Black Plum / Java Plum	<i>Syzygium cumini</i>	3	Schedule-1	LC
Jarnomi	Indian Lilac	<i>Azadirachta indica</i>	2	--	LC
Kol	Banana	<i>Musa spp.</i>	15	--	NE
Khangalu	Thorny Bamboo	-	3	--	NE
Khejur	Date Palm	<i>Phoenix dactylifera</i>	4	--	NE
Hilikha	Indian Elm	-	3	--	--
Krishnasura	Flame of the Forest/ Gulmohar Tree	<i>Delonix regia</i>	2	Schedule-1	LC
Koroi	Karanj Tree	<i>Pongamia pinnata</i>	7	--	LC
Madhuri Aam	Guava Tree	<i>Psidium guajava</i>	4	Schedule-1	LC
Nahor	Mesua Tree / Ironwood Tree	<i>Mesua ferrea</i>	1	--	LC
Omita	Papaya	<i>Carica papaya</i>	3	--	NE

Local Name (Assamese)	English/ Common Name	Botanical Name	Nos.	Enlisted under "The Assam Trees Outside Forest (Sustainable Management) rules, 2022"	IUCN Status
Simolu	Silk Cotton Tree	<i>Bombax ceiba</i>	1	Schedule-1	LC
Sojana	Drumstick Tree / Moringa Tree	<i>Moringa oleifera</i>	3	--	LC
Sotiona	A Medicinal Plant	-	4	--	LC
Soura	Indian Laurel	<i>Terminalia tomentosa</i>	1	--	LC
Tamul	Areca Palm / Betel Nut Tree	<i>Areca catechu</i>	5	Schedule-1	NE
			79		

Source: Physical enumeration and identification of trees with the help of a local person;

Note-1: The local names provided were gathered from a local person of the area. There is a possibility of errors in spelling or representation. Based on the local names of trees, the Common and Botanical names were ascertained;

Note-2: The trees have been classified on the basis of the The Assam Trees Outside Forest (Sustainable Management Rules), 2022

Note-2: IUCN Status: LC - Least Concern; NE - Not Evaluated; DD - Data Deficient

The photographic evidences of the trees within the proposed site which would be cut are depicted in **Appendix 12**.

4.3.3 Faunal Observations and Community Inputs

4.3.3.1. Key Biodiversity Areas (KBAs)

Key Biodiversity Areas (KBAs) in Morigaon represent critical regions that contribute significantly to the global persistence of biodiversity. Morigaon is home to diverse ecosystems, including wetlands, grasslands, and forests, which provide habitats for a wide array of flora and fauna. These areas are recognized for their ecological importance, supporting species that are endemic, threatened, or of global conservation concern. The identification and protection of KBAs in Morigaon play a vital role in maintaining ecological balance, fostering sustainable development, and safeguarding the region's natural heritage for future generations. The KBA assessment is carried out using the Integrated Biodiversity Assessment Tool (IBAT), a web-based, subscription-based tool providing access to critical, authoritative biodiversity datasets, including the IUCN Red List, Key Biodiversity Areas (KBAs), and the World Database on Protected Areas.

The district has two Key Biodiversity Areas (KBAs), namely Pobitora Wildlife Sanctuary and Amchang Wildlife Sanctuary, located approximately 14.4 km and 23.5 km from the proposed substation, respectively. These distances further increase along the alignment of the associated transmission lines, indicating the absence of sensitive ecological zones in the immediate vicinity of the proposed substation and transmission line corridors. **Figure 21** and **Figure 22** illustrate the location of the KBAs in relation to the proposed substation and the associated transmission lines.

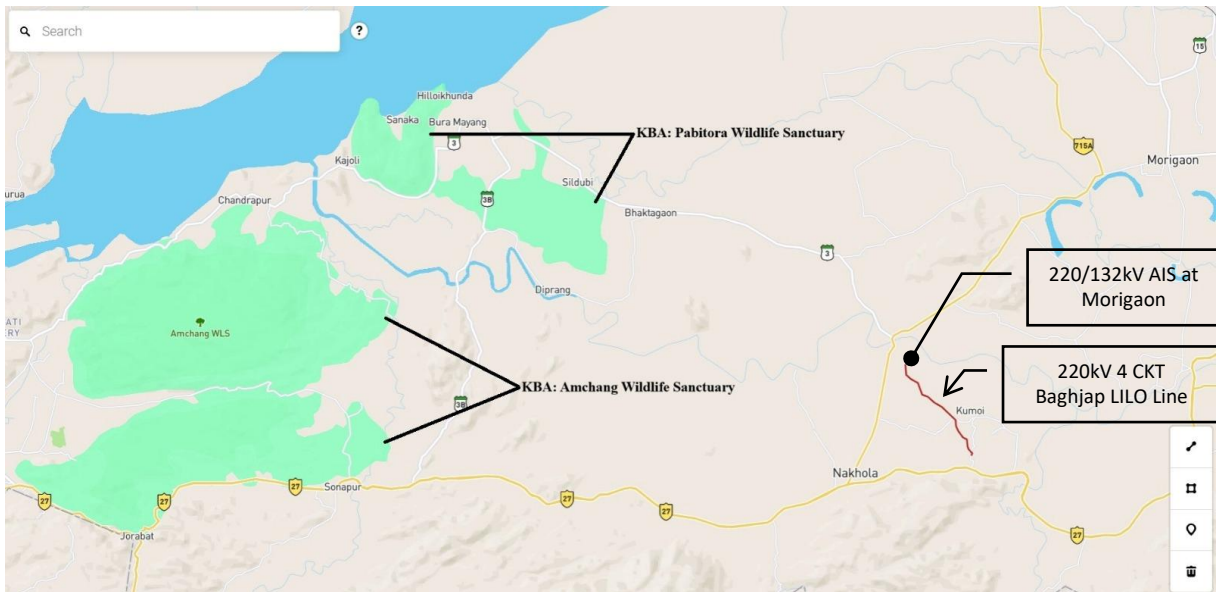


Figure 21: KBAs with respect to the 220/132kV AIS and the 220kV 4 CKY Baghchap LILO Line

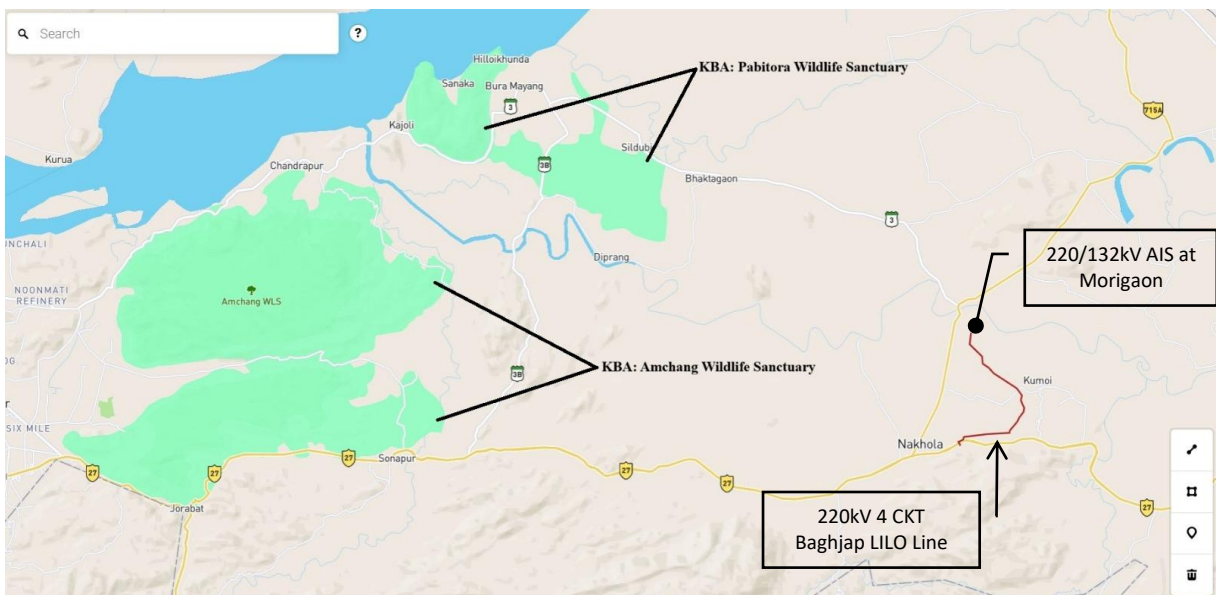


Figure 22: KBA with respect to the 220/132kV AIS and the 220kV D/C TATA Line

The surrounding land use of the study areas are predominantly composed of built-up areas, industrial areas, agricultural lands and barren land which typically support low faunal diversity. No sightings of wildlife species were reported by the local community or observed during the field visit, except some rodents, reptiles, squirrels etc. Common domestic animals such as cattle, goats, dogs, and cats are frequently seen in and around the proposed sites. While occasional sightings of snakes have been reported by residents, such occurrences are rare and transient.

4.3.3.2 Migratory Bird Routes, Flyways and Avifaunal Sensitivity Assessment

A. Regional Flyway Context

The State of Assam lies within the **Central Asian Flyway (CAF)**, one of the nine major global migratory flyways recognized under the Convention on Migratory Species (CMS). The CAF connects breeding

grounds in Arctic Russia and Central Asia with wintering areas in South Asia, including the Brahmaputra floodplains and associated wetland ecosystems in Assam.

As per India's National Action Plan for Conservation of Migratory Birds and their Habitats along the Central Asian Flyway (2018–2023), India plays a strategic role in the flyway, providing critical stopover and wintering habitats to over 90% of the species known to utilize this migratory route. The CAF supports at least 370 migratory bird species visiting the Indian subcontinent, of which approximately 310 species are predominantly wetland-dependent waterbirds, while the remainder include migratory landbirds and raptors.

Within Assam, migratory bird movement is predominantly linked to key ecological features such as (i) the Brahmaputra River system, (ii) floodplain wetlands (beels), (iii) marshland complexes and shallow water bodies, and (iv) protected wetland ecosystems with extensive open-water habitats. Large congregations of migratory birds are generally observed in designated wetlands and wildlife sanctuaries that offer favourable conditions for feeding, roosting, and breeding.

Table 24 presents the list of resident wetland bird species recorded in Morigaon District. **Table 25** provides details of migratory (winter visitor) bird species originating from Central Asia and Siberia, which are primarily restricted to the Amchang and Pobitora Wildlife Sanctuaries, owing to the availability of suitable feeding, roosting, and breeding habitats in these protected areas.

Table 24: Resident Wetland Birds found in Morigaon District

Common Name	Scientific Name	Typical Habitat in Morigaon District	IUCN Red List Status
Lesser Whistling Duck	<i>Dendrocygna javanica</i>	Shallow freshwater wetlands, beels, marshes, paddy fields, slow-moving water bodies	Least Concern
Purple Heron	<i>Ardea purpurea</i>	Reed beds, marshlands, swamp vegetation, river floodplains	Least Concern
Little Cormorant	<i>Microcarbo niger</i> (syn. <i>Phalacrocorax niger</i>)	Rivers, lakes, beels, reservoirs, and fish-rich wetlands	Least Concern
Indian Pond Heron	<i>Ardeola grayii</i>	Shallow wetlands, paddy fields, ponds, drainage channels	Least Concern
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	Dense marsh vegetation, wet grasslands, swamp edges, beel margins	Least Concern

*Source: 1. Wetlands International (2023). "Waterbird Population Estimates." Retrieved from www.wetlands.org.

2. IUCN Red List of Threatened Species. (2023). Retrieved from (<https://www.iucnredlist.org>).

Table 25: Migratory Birds (Winter visitors) found in Morigaon District

Common Name	Scientific Name	Typical Habitat in Morigaon District	IUCN Red List Status
Bar-headed Goose	<i>Anser indicus</i>	Large open wetlands, beels, riverine floodplains, agricultural fields near water bodies; winter migrant feeding on grasses and crops	Least Concern
Northern Pintail	<i>Anas acuta</i>	Shallow freshwater wetlands, marshes, flooded paddy fields, open beels; prefers open water with emergent vegetation	Least Concern
Gadwall	<i>Mareca strepera</i>	Freshwater lakes, marshes, beels, slow-moving rivers with submerged vegetation; wintering grounds in floodplain wetlands	Least Concern

Eurasian Wigeon	<i>Mareca penelope</i>	Open freshwater wetlands, shallow lakes, grazing marshes, inundated grasslands; often feeds in adjacent agricultural fields	Least Concern
CommonTeal (Eurasian Teal)	<i>Anas crecca</i>	Small shallow wetlands, marshy pools, flooded fields, vegetated edges of beels and oxbow lakes	Least Concern

*Source: 1. BirdLife International (2023). "Species Factsheets." Retrieved from www.birdlife.org.
 2. IUCN Red List of Threatened Species. (2023). Retrieved from www.iucnredlist.org.
 (<https://www.iucnredlist.org>)

B. Important Bird Areas (IBAs)

The location map of Important Bird Areas in Morigaon are depicted in **Figure 23**.

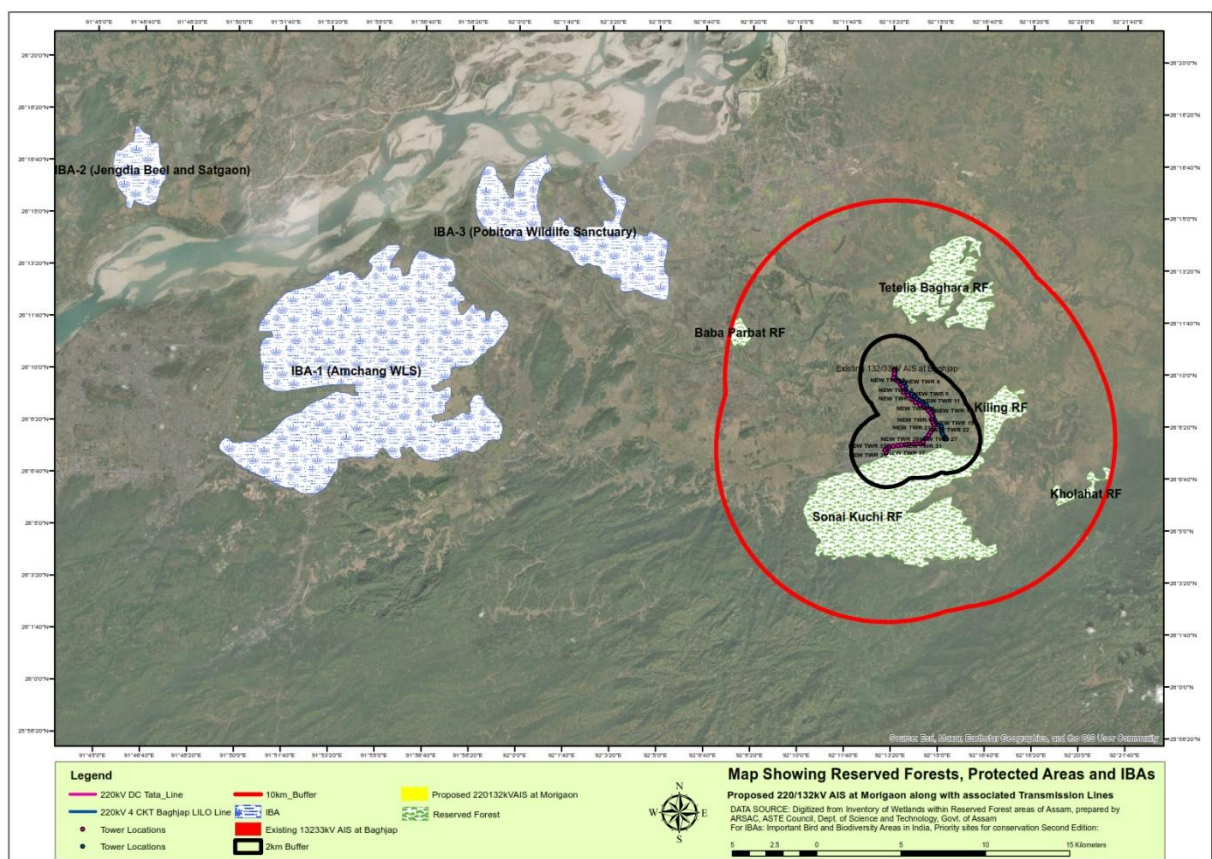


Figure 23: Map showing Reserved Forests, Protected Areas and IBAs

Morigaon hosts a few notable Important Bird Areas (IBAs), including Amchang Wildlife Sanctuary (WLS), Jengdia Beel and Satgaon, and Pobitora Wildlife Sanctuary. GIS-based spatial analysis confirms that Amchang Wildlife Sanctuary is located approximately **23.5 km** from the proposed substation and associated transmission lines, Jengdia Beel and Satgaon are located approximately **44.9 km** away. And Pobitora Wildlife Sanctuary is located approximately **14.4 km** from the sub-project site. These IBAs except Jengdia Beel and Satgaon, are also recognized as Key Biodiversity Areas (KBAs), as verified through the Integrated Biodiversity Assessment Tool (IBAT).

All identified IBA/KBA sites are situated beyond the 10 km buffer of the proposed subproject and do not intersect the transmission line alignment. Accordingly, no direct habitat loss, fragmentation, or disturbance to IBA/KBA-designated areas is anticipated.

C. Site Characteristics, Habitat Context and Field Observations

The sub-project area and its surrounding study zone are predominantly characterized by built-up settlements, agricultural lands, scattered vegetation patches, and isolated Reserved Forest blocks, reflecting a largely modified landscape. The project footprint does not encompass major wetlands, Ramsar sites, significant open-water bodies, or river crossings, and such land-use patterns are typically associated with low faunal diversity and do not function as important migratory stopover, congregation, or bottleneck areas.

Field surveys and community consultations confirm that Avifauna within the project area is largely limited to common resident species, including Mynas, Bulbuls, Pigeons, Sparrows, and Crows. Overall, no migratory bird congregations, breeding colonies, roosting habitats, or significant seasonal movement corridors were identified within the sub-project footprint.

D. Assessment of Migratory Bird Routes and Fly Paths

Although the broader region of Assam forms part of the Central Asian Flyway, migratory birds within the state typically follow ecological corridors associated with:

- The Brahmaputra River corridor
- Floodplain wetland systems
- Large beel complexes and marshland habitats

The proposed transmission line alignment:

- Does not intersect major wetland systems;
- Does not cross significant riverine corridors;
- Is not situated within a recognized migratory bottleneck or congregation site;
- Is located outside designated IBA/KBA boundaries;
- Does not meet the criteria for significant migratory wetlands outlined under the CAF National Action Plan, including thresholds such as congregation of >10,000 migratory birds or 1% biogeographic population of a species.

While the CAF NAP identifies potential risks from aerial infrastructure such as collision and electrocution, such risks are generally associated with major congregation sites, wetland bottlenecks, or high-density migration corridors. The subproject site does not exhibit these characteristics.

Accordingly, the project area is not considered to form part of a primary migratory fly path or ecologically significant stopover habitat.

4.4 Socio-economic Environment

Morigaon, located in central Assam, was established in 1990 following its separation from the then Nagaon district. The district is home to diverse linguistic groups and tribal communities and has a rich historical background, having once comprised several small tribal kingdoms under the suzerainty of the Jaintia and Ahom kings. The district is surrounded by hills of varying sizes abundant water bodies and major rivers such as the Kalang, Kapili, Killing and the Brahmaputra River, which flows along the district's northern boundary. The district is also renowned for the Pabitora Wildlife Sanctuary, famous for its high density of one-horned rhinoceros, and for Mayong, a culturally significant historical site.

Agriculture serves as the primary source of livelihood for the majority of the population. Major crops include rice, jute, mustard, and pulses. The district also supports significant fisheries, horticulture, and livestock activities. Traditional crafts such as handloom weaving and bamboo-cane work are widely practiced in rural areas.

Administratively, Morigaon District comprises **five main development blocks: Bhurbandha, Dolonghat, Lahorighat, Mayang, and Morigaon** and includes 85 Gaon Panchayats and 632 villages, covering a geographical area of 1,704 square kilometers. Morigaon is bordered to the north by the mighty Brahmaputra River, to the south by Karbi Anglong district, to the east by Nagaon district, and to the west by Kamrup district.

According to the 2011 census, the population of Morigaon district is 957,853, of which 92.3% reside in rural areas and 7.7% in urban areas. The population of children aged 0-6 years accounts for 17% of the population. The district's literacy rate is 69.37%, slightly below the Assam state average of 72.19%. The sex ratio stands at 974 females per 1,000 males, higher than the state average of 958. Scheduled Castes and Scheduled Tribes constitute 12.30% and 14.29% of the population, respectively.

The proposed 220/132 kV Air Insulated Substation (AIS) is located on land in the revenue village of Baghjap, within Mayang Circle in Morigaon District. Baghjap lies approximately 17 km west of the district headquarters, and 56 km from the state capital, Dispur. Nearby villages include Paliguri (4 km), Jagiroad (5 km), Konwargaon (5 km), Manaha (6 km), and Baghara (6 km). The closest cities to Baghjap are Morigaon, Mangaldoi, Dispur, and Guwahati. The surrounding population is predominantly rural in character.

In the case of the associated transmission lines, consultations with villages along the proposed alignment have identified the presence of Tiwa (Lalung) and other mixed tribal communities. The Tiwa are a notified Scheduled Tribe in Assam and possess distinct cultural and social characteristics. Accordingly, ESS-3 may be applicable to the transmission line components; however, its final applicability will be confirmed after the completion of a detailed check survey and the availability of the final land schedule for tower footings and Right of Way (RoW).

Table 26: Demographic profiles of the village located within study area of the proposed S/s location as per census 2011

Village	No. of Household	Total Populatio	Male Populatio	Female Populatio	Sex Ratio	SC Populatio	ST Populatio	% Literate	% Male Literate	% Female Literate
Baghjap	213	974	480	494	F=1029 M=1000	38	49	89.31	90.54	88.14
June Bill	106	507	257	250	F=973 M=1000	139	195	71.89	76.82	66.82
Banthal Gaon	55	265	128	137	F=1070 M=1000	120	134	90.57	95.83	85.48

Source: <https://villageinfo.in/assam/morigaon/mayang/>
<https://www.census2011.co.in/data/town/801489-mayang-imphal-manipur.html>
<https://villageinfo.in/assam/karbi-anglong/donka/mayang/>

This section presents the socio-economic environment of the proposed transmission lines viz. Baghjap LILO and TATA Line (Package E). It outlines the methodology used for socio-economic

assessment, followed by the profile of the villages located within the defined study area.

The Socio-economic information has been primarily derived from the secondary sources (*Census of India*). In addition, primary information was collected through consultations and discussions at the villages with the local community members in the project areas. Village-wise secondary data (*obtained from Census, 2011*) has been used to analyze the key socio-economic characteristics of the project area.

For the purpose of this study, the study area has been defined as area within 500m of either side of proposed transmission line alignment. The line-wise list of villages is provided in Table below.

Table 27: List of the Villages Located within Study Area of the Transmission Line

Transmission Line	Name of Village	Block	District
220kV Baghjap LILO	Baghjap	Mayang	Morigaon
	Junbill		
	Banthai Gaon		
	Kharbeel		
	Bangfor		
TATA Line	Baghjap		
	Junbill		
	Banthai Gaon		
	Kharbeel		
	Bangfor		
	Tegheria		

Table 28: Demographic profiles of the village located within 500m of study area as per census 2011 for Transmission Line

Village	No. of Household	Total Populatio	Male Populatio	Female Populatio	Sex Ratio	SC Populatio	ST Populatio	% Literate	% Male Literate	% Female Literate
Baghjap	213	974	480	494	F= 1029 M= 1000	38	49	89.31	90.54	88.14
June Bill	106	507	257	250	F= 973 M= 1000	139	195	71.89	76.82	66.82
Banthai Gaon	55	265	128	137	F= 1070 M= 1000	120	134	90.57	95.83	85.48
Kharbeel	25	115	63	52	F= 825 M= 1000	00	115	60.87	70.37	48.89
Bangfor	281	1288	647	641	F= 991 M= 1000	01	1276	84.68	91.79	77.87
Tegheria	1403	5567	2848	2719	F= 955 M= 1000	297	748	91.17	94.19	87.99

Source: census2011.co.in

4.4.1 Economic Activity and livelihood Pattern

Occupational Pattern:

The most important factor, which governs the occupational pattern of a local economy, is the availability of the total work force. Occupation structure of most of the states of India is generally dominated by the agricultural sector. Following this trend, the economy of Morigaon district has been experiencing the highest percentage of people engaged in agriculture activities (paddy, jute, pulses, oilseeds) for livelihood. The district sees a mix of cultivators, agricultural laborers (many women), and a growing trend of people seeking non-agricultural jobs, with dairy farming and handicrafts offering potential for income diversification. The sector wise classification in Morigaon District is shared below:

Primary Sector (Agriculture & Allied Activities):

Dominant Activity: Agriculture is the backbone, with rice (Ahu, Sali, Boro) being the main crop, alongside jute, pulses, and oilseeds.

Livestock: Essential for small farmers and landless laborers, with dairy and poultry/pig rearing supporting livelihoods and offering subsidiary income.

Fishing: Primarily for self-consumption rather than commercial activity.

Secondary & Tertiary Sectors:

Shifting Trend: There's a noticeable move from primary to secondary (small industries) and tertiary (service) sectors, driven by a desire for better living conditions.

Business & Services: These sectors provide significant livelihood, with a notable presence of women entrepreneurs.

Cottage Industries: Small-scale industries and handicrafts are popular, particularly among tribal communities.

As per Census 2011, in the case of Baghjap Village, 357 out of 974 42.78% of the total population comprises the total worker population and among them 267 are male and 90 are female. Of the total working population, 271 25.89% are main workers whereas 86 31.71% comprises the marginal worker population (44 Male and 42 Female). The employment pattern in this area suggests that In Baghjap village out of total population, 357 were engaged in work activities. 75.91 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 24.09 % were involved in Marginal activity providing livelihood for less than 6 months. Of 357 workers engaged in Main Work, 106 were cultivators (owner or co-owner) while 29 were Agricultural labourer.

4.4.2 Road Network

Baghjap boasts a robust and well-developed road network that ensures connectivity to key locations such as Jagiroad town, Morigaon, Nagaon, and Guwahati. The National Highway 27 (NH-27) and various state highways play a pivotal role in facilitating regional transportation. The area is well-connected through black-topped (pucca) roads, ensuring efficient travel.

Morigaon, in particular, benefits from strong road infrastructure, with NH-27 serving as a major

connectivity route to Dibrugarh in the east and Guwahati in the west. The town features well-maintained pucca roads, while surrounding rural areas are connected via gravel and earthen roads. Public and private bus services provide reliable transportation between Baghjap, Morigaon, and major cities such as Guwahati, Nagaon, and Tezpur. Additionally, the presence of a railway station at Jagiroad, approximately 4 km from the proposed substation, enhances regional accessibility. Local transportation options include auto-rickshaws, taxis, state buses, and modified autos, facilitating convenient travel within Morigaon and its neighboring areas.

The project site is accessible from Guwahati, located 55 km away, via NH-27 (also referred to as AH-1) through Jagi Road. From there, it is a further 6 km via NH-715A to Morigaon, the project location. The road network map is depicted in **Figure 24**.

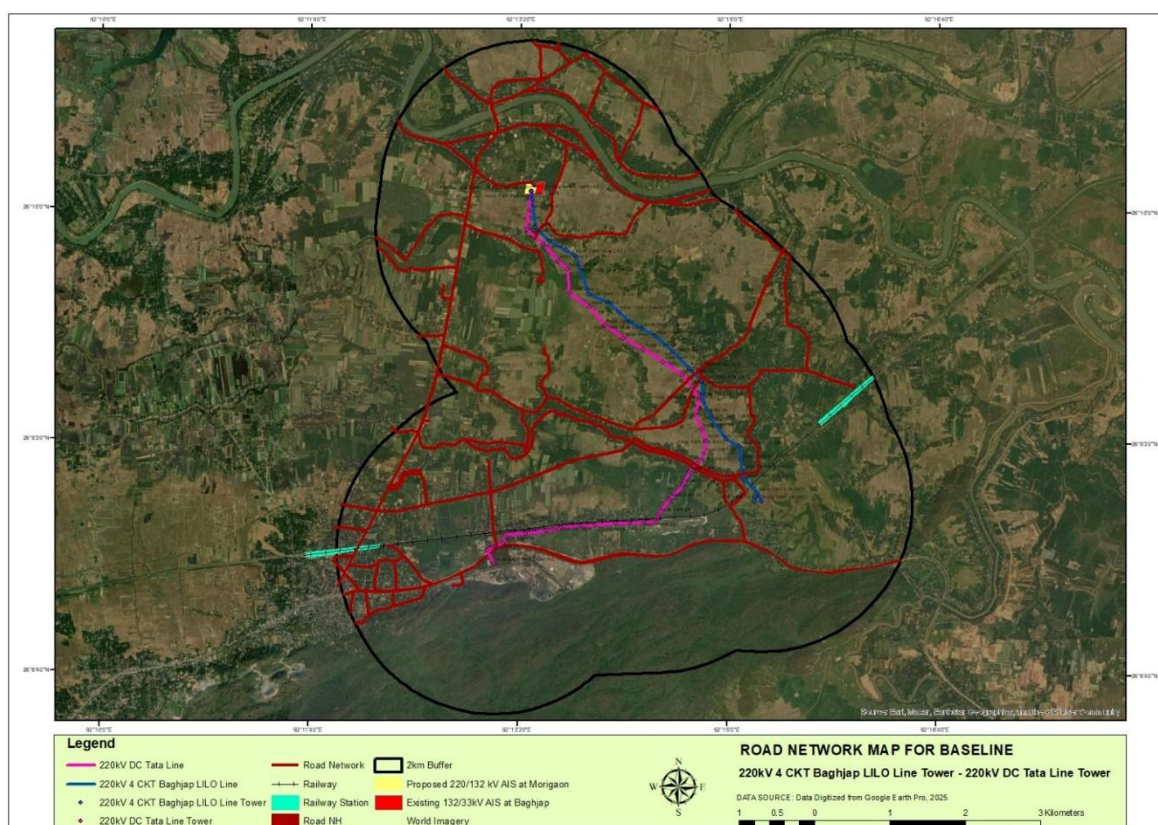


Figure 24: Map Showing the Road Network of Under the Project

4.4.3 Literacy Rate and Education Profile

As per the 2011 Census, Morigaon District's overall literacy rate is around 68.03%, with males at 71.9% and females at 64.04%, below the Assam state average but showing improvement from 2001. The urban areas, like Morigaon town (89.42%), had much higher literacy than the rural parts (66.60%), with significant male-female gaps in both rural and urban settings. Morigaon's literacy rate in 2011 (68.03%) was lower than the Assam state average (72.19%).

Key Literacy Figures (2011 Census):

- ☞ Total District Literacy: 68.03%
- ☞ Male Literacy (District): 71.9%

☞ Female Literacy (District): 64.04%

Rural vs. Urban Literacy:

☞ Rural Literacy: 66.60% (Male: 70.46%, Female: 62.63%)

☞ Urban Literacy (Morigaon Town): 89.42% (Male: 92.95%, Female: 85.82%)

Morigaon District offers a range of educational institutions, including prominent colleges like **Morigaon College**- major college in the district, located in Ghasbari, **Jagiroad College**- situated in Jagiroad, **Moirabari College**- college in the Moirabari area, and **Mayang Anchalik College**- Located in Mayang, along with technical education at **Morigaon Polytechnic** in Kachamari Pathar, teacher training at the **College of Education Morigaon**- Offers B.Ed. and D.El.Ed. Courses for teacher training, and numerous schools such as **Indus Academy, Nalanda Academy, Sankardev Vidya Niketan, and Jagi Higher Secondary School**, catering to various levels from primary to higher education with CBSE, State Board, and private options. There were anganwadi and government secondary and higher secondary schools also available in the study area villages.

As per the 2011 census, Mayong is a block within the Morigaon District of Assam, not a separate district, and it hosts numerous government schools (L.P., M.E., H.S., etc.) across various clusters like Mayong Cluster, Madhya Mayong Cluster, Damal Cluster, Borkuloi Cluster, and others, including Mayong H.S. School, Lokapriya G.n.b. Hs, and many primary schools. Baghjap, Junbil and Banthai Gaon are the villages which comes under our study area.

Table 29: List of educational institutions in Study Area

Village	Anganwadi	Primary School (1 to 5)	Upper Primary School (6 to 8)	Secondary & Sr. School (Above 8)	Collage
Baghjap	01	01	00	01	00
June Bill	01	02	01	00	00
Banthai Gaon	01	02	00	00	00
Kharbeel	01	00	00	00	00
Bangfor	01	02	00	01	00
Tegheria	01	01	00	02	00

Source: From Census 2011 Data

In Baghjap village, there is one Baghjap LP (Lower Primary) School which includes classes 1 to 5 for children aged 6 to 11 years, as well as a pre-primary section (Anganwadi) for children aged 3 to 10 years. Swahid Surya Bora Girls H.s. School, also located in Baghjap, offers education from classes 6 to 10 for students aged 11 to 16 years. In Junebil village, there are two lower primary schools: Junebil LP and Satbhani Achanigaon LP (V) School, both providing education for classes 1 to 5. Additionally, there is one upper primary school, Junebil ME, offering classes 6 to 8, along with a pre-primary section (Anganwadi) for children aged 3 to 10 years. The neighboring village of Bangthai Gaon has two lower primary schools, Bangthai Gaon LP and No. 2 Bangthai Gaon LP (V) School, which offer education for classes 1 to 5, as well as a pre-primary section (Anganwadi) for children aged 3 to 10 years. In Bangfor village, there are two lower primary schools: Bangfor LP School, Dayang Belguri LP School and Bangfor Belghuri Secondary School. In Tegheria village, there is one lower primary school named Tegheria LP School and two higher secondary schools: HPC HS School and HPCL Jagiroad Kendriya Vidyalaya School.

Field consultations indicate that enrolment at primary level is generally high, and most children attend local government schools. However, access to higher secondary education and colleges requires travel outside the villages. Female education levels have improved in recent years due to state scholarship schemes, bicycle distribution programmes and expansion of secondary schooling facilities. Overall, literacy and education access in the study area can be considered moderate with gradual improvement, though rural–urban disparities and access to higher education remain constraints.

4.4.4 Health Infrastructure

Health care infrastructure of the study region is captured in the table below which shows that health care infrastructure is very poor in the study areas. At the broader district level, Morigaon has 01 Civil Hospital, 06 Community Health Centers (all are in Rural area), 34 PHCs and 142 sub-centers in total, as per the Statistical Handbook, Assam- 2024. The state government also implements various schemes like the Mukhya Mantri Lok Sevak Arogya Yojana (MMLSAY) to provide cashless health insurance to eligible beneficiaries. There are no hospitals, primary health center (PHC) and health sub center (SC) in the study area. Nearest Civil Hospital is located at Morigaon Town, which caters to the health care requirement for most people of the study area.

Table 30: Health care facilities in study area 500 m for Substation and Transmission Line

Villages/ District	Hospitals	PHC	Sub-Centre
Morigaon (District)	01	34	142
Mayong (Block)	N	03	04
Baghjap (Study area village)	N	N	N
June Bill (Study area village)	N	N	N
Banthai Gaon (Study area village)	N	N	01
Kharbeel	N	N	N
Bangfor	N	01	01
Tegheria	02	01	N

Source: Statistical Handbook, Assam 2024

Mayong Block in the Morigaon district of Assam has a basic public health infrastructure that includes a **Public Health Centre (PHC)**, **several Sub-Centres (SCs)**, and a **Block Primary Health Center (BPHC)**. More specialized medical care, including hospital facilities, is available in the nearby towns of Jagiroad and Morigaon, as well as in the state capital, Guwahati.

Local Health Facilities in Mayong Block

The primary points of contact for healthcare within Mayong Block are government-run facilities:

- **Public Health Centre (PHC):** Located on SH 3 in Mayong, this is a key facility in the area, providing basic medical care and acting as a referral unit for several sub-centers.
- **Hindustan Paper Corporation (HPCL) Hospital:** Located in Kagajnagar, in Tegheria, providing specialized treatment.

- **Apollo Dialysis Clinic:** Located in Tegheria.
- **Block Primary Health Center (BPHC):** A BPHC is located in the nearby Bhurabandha area of Morigaon, which serves as a central point for health administration and services in the block.
- **Sub-Centres (SCs) / Health & Wellness Centres:** These are the most peripheral first points of contact between the community and the health system, providing primary health services. Specific examples in or near the area include:
 - Sub Health Centre Bangfore
 - Sub Health Centre Chenimara
 - Mantabori Ayushman Arogya Mandir & Sub Center
 - Deusal Prathomik Chikitsa Kendra
 - Sub Health Centre Bangfore

Access to Specialized and Higher Care

For more advanced medical needs, residents of Mayong Block access facilities in nearby urban centers:

- **Morigaon Civil Hospital:** The district hospital in Morigaon town provides a higher level of care and has a wider range of departments compared to the local PHCs.
- **Jagiroad:** The nearby town of Jagiroad has several private and public health facilities, including the Jagiroad Health and Service Hospital and a government hospital at Pabhakati.
- **Guwahati:** As the state capital, Guwahati hosts several large, multi-specialty, and super-specialty hospitals, including the Gauhati Medical College & Hospital (GMCH) and various private hospitals, which are the main referral centers for complex conditions in the region.

General Healthcare Challenges

Similar to other rural areas in Assam, the health infrastructure in Mayong Block has traditionally faced challenges, including:

- High prevalence of water-borne diseases.
- The need for vigorous preventive healthcare measures.
- Accessibility issues for the rural population, which the government of Assam is trying to address through initiatives like the National Health Mission (NHM) and the Mukhya Mantri Lok Sevak Arogya Yojana (MMLSAY) health insurance scheme.

Baghjap village in the Morigaon district of Assam where 220/132 kV AIS substation has been proposed, does not have an in-village health center, but residents have access to various healthcare facilities located within a 5-10 km radius.

The health infrastructure accessible to Baghjap residents includes:

- **Community Health Centre (CHC):** A CHC is located less than 5 km away in Bangthaigaon.
- **Primary Health Centre (PHC):** A PHC is located 5-10 km from the village.
- **Primary Health Sub-centre:** Located within a 5-10 km range.
- **Maternity and Child Welfare Centre:** Accessible within 5-10 km.

- **TB Clinic, Allopathic Hospital, and Dispensary:** These facilities are also available within a 5-10 km radius of Baghjap.
- **Mobile Health Centre and Family Welfare Centre:** These services are available to the community.

Efforts by non-governmental organizations are also present in the region, such as training sessions on nutrition and organic farming conducted by SeSTA (Seven Sisters Development Assistance, a Non-Governmental Organization) in the Baghjap Gaon Panchayat area, which indirectly contribute to community health and well-being.

4.4.5 Electricity, Drinking Water and Sanitation Facilities

Mayang Development Block in Morigaon district has access to basic utilities such as electricity, drinking water, and sanitation; however, infrastructure gaps typical of rural Assam persist. Settlement patterns in the study area remain closely linked to agricultural land and water resources, and access to reliable water sources continues to influence household economic conditions, hygiene practices, and overall living standards.

Electricity access in the block has improved significantly in recent years due to rural electrification programs implemented under national and state schemes. According to the Economic Survey of Assam 2023–24, nearly all rural households in the state are now electrified, and grid connectivity extends to most villages in Morigaon district. However, consultations in the study villages indicate that although electricity connections are available, occasional voltage fluctuations and outages continue to affect reliability, especially during the monsoon and flood seasons.

Recent improvements in drinking water provision have been made under the Jal Jeevan Mission. According to the Jal Jeevan Mission dashboard (accessed 2024–25), an increasing proportion of rural households in Morigaon district now have Functional Household Tap Connections (FHTCs), although full coverage has not yet been achieved. In the study area, groundwater sources such as hand pumps, tube wells, and dug wells remain the primary sources of drinking water for many households. Community consultations indicate that piped water supply schemes are either under implementation or partially operational in nearby villages; however, several households still rely on hand pumps without household-level filtration systems.

Sanitation infrastructure has improved substantially following the implementation of the Swachh Bharat Mission (Gramin) and various state-level sanitation initiatives. According to NFHS-5 (2019–21) and district-level data, rural toilet coverage in Assam has increased significantly, with most households in Morigaon district now having access to individual household latrines. Community consultations confirm that sanitation facilities in the study area have improved, supported by awareness programs and government initiatives. Nevertheless, solid and liquid waste management systems remain underdeveloped, and open drainage and unregulated waste disposal are still observed in some locations. Local authorities continue to address these gaps through ongoing rural development and sanitation programs.

Irrigation facilities in the study area are moderate but remain largely dependent on rainfall. Agriculture in the Mayang block is predominantly rain-fed, with supplementary irrigation provided through ponds, shallow tube wells, and traditional water bodies. Farmers reported using water from local ponds, wells, and tube wells for irrigation during dry periods. The Kopili River, located approximately 2 km from the Baghjap substation site, also serves as a seasonal source of irrigation

water for nearby agricultural fields. Government irrigation schemes implemented by the Irrigation Department of the Government of Assam have been introduced in parts of the block; however, coverage remains partial, and farmers continue to rely primarily on monsoon rainfall for crop cultivation.

Irrigation

Community consultation reveals that irrigation facilities in study area exist and farmers were reported to be entirely dependent upon rain water for cultivation. Though use of water drawn from ponds, wells and tube wells was reported. Kopili River, which is 2 Km from the Baghjap Substation is also used for the irrigation purposes by the locals. Besides all, government schemes is also implemented by the irrigation department.

4.4.6 Armed Security Personnel Recruitment and Training Details, Deployed at Substation

As per the “ASEB Security Service Regulation, 1975”, “Private Security Agencies (Regulation) Act, 2005 (PSARA)” and “CEA (Measures relating to Safety and Electric Supply) Regulations, 2023”, Assam Electricity Grid Corporation Limited (AEGCL) has deployed security personnel at its corporate office as well as at various substations. These personnel are engaged through Official Recruitment or sourced from Assam Police Departments. Some of the security guards are armed, depending on the requirements of AEGCL at the divisional or corporate level.

At the Baghjap substation, a total of five guards is employed on a rotational shift basis, two of whom are armed. These guards are recruited through the Disha Commandant office in Amgoni, Nagaon. The recruitment policy includes eligibility criteria and requires submission of documents such as Aadhaar Card, police verification, medical fitness certificate, educational qualifications, experience certificates (if any), and copies of valid firearm training certificates and arms licenses, which are mandatory. Basic and specialized training is provided by government-authorized training institutes, with highly experienced trainers conducting firearms training. Security management plan is appended in **Appendix 13**.

4.4.7 Archaeological and Historical Monuments and Cultural & Worships

Morigaon district, particularly around Mayong, is rich in archaeological and historical sites, including Neolithic tools, Pala-Sena period sculptures, medieval rock-cut carvings (like Ganesha, Uma-Maheshwar), and historical remnants like Kajali Chowki (Ahom military post) and temple ruins at **Kachasila Hill**, offering insights into ancient stone age settlements, Vajrayana Buddhism, and Ahom military history, alongside significant Vaishnavite Satras and traditional religious structures.

Key Archaeological & Historical Sites:

- Mayong: Known as a center for traditional magic, ancient manuscripts, metal objects (Vajrayana sect), pottery, and the Mayong Museum showcasing Neolithic tools and historical artifacts.
- Kachasila Hill: Features ancient Shiva-Parvati temples (9th Century AD), rare stone carvings, and corin stones, blending spirituality with natural beauty near Pobitora.

- Kajali Chowki: A crucial Ahom military station with unearthed stone bullets and arms, significant for the Battle of Saraighat.
- Deoparbat (Deoshal): An ancient site with temple ruins and sculptures from the Pala-Sena era, as noted by the Assam Tourism website.
- Rock-Cut Sculptures: Found in Mayong and surrounding areas, depicting deities like Ganesha and Uma-Maheshwar, reflecting Pala-Sena influence.
- Satras & Naamghars: Vaishnavite monasteries (Satras) and prayer halls (Naamghars) like Juriya Namghar reflect the region's strong religious and cultural heritage.

Morigaon district in Assam boasts numerous significant *mandirs* (temples) and *namghars* (Vaishnavite prayer halls), including historic sites like the **Sidhabari Shiva Mandir**, the culturally rich **Sahityarathi Laxminath Bezboruah Samannay Khetra**, and important *namghars* such as Ahatguri Buha Suba Namghar and the local **Morigaon Anchalik Barnaamghar**, serving as vital centers for worship, cultural preservation, and community gatherings, with prominent locations in areas like Ghoramara Pathar, Doloichuba, and Jagiroad.

As per the consultation with the local community people there is no archeologically sensitive sites around the 10 KM radius of the proposed substation construction site. While the Pobitora Wild Life Sanctuary is located at a distance of around 20 Km from the proposed Substation.

Table 31: List of Mandirs (Temples) in the Study Area

Village	Madir	Mosque	Church	Namgarh (Satras)	Cemetary	Govt Dept. Offices
Baghjap	Y	N	N	N	N	Y
June Bill	N	N	N	Y	N	N
Banthai Gaon	Y	N	N	N	N	N
Kharbeel	Y	N	N	N	N	N
Bangfor	Y	N	N	N	N	N
Tegheria	Y	Y	N	Y	N	N

Source: Census Data 2011

Chapter 5: Analysis of Alternatives

5.1 Introduction

This chapter presents an analysis of alternatives for the proposed construction of the 220/132 kV (2×160 MVA) AIS Substation at Morigaon, along with the two associated transmission lines, namely the 220 kV 4 CKT Baghjap LILLO Line and the 220 kV D/C TATA Line. The assessment has been carried out in accordance with the Environmental and Social Framework (ESF, 2024) of the Asian Infrastructure Investment Bank.

The Environmental and Social Framework (ESF) of the Asian Infrastructure Investment Bank requires a systematic and comparative evaluation of alternatives, including investment options, site selection, design configurations, technology choices, and the “no project” scenario. This analysis is intended to determine whether the selected option effectively minimizes environmental and social risks, ensures cost-effectiveness, and maintains operational feasibility within the prevailing local conditions.

5.2 Without Project Scenario (Substation component only)

If the proposed substations are not developed, the regional transmission network will continue to experience several constraints, including:

- Overloading of existing substations and transmission lines,
- Inability to adequately meet the increasing regional power demand,
- Reduced reliability and quality of electricity supply,
- Limited capability to integrate renewable energy sources, and
- Potential adverse impacts on regional socio-economic development.

Therefore, the “without project” scenario is not considered a viable option, as it would fail to meet the region’s growing energy requirements and would hinder overall development and power system reliability.

5.3 Site Selection Process

The Assam Electricity Grid Corporation Limited (AEGCL), the state transmission utility, has placed strong emphasis on reducing social and environmental impacts during the planning and execution of its substation projects. For the proposed 220/132 kV AIS at Morigaon, no additional land acquisition is necessary. The new AIS substation will be developed within the existing Baghjap Grid Substation premises, which span a total area of 4.68 hectares and are owned by AEGCL. Of this, 1.34 hectares are currently occupied by the existing substation, while the remaining 3.34ha presently consisting of staff quarters, open spaces, vegetation, trees, a water tank, and other minor structures, will be allocated for the construction of the new AIS facility. The entire site is enclosed by a brick boundary wall. The selection of this site offers several advantages:

1. Avoidance of Land Acquisition:

No additional land acquisition is required, eliminating risks of involuntary resettlement or displacement of communities.

2. Ownership and Legal Status:

The land is already under AEGCL ownership and has been confirmed to be free from encroachment, legal disputes, or environmental sensitivities such as forest areas, archaeological sites, or ecologically protected zones.

3. Sustainability and Resource Optimization:

Utilizing existing infrastructure aligns with principles of sustainability by reducing the need for extensive new civil works and land development efforts.

4. Accessibility:

The site is easily accessible via public roads, facilitating efficient transportation of equipment and materials during construction and operational phases.

5. Infrastructure Compatibility:

The site provides convenient access for terminating high-voltage lines (132 kV and 33 kV) without physical obstructions.

6. Alignment with Environmental and Social Standards (ESS)

The site selection approach aligns with AIB’s Environmental and Social Standards (ESS), particularly the principle of “Avoid, Minimize, and Mitigate.” By utilizing existing land and infrastructure, the project avoids environmental and social impacts typically associated with new land acquisition. This minimizes disruptions to local communities and biodiversity while ensuring compliance with sustainability objectives.

5.4 Assessment of Hypothetical Alternative Sites

While no official alternatives were appraised due to land available with AEGCL, a comparative matrix is provided to evaluate the selected sites against hypothetical private or forest land options:

Criteria	Hypothetical Alternative Site	Selected AEGCL existing Land Site
Land Ownership	Private/Forest	AEGCL existing land
Land Acquisition Requirement	Yes	No
Resettlement Risk	High	None
Environmental Sensitivity	Unknown	Low (screened and verified)
Cost Implication	High (due to acquisition and compensation)	Low (AEGCL existing land)
Grid Connectivity Feasibility	Uncertain	Technically Feasible

This comparison validates the appropriateness of the selected sites from environmental, social, and technical standpoints.

5.5 Transmission route alignment

The objective of the alternatives analysis for the proposed **(i)** 220kV 4 CKT Baghjap LILO Line, which will loop in and loop out (LILO) from the existing 220 kV Karbi-Langpi-Sarusajai D/C transmission line at Uttar Deosal settlement, and **(ii)** the 220kV D/C TATA Line, which will evacuate power from the proposed AIS substation to the under-construction TATA Semi-conductor substation at Jagiroad, is to identify the most technically feasible, environmentally sustainable, and socially acceptable alignments. The analysis also aims to minimize environmental and social risks, optimize project costs, and reduce potential long-term impacts while ensuring reliable and efficient power transmission.

Three alternative routes were considered for each of the above-mentioned lines, based on technical feasibility and environment and social screening. The final route for transmission line was selected and finalized from the alternatives, by AEGCL, considering following environmental and social criteria for route selection apart from the technical considerations:

The following key design, environmental, and social principles guided the alignment selection:

- **Avoidance of human settlements:** Efforts were made to ensure that the transmission line does not pass through or immediately adjacent to residential areas.
- **Protection of cultural and archaeological resources:** No alignment option should intersect with known archaeological sites, cultural structures, or heritage monuments.
- **Avoidance of forest areas:** Alignments were screened to eliminate or minimize forest involvement and reduce the need for forest clearance procedures.
- **Exclusion of protected areas:** Routes were assessed to ensure they do not pass through or near environmentally sensitive zones such as wildlife sanctuaries or national parks.
- **Minimizing disturbance to public utilities:** Sensitive receptors such as schools, hospitals, playgrounds, religious structures, and major public facilities were carefully avoided.
- **Technical feasibility considerations:** Terrain suitability, accessibility for construction, line length, and tower requirements were examined for each route.

The check survey for the proposed 220 kV 4 CKT Baghjap LILO Line will be undertaken after the EPC Contractor is mobilized and onboarded. Accordingly, the final alignment has not yet been confirmed. In the interim, a preliminary route optimization and analysis was undertaken to identify alignments with the least environmental and social sensitivities, thereby ensuring minimal impacts during project implementation.

During the route selection process, all practicable efforts were made to avoid environmentally and socially sensitive features. Where complete avoidance was not feasible, measures were considered to minimize potential impacts to the extent possible. Based on initial screening, field verification, and technical feasibility assessment, three alignment options—Route I, Route III, and the Final Selected Route (Route II) were identified and analysed in detail.

Figure 25 presents the three proposed alternative alignments for the 220 kV 4 CKT Baghjap LILO Line. Each alternative was evaluated against relevant environmental and social parameters to determine

the most suitable alignment, with particular emphasis on minimizing ecological disturbance and addressing potential social impacts.

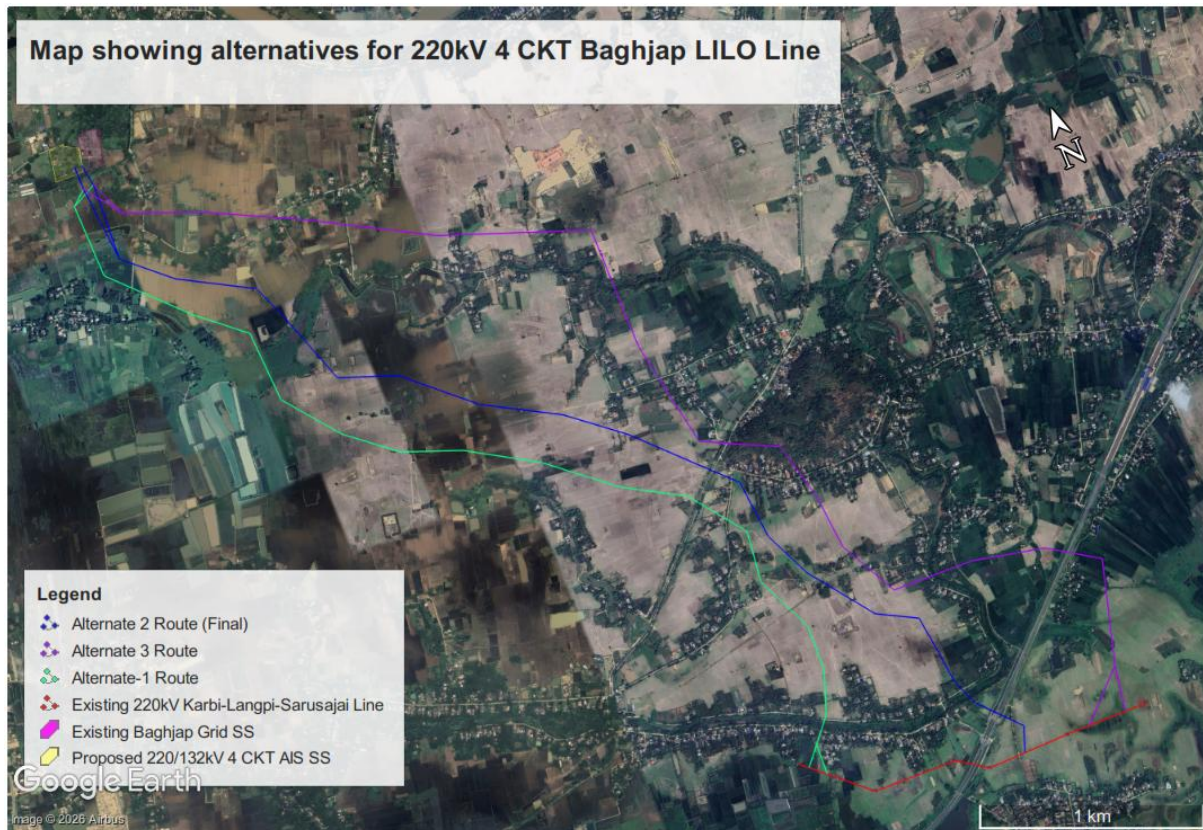


Figure 25: Map showing 3 alternatives of the 220kV 4 CKT Baghjap LILO Line

Table 32: Assessment of Alternative Routes for the 220kV 4 CKT Baghjap LILO Line provides a summary of the initial evaluation of the three alternative routes. The analysis considered various factors, including land use, proximity to sensitive areas, potential displacement of communities, and other environmental and social criteria.

Table 32: Assessment of Alternative Routes for the 220kV 4 CKT Baghjap LILO Line

Description	Alternative- I	Alternative-II (Final)	Alternative-III
Route Length (in Kms.)	5.62km	5.47km	7.22km
Angle Point	18	17	16
River Crossing (Major)	NIL	NIL	NIL
River Crossing (Minor)	Yes - 2	Yes - 2	Yes - 2
Forest (Reserved Forest & Protected Forest)	NIL	NIL	NIL
Tea Garden (Affected Route length)	NIL	NIL	NIL
Low Land Area	NIL	NIL	NIL
Habitation area	Mostly avoided (4 structure in RoW between Twr 1&2)	Mostly avoided (1 structure in RoW between Twr 11&12)	Partially involved (Passing over 2structures near Twr-14, and 11 RoW structures)

Description	Alternative- I	Alternative-II (Final)	Alternative-III
Railway Crossing	No	Yes (01)	Yes (01)
Power Line crossing	Yes - 2 location existing lines	Yes - 2 location existing lines	Yes - 2 location existing lines
Road crossing	Village roads crossing involved.	Village roads crossing involved.	Village roads crossing involved.
Trees / Bamboo	Crossing over trees at 10 locations	Crossing over trees at 7 locations	Crossing over trees at 22 locations
RoW issues	Few Anticipated	Very few anticipated	High Anticipated
Compensation related issues	Few	Anticipated to be minimum	High
Accessibility to tower location	Low accessible	Moderate to access	Easy to access

Among the three options, one alternative was selected as the preferred route due to its lower environmental and social sensitivities compared to the other two. This selection was based on an analysis conducted during the preliminary optimization phase. **Alternate-2** was selected to be most optimal as it largely traverses through paddy fields and avoid human settlements and impacts due to other aspects are also noted to be minimal.

Like-wise, a similar analysis of the alternatives was carried-out for the 220kV D/C Tata Line, which is depicted in **Figure 26** and **Table 33**.

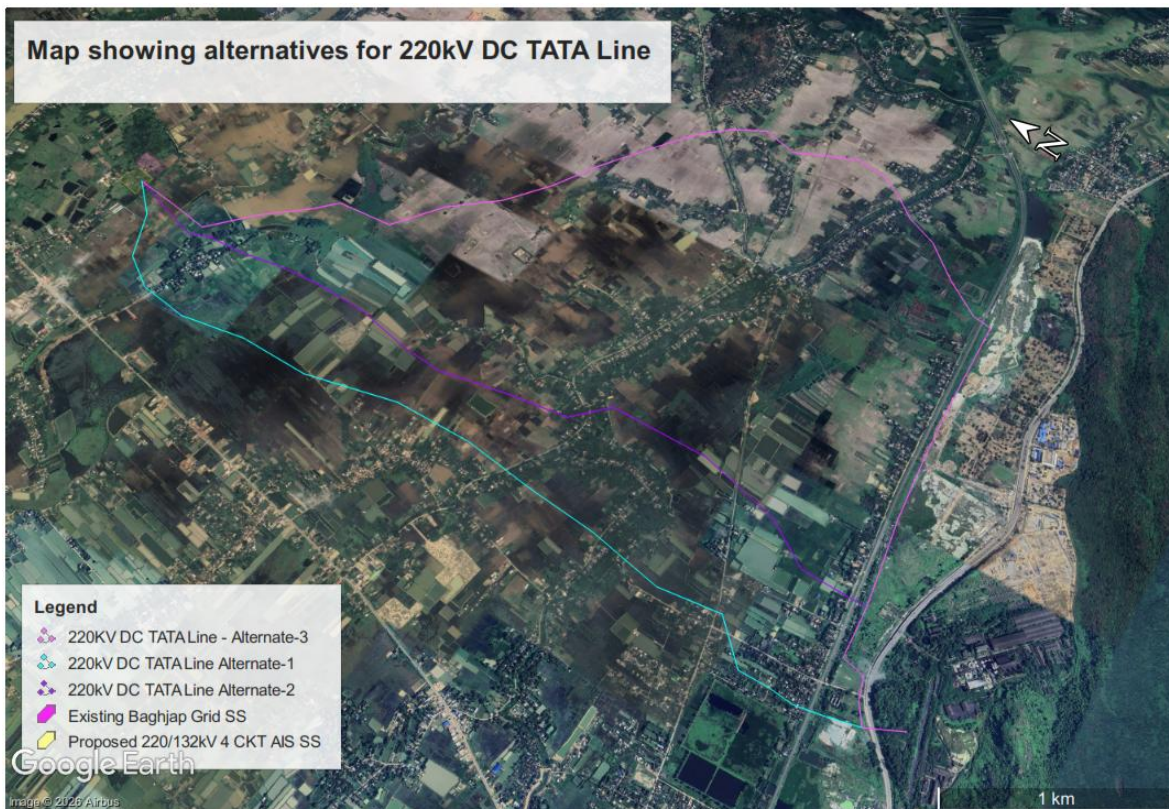


Figure 26: Map showing three alternative transmission lines routes for the 220kV D/C TATA Line

Table 33: Assessment of Alternative Routes for the 220kV D/C TATA Line

Description	Alternative- I	Alternative-II	Alternative-III (Final)
Route Length (in Kms.)	5.15 km	4.74 km	8.31km
Angle Point	16	14	33
River Crossing (Major)	NIL	NIL	NIL
River Crossing (Minor)	Yes - 1	Yes - 1	Yes -1
Forest (Reserved Forest & Protected Forest)	NIL	NIL	NIL
Tea Garden (Affected Route length)	NIL	NIL	NIL
Low Land Area	NIL	NIL	NIL
Habitation area	Involved (Passing over 6 structures and within RoW 24 structures)	Involved (Passing over 1 structure and within RoW 5 structures)	Mostly avoided (12 structures within RoW)
Railway Crossing	Yes (01)	Yes (01)	Yes (01)
Power Line crossing	Yes - 3 locations existing lines	Yes - 3 on the existing line	Yes - 3 on the existing line
Road crossing	Crossing at village roads involved.	Crossing at village roads involved.	Crossing at village roads involved.
Trees / Bamboo	8 locations	6 locations	2-3 location
RoW issues	Very high Anticipated	Moderate anticipated	Few anticipated
Compensation related issues	High	Moderate	Low
Accessibility to tower location	Moderate to access	Moderate to access	Moderate to access

All the alternatives were found to traverse to a large extent through paddy fields, avoiding settlement areas and tree canopy cover to the extent possible. Thus, based on the Environmental & Social considerations **Alternative-2**, being the shortest line, was selected for **220kV 4 CKT Baghjap LILO**, while **Alternative-3** was selected for **220kV D/C TATA Line**, despite having the longest in length. These Alternatives were considered as the most optimal route and recommended for erection of transmission line.

Thus, the finalized line selected for the 220kV 4 CKT Baghjap LILO line and the 220kV D/C TATA Line is depicted in **Figure 27**.

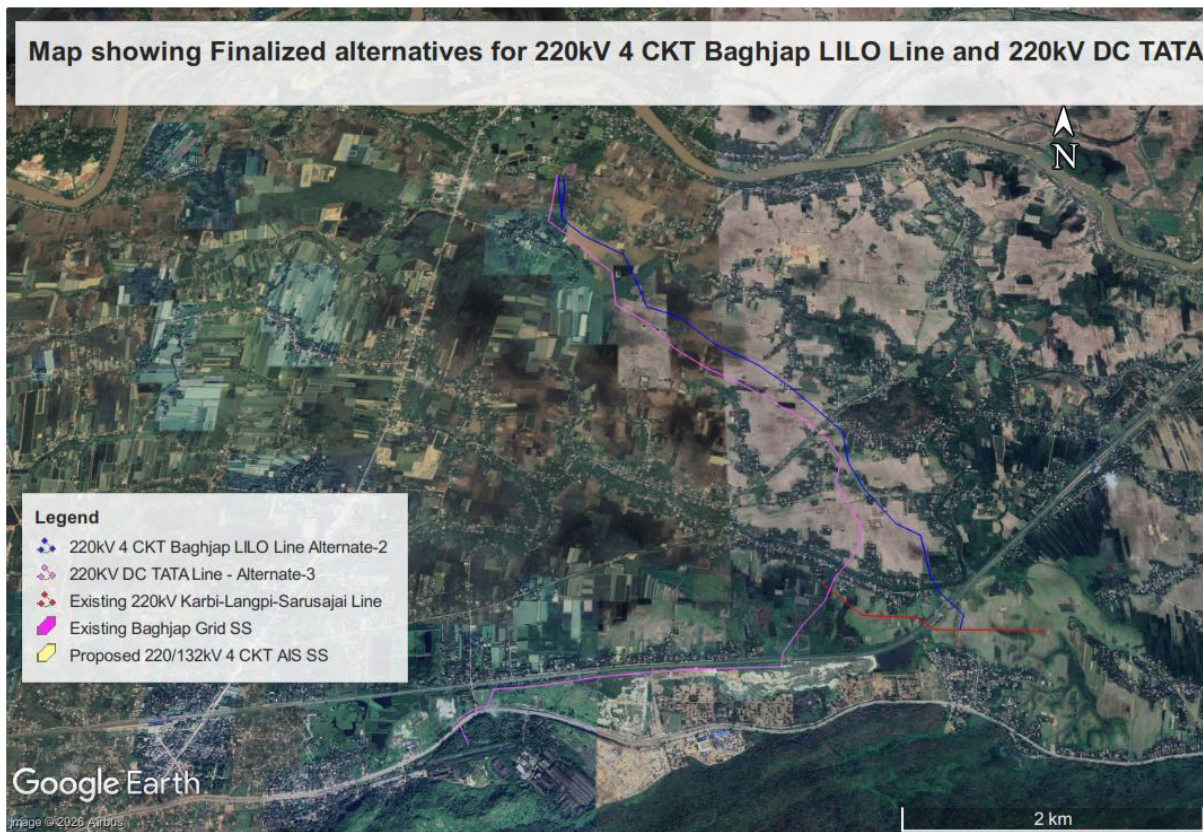


Figure 27: Finalized alternative for 220kV 4 CKT Baghjam LILO and 220kV D/C TATA Lines

5.6 Alternative Technologies

AIS technology has been chosen over Gas-Insulated Substation (GIS) for several compelling reasons:

Construction: AIS substations utilize air as the insulating medium, exposing electrical components to the surrounding environment. Electrical equipment such as circuit breakers and transformers are mounted on steel or concrete structures. GIS substations, on the other hand, use SF₆ gas for insulation within enclosed metal structures, offering superior dielectric properties and protection against external elements. This sealed design makes GIS less susceptible to electromagnetic interference and reduces maintenance frequency compared to AIS.

Footprint & Suitable Environments: GIS substations are compact and ideal for urban areas, industrial facilities, underground installations, and locations with limited space such as tunnels or offshore platforms. In contrast, AIS substations require larger spaces due to the need for air insulation distances, making them more suitable for rural or suburban settings. Regarding environmental adaptability, GIS performs well in harsh conditions like coastal, desert, or high-humidity regions due to its enclosed design. AIS is better suited for moderate climates, as air insulation is vulnerable to humidity, pollution, and temperature fluctuations, necessitating additional maintenance in challenging environments.

Safety & Reliability: GIS substations offer enhanced safety by reducing arc flash risks through their enclosed design and SF₆ insulation. This minimizes direct interaction with high-voltage components and improves overall reliability. AIS substations, being outdoor installations, are more exposed to environmental factors such as lightning and pollution, which can increase maintenance requirements and operational risks.



Scalability: AIS substations are relatively easier to expand due to their open-air layout, allowing for cost-effective addition of bays, transformers, or switchgear with minimal disruption. GIS substations are more complex to scale because of their modular and compact design. Expansion typically involves specialized handling and higher costs. However, manufacturers like CHINT are developing modular GIS solutions to improve scalability while integrating digital monitoring systems for adaptability.

Environmental Impact: AIS substations rely on air for insulation, while electrical components within the substations use SF6 gas a potent greenhouse gas with significant global warming potential. While designed to prevent leaks, emissions can occur due to aging equipment or mishandling. Manufacturers are exploring eco-friendly alternatives such as dry air or other gases to reduce environmental impact. AIS substations have a lower environmental footprint regarding insulation but require larger land areas that may lead to deforestation or habitat disruption in large-scale installations.

In summary, the choice between AIS and GIS substations depends on factors like spatial constraints, environmental conditions, safety priorities, scalability needs, and sustainability goals. Both systems have distinct advantages suited to specific applications and operational requirements.

Technological options for towers

Technological options for towers, construction methodology options considered for the project components are as follows:

- Optimum route length;
- Nos. of angle towers to reduce the tension;
- Nos. of crossing lines, highway, railway, other transmission lines, river crossing;
- Maintain distance from the Air defense / Air traffic;

The following areas, however, are to be avoided as far as possible while selecting the routes of the line:

- Tough inaccessible areas where approach is difficult.
- Towns and villages, leaving sufficient margin for their growth.
- Areas subject to floods and other natural hazards gushing nalas during rainy seasons, tanks, ponds, lakes, etc.
- Wooded areas with high trees or fruit bearing trees involving payment of heavy compensations for cutting of the trees.
- Swamps and shallow lands subject to flood, marshy areas, low lying lands, river beds and earth slip zones, etc. involving risk to stability to foundations.
- High hillocks / hilly areas / sand dunes and areas involving abrupt changes in levels and requiring too many long spans.
- Series of irrigation wells.
- Shooting areas and other protected areas such as army / defense installations/ ammunition depots, areas of archaeological importance, forest areas and wild life sanctuary.

- Areas which involve risk to human life, damage to public & private properties, religious places, cremation grounds, quarry sites and underground mines, gardens, orchards and plantations.
- Areas that may create probable RoW issues.
- Buildings/ Storage areas for explosives or inflammable materials, bulk oil storage tanks, oil or gas pipelines, etc.

Based on the latest design of Tower considering soil condition and seismic hazard, optimization of line length, selection of appropriate tower based on the profile of the line and tower spotting data has been done. Also, number of towers and type of tower has been selected to minimize Zirat damage (surface damage) and minimize the area involved for tower location.

5.7 Conclusion

The selected site for the 220/132kV AIS Substation at Morigaon, along with the identified transmission line alternatives, has been determined as the most suitable choice. This decision effectively addresses regional power transmission needs while ensuring adherence to environmental and social safeguards. Particular attention will be required to manage consultations and Right of Way (RoW) issues with sensitivity. Utilizing existing AEGCL-owned land enhances cost-efficiency, operational feasibility, and minimizes environmental and social impacts, aligning with the region's development objectives and improving energy reliability.

The proposed substation expansion project is situated within a Assam State Legislative Autonomous Council district, an area designated for the protection of Tiwa communities. However, the expansion within the substation will remain confined to the existing land owned by AEGCL, while the transmission lines would traverse through paddy fields of these Indigenous peoples or may possibly infringe upon their customary rights, although tower erection would be of short duration and interaction of workers is anticipated to be minimal with local people/ community. Consultations with the local people, comprising Assamese and mixed tribes in the vicinity of the substation on 8-Jan-2026; documentation and photographs are provided in **Chapter 10**. However, meaningful consultations with Indigenous Peoples (IP) community needs to be carried-out, if found along the transmission line route.

Although a formal multi-site selection study was not undertaken, AEGCL conducted thorough Environmental and Social Due Diligence, which confirmed the following:

- The site/ tower locations are not located within forested or ecologically sensitive areas;
- No resettlement or private land acquisition is required, and the sites are free from any encroachment, although there may be RoW issues while erecting the towers;
- Adequate road access and grid connectivity are available;
- The sites pose low environmental and social risks.

This evaluation ensures that the project aligns with environmental and social compliance standards while addressing the concerns of the local community.

A comparative analysis has been conducted to assess the selected sites against potential hypothetical alternatives, such as private or forest land. While no formal alternatives were officially appraised due



to the availability of land with AEGCL, the matrix provides an evaluative framework to highlight the feasibility and implications of such options.

Criteria	Hypothetical Alternative Site	Selected AEGCL existing Land Site
Land Ownership	Private/Forest	AEGCL existing land
Land Acquisition Requirement	Yes	No
Resettlement Risk	High	None
Environmental Sensitivity	Unknown	Low (screened and verified)
Cost Implication	High (due to acquisition and compensation)	Low (AEGCL existing land)
Grid Connectivity Feasibility	Uncertain	Technically Feasible

The selected sites have been validated as appropriate from environmental, social, and technical perspectives. The substation is designed using Air-Insulated Substation (AIS) technology at the 220/132kV voltage level, aligning with CEA and AEGCL standards. This choice is deemed optimal based on the specific site conditions and project requirements.

Chapter 6: Assessment of Potential Environmental and Social Impacts, Its Significance and Mitigation Measures

6.1 Introduction

This chapter elucidates an in-depth evaluation of the potential environmental and social impacts associated with the construction of the proposed 220/132kV AIS in Morigaon, Assam. The analysis is grounded in a thorough understanding of the current environmental and socio-economic baseline conditions, established through a combination of primary field surveys and secondary data analysis. This approach aligns with relevant statutory and regulatory requirements as well as the Environmental and Social Standards (ESSs) of AIIB.

The assessment examines the physical, biological, and socio-economic components of the proposed subproject area. It evaluates potential risks and impacts across all project phases—pre-construction, construction, and operation. Anticipated impacts are identified, and mitigation measures are proposed in line with the mitigation hierarchy: avoidance, minimization, mitigation, and compensation or offset for residual impacts. A site-specific Environmental and Social Management Plan (ESMP) has been developed and is detailed-out in a separate Chapter of this report. The ESMP outlines mitigation and monitoring measures, along with corresponding institutional responsibilities, to ensure effective implementation and compliance throughout the subproject lifecycle.

The methodology adopted for this assessment includes the following key steps:

- Identification and evaluation of the range and severity of potential environmental and social impacts across all subproject phases;
- Recommendation of viable, cost-effective, and environmentally sound mitigation measures to address the identified impacts; and
- Formulation of a comprehensive site-specific ESMP that integrates the proposed mitigation measures into a structured and actionable implementation framework.

6.2 Assessment of Impact Significance

The assessment of impact significance entails a thorough evaluation of the potential environmental and social impacts associated with the proposed subproject. This evaluation considers various factors, including the type, scale, duration, frequency, extent, and likelihood of the impacts. The primary objective is to prioritize these impacts based on their **severity** and to guide the development of effective mitigation measures.

To determine the **significance** of each identified impact, two key parameters are analyzed: the **magnitude** of the impact and the **sensitivity, vulnerability, or importance** of the affected receptors. Magnitude refers to the intensity or scale of the predicted change affecting specific environmental or social resources or receptors. It is categorized into four levels: **Negligible, Small, Medium, and Large**. **Sensitivity, vulnerability, or importance** reflects the ecological, social, or economic value of

a receptor and its ability to tolerate or absorb change. This parameter is classified as **Low, Medium, or High**.

By combining these parameters, a qualitative determination of impact significance is made for each case. This systematic approach ensures that impacts are assessed comprehensively and appropriately addressed in subsequent project planning and implementation stages. A summary of the evaluation framework is provided in the relevant sections of the report for reference and transparency.

The assessment of impact significance involves evaluating the potential environmental and social impacts of the proposed subproject in terms of their type, scale, duration, frequency, extent, and likelihood. This process is essential to prioritize impacts based on their severity and to inform the design of appropriate mitigation measures. The significance of each identified impact is determined by considering both the **magnitude** of the impact and the **sensitivity/vulnerability/importance** of the affected environmental and social receptors.

Magnitude refers to the intensity or scale of the predicted change affecting a specific environmental or social resource/receptor as a result of the impact and categorized as **Negligible, Small, Medium, or Large**. The **sensitivity/vulnerability/importance** of a receptor indicates its ecological, social, or economic importance and its capacity to absorb or tolerate change and categorized as **Low, Medium, or High**. By combining these two parameters, the **significance of each impact** is determined qualitatively in the relevant sections of the report. The evaluation framework is summarized as follows:

Table 34: Impact Significance Evaluation Matrix

		Sensitivity/Vulnerability/Importance of Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The **impact significance** has been assessed and categorized into four ratings: **Negligible, Minor, Moderate, and Major**. This rating framework is consistently applied to all receptors and associated impacts, as receptor-specific factors have been integrated into the evaluation of both magnitude and sensitivity. Additionally, it is essential to highlight that the process of impact prediction and evaluation incorporates any embedded controls, whether physical or procedural, that are already planned as part of the subproject design, irrespective of the outcomes from the impact assessment process.

Table 35: Context of Impact Significance

Interpretation/ Context of Impact Significance			
Negligible	Minor	Moderate	Major
<p>An impact of negligible significance refers to a scenario where a resource or receptor, including individuals, experiences no discernible effect from a specific activity. Alternatively, the predicted effect may be so minor that it is considered imperceptible or indistinguishable from natural background variations.</p>	<p>An impact of minor significance refers to a situation where a resource or receptor is affected in a noticeable way; however, the magnitude of the impact remains relatively small. Additionally, the resource or receptor in question is characterized by low sensitivity, vulnerability, or importance. In such cases, the extent of the impact is expected to remain well within applicable standards or guidelines, ensuring minimal overall concern.</p>	<p>An impact of moderate significance refers to an effect that falls within applicable standards or guidelines but exists in a range between a minor threshold and a level just below breaching a legal limit. While it is not considered best practice to design activities that merely avoid breaking laws or causing major impacts, the focus for moderate impacts lies in ensuring that the impact has been reduced to a level that is "as low as reasonably practicable" (ALARP). This approach does not necessarily require reducing moderate impacts to minor levels but emphasizes the importance of managing these impacts effectively and efficiently.</p>	<p>Major residual impacts are those where an accepted limit or standard is exceeded, or where significant effects occur on highly valued or sensitive resources and receptors, even after all practical mitigation measures have been applied. The goal of impact assessment is to minimize or eliminate such impacts, ensuring they do not persist in the long term or affect a large area. However, in certain cases, some residual impacts may remain despite efforts to reduce them to As Low As Reasonably Practicable (ALARP). For instance, the visual impact of a facility might still be significant. In such scenarios, it becomes the responsibility of regulators and stakeholders to evaluate these negative aspects in relation to potential positive outcomes, such as economic benefits or employment opportunities, to make an informed decision regarding the subproject.</p>

6.3 Impact Mitigation Strategy

The document outlines the mitigation strategies and environmental and social impact measures associated with the development of a 220/132 kV Gas-Insulated Substation (GIS) at Phuhurabari Village. The mitigation hierarchy adopted by AEGCL emphasizes minimizing impacts at the source through design adjustments, implementing on-site and off-site control measures, repairing or restoring affected resources, and providing compensation where necessary.

The primary focus of mitigation is to avoid or reduce impacts arising from project activities at their source. Residual effects that cannot be fully mitigated are addressed through abatement or compensatory actions to minimize their overall significance.

- **Avoid at Source, Reduce at Source:** Mitigate impacts by designing the subproject to prevent

or minimize them at their origin.

- **Abate on Site:** Incorporate measures within the project design to reduce or eliminate the impact on-site.
- **Abate at Receptor:** If on-site abatement is not feasible, implement control measures at the point where the impact is experienced off-site.
- **Repair or Remedy:** Address unavoidable damage to resources, such as vegetation, cropland, or trees, caused by activities like creating access routes, work camps, or storage areas, through repair, restoration, or reinstatement efforts.
- **Compensate in Kind or Through Other Means:** When other mitigation measures are impractical or insufficient, provide compensation for losses, damages, or disturbances. This could include replanting to replace damaged vegetation, financial compensation for affected crops, or offering community facilities to offset the loss of access, recreational areas, or amenities.

Regarding the physical environment, the substation development involves limited disturbance due to its location within an existing grid substation premises. The assessment evaluates potential impacts on land use, soil quality, air quality, water resources, and ambient noise levels during both construction and operational phases. However, transmission lines (pink and blue) would traverse largely through paddy fields. The evaluation focuses on examining the potential effects on land use, soil integrity, air quality, water resources, and noise levels throughout both the construction and operational stages of the project. Thus, mitigation measures are recommended to ensure compliance with environmental standards and to minimize adverse effects.

6.4 Environmental and Social Impacts and Mitigation Measures

6.4.1 Impact on Physical Environment

The proposed development of the 220/132 kV Air-Insulated Substation (AIS) at Baghjap village is designed to utilize existing AEGCL land, minimizing physical disturbances due to its location within the premises of an established grid substation. Contrarily, the 2 proposed transmission lines (220kV 4 CKT Baghjap LILO and 220kV D/C Tata Line) traverses largely through paddy fields in the villages of Baghjap, Junbil, Bantjai Gaon, Bangfor and Tegheria. A comprehensive evaluation has been conducted to assess the potential environmental impacts during both the construction and operational phases. Key considerations include land use, soil quality, air quality, water resources, and noise levels.

The assessment identifies potential short-term impacts during construction, such as temporary disruptions to soil and air quality, as well as noise generation. Long-term operational impacts are also analyzed to ensure compliance with environmental standards. Mitigation measures are recommended to address these concerns effectively, including dust suppression strategies, proper waste management, noise control measures, and monitoring of air and water quality. These measures aim to minimize adverse effects and ensure sustainable project implementation while adhering to regulatory guidelines.

A. Impacts during Pre-Construction and Construction Phase

A. Land-use and Land Cover	
<p>Context and receptor</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> The proposed 220/132kV AIS substation at Morigaon will be developed within the premises of the existing 132/33 kV Baghjap Grid Substation, which is owned and operated by AEGCL. The entire land parcel required for the proposed expansion is already under AEGCL ownership, and therefore no additional land acquisition is necessary. The selected site is located on relatively flat terrain and is technically suitable for the intended development. The existing premises currently accommodate 6 structures (25 flats), including the Resident Engineer's residence, along with some trees. These structures and trees will be demolished or removed to facilitate the expansion works. A baseline survey and visual inspection confirmed that none of the structures contain asbestos-containing materials (ACM) or other hazardous substances. The subproject will result in a permanent change in land use within approximately 3.34 ha of land; however, this change is confined entirely within an already established utility infrastructure area. As the subproject does not involve conversion of agricultural land, forest land, or private landholdings, and does not result in displacement of external communities, the potential for land-use conflict or socio-economic disruption is minimal. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> The proposed transmission line alignments primarily traverse agricultural land, with scattered residential areas located intermittently along the corridor. No major industrial or intensive anthropogenic activities are observed in the project area apart from agricultural cultivation. Permanent land-use change will occur only at the tower foundation locations: <ul style="list-style-type: none"> 17 towers under the 220/132kV 4 CKT Baghjap LILO Line (approximately 0.096 ha) 33 towers under the 220/132kV D/C Tata Line (approximately 0.188 ha) The total permanent footprint is approximately 0.285 ha. In addition to the tower base area, land falling within the Right of Way (RoW) will be subject to operational restrictions, including prohibition of plantation of tall-growing trees and restriction on construction of permanent structures. However, agricultural activities such as seasonal cropping may continue within the RoW.
<p>Embedded measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> Selection of the site within existing AEGCL-owned premises, eliminating the need for new land acquisition. Integration of the substation design within the current land footprint to avoid outward expansion. Avoidance of surrounding agricultural or undeveloped land for temporary project-related activities such as laydown areas, vehicle movement, or worker accommodation. Use of existing access roads to minimize disturbance to adjoining land parcels. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> Optimization and micro-siting of tower locations to reduce interference with agricultural operations and residential structures. Alignment selection to avoid densely populated areas to the extent technically feasible. Compensation for crop loss and land use as per applicable statutory provisions. Continuation of agricultural activities permitted within the RoW.



A. Land-use and Land Cover	
<p>Impact Significance</p>	<p>Substation Component:</p> <p>The proposed subproject will lead to permanent land-use change within approximately 3.34 ha of land. However, this transformation is restricted entirely within the existing utility-designated premises of AEGCL. There is no acquisition of private land, no conversion of productive agricultural land, and no impact on ecologically sensitive areas. While demolition of staff quarters and removal of trees will alter the internal land configuration, the overall land-use category remains utility infrastructure. Considering that the land is already allocated for substation purposes and that no sensitive or high-value receptors are affected, the magnitude of impact is assessed as Small, and the sensitivity of the receptor is assessed as Low. In accordance with the Impact Significance Assessment Matrix, the resulting overall impact significance is Negligible.</p> <p>Transmission Line Component:</p> <p>The transmission lines will result in permanent land-use change at tower base locations and long-term restrictions within the RoW. Although the permanent footprint is limited to approximately 0.285 ha, the affected land parcels are predominantly agricultural, which represent economic livelihood resources. Furthermore, the RoW restrictions impose partial limitations on future land-use flexibility, particularly with respect to permanent construction and tall vegetation.</p> <p>Considering the permanent nature of tower foundations and operational land-use restrictions within the RoW, the magnitude of impact is assessed as Medium. As the land is primarily agricultural and socially and economically important to local communities, the sensitivity of the receptor is assessed as Medium. As per the Impact Significance Assessment Matrix, the combination of Medium magnitude and Medium sensitivity results in an overall impact significance of Moderate prior to implementation of additional mitigation measures.</p>
<p>Additional mitigation measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Demolition and land reconfiguration activities will be undertaken in compliance with the Construction and Demolition (C&D) Waste Management Plan, which has been prepared in accordance with the applicable national regulations, including the Construction and Demolition Waste Management Rules, 2016, and is provided in Appendix 14 of this ESIA. • A more detailed Construction and Demolition Management Plan (C&D Plan) will be prepared by the EPC Contractor as part of the Contractor’s Environmental and Social Management Plan (CESMP). The CESMP will provide detailed information on: <ul style="list-style-type: none"> • Sequencing and scheduling of demolition activities; • Use of less noisy and low-impact demolition equipment; • Transportation of debris in covered trucks to prevent dust dispersion; • Identification of authorized disposal or recycling sites; • Estimation of demolition debris volumes; • Maintenance of waste logs and documentation; • Applicable national regulatory requirements and compliance mechanisms. • Topsoil generated during site preparation will be preserved and reused within the substation premises for landscaping and greenbelt development. Construction materials will be stored strictly within the designated project area to prevent encroachment into adjacent land parcels. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Compensation for permanent land loss and crop damage will be provided in accordance with applicable regulations. • Temporarily disturbed agricultural land will be reinstated after tower construction. • Movement of heavy machinery will be controlled to minimize soil compaction and



A. Land-use and Land Cover	
	<p>damage to adjoining land.</p> <ul style="list-style-type: none"> Any damage to village roads or access tracks due to transportation of materials and equipment will be restored to pre-construction condition.
Residual Impact Significance	<p>Substation Component: After implementation of the proposed mitigation measures, including compliance with the approved Construction and Demolition Waste Management Plan and preparation of a detailed C&D Management Plan under the CESMP, the permanent land-use change will remain confined within the existing AEGCL premises. No additional land outside the designated boundary will be affected, and the land-use category will continue as utility infrastructure. Therefore, the residual impact on land use and land cover for the substation component is assessed as Negligible.</p> <p>Transmission Line Component: After implementation of compensation measures, reinstatement of temporarily disturbed agricultural land, and restoration of access routes, the permanent land-use change will remain limited to tower foundation areas, while agricultural activities will continue within the RoW. There is a potential for temporary damage to local or village roads during transportation of materials and equipment; however, such impacts will be localized, short-term, and restored to pre-construction condition by the EPC Contractor. Accordingly, the residual impact significance for the transmission line component is assessed as Minor.</p>

B. Soil Environment	
Context and Receptor	<p>Substation Component: Site preparation activities such as clearance, excavation, and ground levelling may disturb natural soil strata and alter soil structure.</p> <ul style="list-style-type: none"> Excavation and grading works may increase the risk of localized soil erosion and degradation. Accidental leaks or spills of oil, lubricants, diesel, and hydraulic fluids from construction machinery may result in soil contamination. Construction and demolition (C&D) waste including concrete debris, scrap metal, wooden pallets, and packaging materials may cause localized soil pollution if not properly managed. Domestic solid waste generated by the construction workforce (food waste, plastics, glass, aluminium cans, paper, etc.) may contaminate soil if inadequately handled.
Embedded measures	<p>Substation Component:</p> <ul style="list-style-type: none"> Excavation restricted strictly to the defined project footprint within AEGCL premises. Designated areas identified for temporary stockpiling, material storage, and vehicular movement to avoid unnecessary soil disturbance. Landscape restoration measures incorporated into project planning. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> Vegetation clearance and excavation confined to marked construction areas. Excavated soil reused for backfilling of foundations. Topsoil preserved separately in designated, covered, bunded areas and reused after construction. Post-construction site clearance of excess materials in consultation with concerned authorities. Spill management kits provided at construction sites. Waste collection bins provided at labour camps. Tower components placed on stable, level ground to minimize disturbance to surrounding crops.



B. Soil Environment	
<p>Impact Significance</p>	<p>Substation Component:</p> <p>Although the substation is located within existing AEGCL premises, construction activities such as excavation, material handling, and waste generation may cause soil disturbance and localized contamination if not properly managed. Considering the moderate scale of excavation and the risk of accidental spills, the magnitude of impact is assessed as Medium. The receptor sensitivity is also considered Medium, given that the baseline soil quality is suitable for both agricultural and engineering use and does not show contamination. As per the Impact Significance Assessment Matrix, a Medium magnitude combined with Medium sensitivity results in an overall impact significance of Moderate.</p> <p>Transmission Line Component:</p> <p>Soil impacts for transmission lines will be localized to tower foundation sites and access routes. Disturbance to fertile topsoil at tower locations within agricultural land increases receptor sensitivity. However, impacts are temporary and largely reversible through backfilling and natural soil recovery. Considering the limited spatial extent and reversible nature of impacts, the magnitude of impact is assessed as Small, while receptor sensitivity is assessed as Medium due to agricultural importance. According to the Impact Significance Assessment Matrix a Small magnitude combined with Medium sensitivity results in an impact significance of Minor.</p>
<p>Additional mitigation measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Excavation and construction activities will follow clearly demarcated work zones to minimize soil disturbance. Excavated soil will be reused for backfilling in accordance with IS 1200 (Part 1): 1992. • Topsoil removed during foundation and levelling work will be stored separately in designated heaps not exceeding two meters in height, covered to prevent erosion, and reused for landscaping or final surface restoration. • Excess excavated material and construction waste will be disposed of at approved locations in accordance with applicable national regulations. Spill containment kits will be maintained onsite, and any contaminated soil from accidental spills will be removed and disposed of as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. • Labour camps will implement waste segregation and disposal through authorized municipal systems. Vehicular movement will be restricted to existing access roads to prevent unnecessary soil compaction. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Excavated soil will be reused for backfilling, and preserved topsoil will be reinstated after completion of foundation works. Compacted agricultural land surrounding tower sites will be restored through ploughing and levelling. • Spill kits will be maintained onsite to address accidental leaks. Excess excavated soil and waste materials will be disposed of at approved locations. Movement of heavy vehicles will be controlled to minimize soil compaction beyond designated areas.
<p>Residual impact significance</p>	<p>Substation Component:</p> <p>After implementation of the mitigation measures, including topsoil preservation, spill prevention, controlled excavation, and regulated waste disposal, soil disturbance will remain localized and reversible. The residual impact magnitude is reduced to Small, and the residual impact significance is therefore Minor.</p> <p>Transmission Line Component:</p> <p>Following reinstatement of backfilled areas, restoration of compacted soil, and implementation of spill management measures, soil conditions at tower sites are expected to recover to near-original levels. Therefore, the residual impact significance for</p>



B. Soil Environment	
	transmission lines is assessed as Negligible to Minor, with no long-term degradation anticipated.

C. Ambient Air Quality	
<p>Context and Receptor</p>	<p>Substation Component:</p> <p>The construction phase of the proposed 220/132kV AIS at Baghjap has the potential to temporarily affect ambient air quality in the surrounding area. The primary sources of air emissions during construction will include:</p> <ul style="list-style-type: none"> • Fugitive dust generated from excavation, grading, drilling, backfilling, and levelling activities; • Dust emissions from vehicular movement within and around the site; • Emissions from operation of construction machinery and diesel generator (DG) sets; • Dust generated during loading, unloading, storage, and transportation of construction materials such as sand, soil, and aggregates. <p>Baseline ambient air quality monitoring conducted as part of the ESIA indicates that concentrations of SO₂, NO₂, and CO are within permissible limits prescribed under the National Ambient Air Quality Standards (NAAQS) as well as WHO guidelines. However, PM₁₀ and PM_{2.5} concentrations, although compliant with NAAQS limits, exceed the more stringent WHO Air Quality Guidelines (2021). Such exceedances are typical in semi-urban Indian settings and are attributable to cumulative background sources such as vehicular emissions, unpaved roads, biomass burning, and other anthropogenic activities.</p> <p>Sensitive Receptors – Substation</p> <p>The following sensitive receptors are located within 500 m of the proposed AIS:</p> <ul style="list-style-type: none"> • Shiv Mandir (inside substation campus – 0 m; will not be demolished); • Pre-Primary School (Anganwadi) – approximately 15 m from site boundary; • Baghjap Playground – approximately 17 m; • Residential houses – located between 10 m and 500 m from the substation boundary. <p>The presence of an Anganwadi and nearby residences indicates moderate social sensitivity, particularly due to potential exposure of children and elderly persons. The site is located outside any Protected Area (PA), Eco-Sensitive Zone (ESZ), or Critical Habitat, indicating low ecological sensitivity.</p> <p>Transmission Line Component:</p> <p>Construction of transmission towers along the alignment will generate temporary air emissions primarily from:</p> <ul style="list-style-type: none"> • Excavation and foundation work at tower sites; • Transportation of tower components and construction materials; • Movement of heavy construction machinery; • Operation of DG sets and stringing equipment; • Fugitive dust generated from unpaved access tracks. <p>Although emissions will be dispersed in an open rural environment, localized increases in dust concentration may occur near tower sites, particularly during dry and windy conditions.</p> <p>Sensitive Receptors – Transmission Lines</p> <p>The following sensitive receptors are located in proximity to the transmission alignment:</p> <ul style="list-style-type: none"> • Paschim Tegheria Anganwadi – 83 m



C. Ambient Air Quality	
	<ul style="list-style-type: none"> • Paschim Tegheria Mosque – 83 m • Paschim Tegheria Anganwadi cum LP School – 85 m • Paschim Tegheria Namghar – 155 m • Paschim Tegheria Shiv Temple – 55 m • Local Temple at Paschim Tegheria – 68 m • Uttar Deusal School – within 500 m • Bangfor Ayushman Arogya Mandir – 50 m and 188 m • Bangor LP School – 55 m and 85 m • Local Temple at Bangfor – 271 m and 482 m • Namghar at Junbeel – 451 m and 548 m <p>The presence of schools, health facilities, and religious structures within 50–155 m of several tower locations increases social sensitivity. No ecological sensitivities are located within the RoW.</p>
Embedded measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Inclusion of air pollution control clauses within contractor tender documents. • Mandatory compliance with CPCB emission norms for DG sets and equipment. • Regular maintenance of vehicles and machinery with valid Pollution Under Control (PUC) certification. • Avoidance of excavation during high wind conditions where practicable. • Water sprinkling on unpaved roads and exposed surfaces during dry periods. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Inclusion of pollution control requirements in contractor agreements. • Mandatory PUC certification for vehicles and equipment. • Water sprinkling on temporary access roads where required. • Controlled stockpiling and avoidance of material storage near sensitive receptors.
Impact Significance	<p>Substation Component:</p> <p>Construction activities are expected to generate temporary increases in particulate matter and minor gaseous emissions, particularly affecting nearby residences and the Anganwadi located approximately 15 m from the site. Given that these emissions are short-term, reversible, and confined to the construction phase, the magnitude of impact is assessed as Medium.</p> <p>Considering the presence of socially sensitive receptors (school and residences) but absence of ecological sensitivities, the receptor sensitivity is assessed as Medium. As per the Impact Significance Assessment Matrix, a Medium magnitude combined with Medium sensitivity results in an overall impact significance of Moderate prior to implementation of additional mitigation measures.</p> <p>Transmission Line Component:</p> <p>Foundation works and material transportation may cause temporary dust and gaseous emissions affecting nearby schools, temples, mosques, and health facilities. However, these impacts are short-term, intermittent, and limited to specific tower construction periods. Given the temporary and localized nature of emissions, the magnitude of impact is assessed as Medium. Considering the presence of socially sensitive receptors within close proximity, receptor sensitivity is assessed as Medium. In accordance with the Impact Significance Assessment Matrix, the overall impact significance for the transmission line component is Moderate prior to additional mitigation measures.</p>



C. Ambient Air Quality

Additional mitigation measures	<p>Substation Component:</p> <ul style="list-style-type: none">• Frequent water sprinkling at active work zones and internal roads.• Covering of loose materials during storage and transportation.• Installation of temporary dust barriers near the Anganwadi during peak construction activities if required.• Speed restriction (<20 km/h) for vehicles within site premises.• Deployment of low-sulphur diesel and low-emission equipment where feasible.• Monitoring of ambient air quality during peak construction.• Operationalization of a Grievance Redress Mechanism (GRM) to address dust-related complaints promptly. <p>Transmission Line Component:</p> <ul style="list-style-type: none">• Water sprinkling at tower sites during excavation and foundation works.• Covering of transported materials and prohibition of overloading.• Vehicle speed restriction near settlements and schools (<20 km/h).• Temporary dust screens near sensitive receptors where required.• Scheduling high-dust activities away from school hours where feasible.• Continuous stakeholder engagement and functional GRM.
Residual impact significance	<p>Substation Component:</p> <p>Following implementation of the above mitigation measures, construction-related dust and emissions will be substantially controlled and limited to short-duration, localized activities. Emissions are expected to remain within NAAQS limits and will not result in long-term air quality deterioration. Therefore, the residual impact significance for the substation component is assessed as Minor.</p> <p>Transmission Line Component:</p> <p>After implementation of mitigation measures, fugitive dust and emissions will be controlled and limited to short-duration construction windows at individual tower sites. Emissions are expected to remain within applicable national standards and will not cause sustained degradation of ambient air quality. Accordingly, the residual impact significance for the transmission line component is assessed as Minor.</p>



D. Acoustic Environment

<p>Context and receptor</p>	<p>Substation Component:</p> <p>Construction of the proposed 220/132kV AIS at Baghjap will involve several noise- and vibration-generating activities, including:</p> <ul style="list-style-type: none"> • Demolition of existing staff quarters within the campus; • Excavation and foundation works using mechanical equipment; • Operation of concrete mixers, cranes, compressors, and compactors; • Use of diesel generator (DG) sets; • Transportation of materials through heavy vehicles; • Loading and unloading of construction materials; • Potential impact noise from steel handling and structural erection activities. <p>In addition to airborne noise, demolition and compaction activities may generate low-level ground-borne vibration, which could cause temporary disturbance to nearby receptors. Baseline ambient noise monitoring undertaken as part of the ESIA confirmed that existing day and night noise levels are within CPCB limits and consistent with WHO environmental noise guidance. The area is therefore characterized by a relatively low-to-moderate baseline noise environment.</p> <p>Sensitive Receptors – Substation</p> <p>Sensitive receptors within 500 m include:</p> <ul style="list-style-type: none"> • Shiv Mandir (0 m, inside campus) • Pre-Primary School (Anganwadi) – 15 m • Baghjap Playground – 17 m • Residential dwellings – 10 m to 500 m <p>The proximity of the Anganwadi (15 m) increases social sensitivity, particularly during daytime teaching hours. Although ecological sensitivity is low (outside PA/ESZ/Critical Habitat), social sensitivity is moderate due to the presence of children and residential receptors.</p> <p>Transmission Line Component:</p> <p>Noise generation during transmission line construction will primarily occur at tower locations and during stringing operations. Key sources include:</p> <ul style="list-style-type: none"> • Excavation and foundation works (concrete mixers, DG sets); • Rock breaking or drilling (where required); • Vehicular movement for transport of tower components; • Crane operation during tower erection; • Continuous tractor movement during stringing; • Communication noise (whistles, verbal instructions) during erection and stringing; • Temporary increase in traffic noise along access roads. <p>Noise-generating activities at each tower site will generally last 2–3 days, making impacts localized and intermittent.</p> <p>Sensitive Receptors – Transmission Lines</p> <p>Sensitive receptors within proximity of the alignment include:</p> <ul style="list-style-type: none"> • Paschim Tegheria Anganwadi – 83 m • Paschim Tegheria Mosque – 83 m • Paschim Tegheria Anganwadi cum LP School – 85 m • Paschim Tegheria Namghar – 155 m • Paschim Tegheria Shiv Temple – 55 m • Local Temple at Paschim Tegheria – 68 m • Uttar Deusal School – within 500 m • Bangfor Ayushman Arogya Mandir – 50 m and 188 m • Bangor LP School – 55 m and 85 m
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D. Acoustic Environment	
	<ul style="list-style-type: none"> Local Temple at Bangfor – 271 m and 482 m <p>Namghar at Junbeel – 451 m and 548 m No ecological sensitivities exist within the RoW; however, the presence of schools and health facilities within 50–85 m indicates elevated social sensitivity at specific tower locations.</p>
Embedded measures	<p>Substation and Transmission Line</p> <ul style="list-style-type: none"> Restriction of construction activities to daytime hours (6:00 AM to 6:00 PM). Avoidance of unnecessary horn use.
Impact Significance	<p>Substation Component:</p> <p>Demolition, excavation, and equipment operation are expected to generate intermittent but noticeable increases in noise levels at nearby residences and the Anganwadi. Temporary vibration may also be perceptible during demolition and compaction activities. However, impacts will be limited to the construction phase and confined within defined working hours. Given the intensity of machinery involved and proximity of sensitive receptors, the magnitude of impact is assessed as Medium.</p> <p>Considering the presence of socially sensitive receptors, particularly the Anganwadi and residential dwellings, the receptor sensitivity is assessed as Medium. As per the Impact Significance Assessment Matrix, the overall construction-phase impact significance for the substation is Moderate.</p> <p>Transmission Line Component:</p> <p>Noise impacts will be temporary, site-specific, and limited to short construction windows per tower location. However, given that some sensitive receptors (schools and health facility) are located as close as 50–85 m from the alignment, noise may be perceptible during foundation and erection activities.</p> <p>The magnitude of impact is assessed as Medium due to equipment operation and short-duration high-noise activities. Receptor sensitivity is assessed as Medium, considering the proximity of schools, health facilities, and religious structures. As per the Impact Significance Assessment Matrix, the overall construction-phase impact significance for the transmission lines is Moderate.</p>
Additional mitigation measures	<p>Substation Component:</p> <ul style="list-style-type: none"> All construction equipment and DG sets shall comply with CPCB noise emission standards, and DG sets shall be fitted with acoustic enclosures. High-noise activities such as demolition and compaction shall be restricted to daytime hours (6:00 AM–6:00 PM) and, where feasible, scheduled outside Anganwadi operating hours. Portable noise barriers shall be installed near the Anganwadi (15 m from site boundary) during demolition or other peak noise activities. Preventive maintenance of machinery shall be carried out regularly to ensure proper functioning of silencers and mufflers. Workers exposed to elevated noise levels shall be provided with hearing protection, and a functional GRM shall be maintained to address community noise complaints. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> Construction activities at tower locations shall be limited to daytime hours, and high-noise activities shall be scheduled, where feasible, outside school or prayer times at nearby institutions. DG sets and construction equipment used during foundation and erection activities shall comply with CPCB noise standards and be fitted with acoustic enclosures or silencers. Vehicular movement near settlements, schools, and health facilities shall be controlled, with speed restrictions imposed to minimize traffic noise. Simultaneous operation of multiple high-noise equipment at tower locations near



D. Acoustic Environment

	<p>sensitive receptors shall be avoided to reduce cumulative noise levels.</p> <ul style="list-style-type: none"> Workers involved in tower erection and stringing activities shall be provided with hearing protection, and a GRM shall be maintained to address noise-related concerns from nearby communities.
<p>Residual impact significance</p>	<p>Substation Component:</p> <p>After implementation of engineering and administrative controls, construction noise will remain temporary, intermittent, and limited to daytime hours. Vibration impacts will be minor and non-structural in nature. Noise levels at the nearest receptors are expected to remain within applicable standards. Accordingly, the residual impact significance for the substation component is assessed as Minor.</p> <p>Transmission Line Component:</p> <p>With mitigation measures in place, noise impacts will remain short-term, localized, and intermittent. No operational-phase noise impacts are anticipated from the transmission line.</p> <p>Accordingly, the residual impact significance for the transmission line component is assessed as Minor.</p>

E. Water Resources and Quality

<p>Context and receptor</p>	<p>Substation Component:</p> <p>The proposed 220/132kV AIS substation is located in Morigaon District, Assam. As per the Central Ground Water Board (CGWB) Report on Aquifer Mapping and Management Plan of Morigaon District, Assam (2021–2022), the district falls under the “SAFE” category, with a stage of groundwater extraction of 29.87%. This indicates that groundwater resources are not under significant stress and that sustainable abstraction is currently being maintained.</p> <p>Local communities rely primarily on groundwater accessed through tube wells and borewells for domestic and drinking purposes, while irrigation canals are used for agricultural activities. The River Kopili flows approximately 900–1500 m north of the proposed substation site. Although the project does not directly interact with the river, indirect impacts could arise from poor site drainage management or accidental contamination.</p> <p>Construction-phase water-related impact pathways include:</p> <ul style="list-style-type: none"> Water abstraction for curing, dust suppression, and domestic use; Accidental spillage of fuels, lubricants, cement slurry, or chemicals; Sediment-laden runoff from excavation areas; Domestic wastewater generation from labour camps; Improper disposal of excavated materials near drainage paths; Leakage from storage areas for hazardous materials. <p>Baseline water quality monitoring (Appendix 9) confirms that groundwater, drinking water, and surface water parameters are within permissible regulatory limits. No heavy metal contamination or microbiological exceedances were detected.</p> <p>Transmission Line Component:</p> <p>Construction of transmission tower foundations requires approximately 50 m³ of water per tower, primarily for concrete mixing and curing. Water will be sourced locally through authorized tankers.</p> <p>The transmission alignment:</p> <ul style="list-style-type: none"> Does not cross major rivers; Crosses small streams and nallahs; Traverses low-lying areas prone to seasonal inundation; Intersects natural drainage channels. <p>The River Kopili is located 2 km away from the transmission line alignment and increasing as length</p>
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	<p>increases.</p> <p>Potential impact pathways include:</p> <ul style="list-style-type: none"> • Temporary abstraction of water for foundation works; • Sediment runoff into small drains during excavation; • Accidental discharge of cement slurry; • Oil and fuel spills during machinery operation; • Temporary obstruction of natural drainage during monsoon; • Improper disposal of excess excavated soil near nallahs. <p>Tower erection and stringing activities do not require significant water consumption.</p> <p>Baseline water quality data indicate that groundwater and surface water quality along the alignment are within permissible limits.</p>
<p>Embedded measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Use of existing borewells within the substation premises to avoid additional abstraction from community sources. • No direct discharge of untreated wastewater into canals or natural water bodies. • Installation of septic tanks and soak pits for labour camp wastewater. • Storage of fuels and chemicals on impervious platforms with secondary containment. • Prohibition of dumping excavated material into irrigation canals or drainage channels. • Avoidance of storage of construction materials near water bodies. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Avoid storage of materials within 50 m of water bodies wherever feasible. • Prohibit dumping of excavated soil into nallahs or natural drainage channels. • Use approved water sources for foundation activities. • Provide septic tanks and soak pits at labour camps. • Maintain natural drainage patterns and avoid obstruction.
<p>Impact Significance</p>	<p>Substation Component:</p> <p>Given that the district falls under a groundwater “SAFE” category with only 29.87% stage of extraction, and water use during construction will rely on existing borewells within the premises, the magnitude of impact on water resources is assessed as Small.</p> <p>Although local communities depend on groundwater, the stable aquifer condition and the absence of direct interaction with major water bodies reduce the risk of significant depletion or contamination. Therefore, receptor sensitivity is assessed as Medium, reflecting community reliance on groundwater but stable resource status. As per the Impact Significance Assessment Matrix, the overall impact significance is assessed as Minor.</p> <p>Transmission Line Component:</p> <p>Water abstraction for foundation works is temporary and limited in scale. Each tower location is active for a short duration, and no major river crossings occur. Therefore, the magnitude of impact is assessed as Small. Given the presence of small streams and seasonal drains, receptor sensitivity is assessed as Low to Medium, depending on proximity to drainage features. As per the Impact Significance Assessment Matrix, the overall impact significance is assessed as Minor.</p>
<p>Additional mitigation measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Maintain records of construction-phase water consumption. • Sensitize workers on water conservation and conduct regular leak inspections. • Provide temporary stormwater drainage and sedimentation pits around excavation areas. • Reuse treated water for dust suppression and curing wherever feasible. • Store fuels, oils, and chemicals in covered bunded enclosures with secondary containment capacity of at least 110% of the largest container stored. • Maintain spill kits at storage and refuelling locations and dispose of contaminated soil as per Hazardous and Other Wastes Rules, 2016.



	<ul style="list-style-type: none"> Restrict vehicle movement near irrigation canals and ensure natural drainage remains unobstructed. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> Avoid foundation works near drainage channels during peak monsoon, where feasible. Install temporary bunding or silt fencing around foundation pits near watercourses. Prevent discharge of concrete wash water into natural drains. Conduct refuelling at least 50 m away from water bodies. Avoid storage of hazardous materials at tower sites unless necessary; if stored, provide secondary containment. Maintain spill kits at active tower construction sites. Restore original ground contours and drainage after completion of foundation works.
Residual impact significance	<p>Substation Component:</p> <p>After implementation of mitigation measures, impacts on groundwater and surface water are expected to remain localized, controlled, and reversible. No long-term depletion or deterioration of water quality is anticipated. Accordingly, the residual impact significance for the substation component is assessed as Minor.</p> <p>Transmission Line Component:</p> <p>After implementation of mitigation measures, impacts on water resources and water quality will remain short-term, localized, and reversible. No operational-phase impacts on groundwater or surface water are anticipated.</p> <p>Accordingly, the residual impact significance for the transmission line component is assessed as Negligible to Minor.</p>

F. Drainage	
Context and receptor	<p>Substation Component:</p> <ul style="list-style-type: none"> A small stream is located approximately 600 m from the proposed substation site. The Kopili River lies approximately 800–1000 m from the nearest point of the site. An irrigation canal is located approximately 100 m from the site boundary. The area experiences significant surface runoff during monsoon seasons. The site terrain may generate localized runoff during excavation and site grading. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> The transmission line alignment follows natural terrain. It does not cross major rivers. It crosses small streams and seasonal nallahs. The area includes low-lying land that may experience monsoon inundation. Natural drainage systems are present along the corridor.
Embedded measures	<p>Substation Component:</p> <ul style="list-style-type: none"> Proposed stormwater drainage system to collect and channel runoff. Site grading and contouring to prevent stagnation. Design measures to direct runoff away from critical infrastructure. <p>Transmission Lines</p> <ul style="list-style-type: none"> Construction activities confined to designated footprint. Natural drainage channels will not be blocked or altered. Monitoring of drainage conditions during construction.
Impact Significance	<p>Substation Component:</p> <p>The irrigation canal located approximately 100 m from the site supports agricultural activities and is considered an important receptor. Construction-phase soil exposure, particularly during monsoon, may result in localized erosion and siltation; however, major water bodies such as the Kopili River are located 600–1000 m away, reducing the likelihood of direct impact. Accordingly, the magnitude of impact is assessed as Small, and the receptor sensitivity as Medium. As per the</p>



	<p>Impact Significance Assessment Matrix, the overall impact significance is Minor.</p> <p>Transmission Line Component: The transmission line does not involve major river crossings, and tower foundations occupy limited areas without permanently altering natural drainage paths. Impacts, if any, will be localized and short-term during construction. Therefore, the magnitude of impact is assessed as Small, and receptor sensitivity as Low. As per the Impact Significance Assessment Matrix, the overall impact significance is Negligible.</p>
Additional mitigation measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Develop and implement a detailed stormwater management plan prior to commencement of construction. • Construct temporary diversion bunds around excavation zones during monsoon. • Install silt traps and sedimentation pits before discharge of site runoff into natural drains. • Avoid stockpiling of excavated material near drainage paths. • Maintain free flow in nearby irrigation canal and ensure no blockage from construction debris. • Stabilize exposed slopes through compaction and temporary vegetation cover where feasible. • Conduct routine inspection of drainage structures during monsoon season. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Avoid excavation near nallahs during peak monsoon wherever feasible. • Provide temporary bunding or silt fencing at tower locations near drainage channels. • Ensure excavated soil is stored away from natural drains. • Restore original ground levels and contours after backfilling. • Inspect tower locations in low-lying areas during monsoon to prevent localized blockage.
Residual impact significance	<p>Substation Component: With proper stormwater management, sediment control, and maintenance of natural drainage paths, impacts will remain temporary and localized to the construction phase. No long-term alteration of drainage pattern is anticipated. Residual Impact Significance: Minor.</p> <p>Transmission Line Component: After implementation of mitigation measures, drainage patterns will remain unaltered, and any temporary obstruction during construction will be restored. No long-term drainage disruption is anticipated. Residual Impact Significance: Negligible</p>

B. Impacts during Operation Phase

A. Soil Environment	
Context and receptor	<p>Substation Component: During the operation phase, soil-related risks are primarily associated with waste generation and equipment maintenance activities within the substation premises. Key potential sources of soil contamination include:</p> <ul style="list-style-type: none"> • Municipal solid waste generated by staff (food waste, packaging, sanitary waste); • Used transformer oil and lubricants from maintenance activities; • Oil-soaked cotton rags, filters, and absorbent materials; • Scrap metal, insulated copper/aluminum conductors, and replaced bus bars; • Waste components from air-insulated switchgear (AIS), if any; • Accidental leakage from oil-filled equipment. <p>Although waste generation during operation is limited and localized within the fenced substation area, improper handling of hazardous materials could potentially lead to localized soil contamination.</p> <p>The substation operates within a controlled and paved environment, reducing the likelihood of widespread soil exposure. No agricultural land or ecologically sensitive areas exist within the</p>



	<p>operational footprint.</p> <p>Transmission Line Component:</p> <p>During the operational phase, transmission lines require limited maintenance activities. Potential soil-related impacts may arise from:</p> <ul style="list-style-type: none"> • Minor spillage of aluminium oxide paint during tower repainting; • Localized soil disturbance during periodic tower maintenance; • Temporary placement of maintenance equipment near tower bases. <p>Painting activities are infrequent and limited to small surface areas. No hazardous liquid storage is maintained at tower sites during normal operation.</p> <p>The transmission alignment largely traverses agricultural and rural land, where soil sensitivity may vary; however, operational activities are infrequent and temporary.</p>
<p>Embedded measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Spent transformer oil and lubricants are collected and stored in leak-proof containers. • Disposal of hazardous waste is carried out through authorized vendors. • Routine leak detection and preventive maintenance are conducted to prevent oil seepage. <p>Transmission Line</p> <ul style="list-style-type: none"> • Preventive maintenance plan implemented for transmission line infrastructure. • No routine storage of hazardous materials at tower sites.
<p>Impact Significance</p>	<p>Substation Component:</p> <p>Operational waste generation at the substation is minimal and confined within a controlled and paved environment. Preventive maintenance practices, leak-proof storage systems, and proper handling of hazardous materials significantly reduce the likelihood of soil contamination. Therefore, the magnitude of impact is assessed as Small, and given the absence of agricultural or ecologically sensitive land within the premises, the receptor sensitivity is considered Low. As per the Impact Significance Assessment Matrix, the overall operational phase impact on soil is assessed as Negligible.</p> <p>Transmission Line Component:</p> <p>Operational activities along the transmission line are limited to periodic inspection and maintenance. Painting works are infrequent and localized, and no continuous source of soil contamination exists. Accordingly, the magnitude of impact is assessed as Small. Although the alignment passes through agricultural areas, disturbance during operation is minimal, and receptor sensitivity is considered Low to Medium. As per the approved Impact Significance Assessment Matrix, the overall operational phase impact on soil is assessed as Negligible.</p>
<p>Additional mitigation measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Store hazardous waste (used oil, rags, filters) on impervious flooring within covered bunded enclosures with secondary containment (minimum 110% of largest container). • Maintain disposal records and manifests in compliance with the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. • Dispose of e-waste and used batteries through authorized recyclers as per E-Waste Management Rules, 2022 and Battery Waste Management Rules, 2022. • Provide spill kits at transformer and maintenance areas and ensure immediate remediation of minor spills. • Train operational staff on waste segregation and spill response procedures. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • During repainting, protective sheets shall be spread beneath tower structures to prevent paint



	<p>spillage onto soil.</p> <ul style="list-style-type: none"> • Use controlled painting techniques to minimize overspray. • Avoid painting during high wind conditions. • Ensure no storage of paints or chemicals at tower sites beyond the duration of maintenance.
Residual impact significance	<p>Substation Component:</p> <p>With regulatory-compliant waste handling, secondary containment, and routine maintenance, the risk of soil contamination during operation will remain minimal and localized. Residual Impact Significance: Negligible</p> <p>Transmission Line Component:</p> <p>Given the infrequent and localized nature of operational maintenance, and implementation of simple preventive measures, no significant long-term soil impacts are anticipated. Residual Impact Significance: Negligible</p>

B. Acoustic Environment

Context and receptor	<p>Substation Component:</p> <p>During the operational phase, the 220/132 kV AIS substation is expected to generate limited noise. Continuous operational processes such as electricity transmission through transformers and switchgear may produce low-level transformer hum; however, these are designed to operate within prescribed CPCB noise standards. Intermittent noise may occur during maintenance activities, vehicle movement, or equipment servicing.</p> <p>Sensitive receptors within 500 m of the substation include residential houses, temples, schools, and other socially significant structures. The site is not located within or adjacent to any Protected Area (PA), Eco-Sensitive Zone (ESZ), or Critical Habitat, indicating low ecological sensitivity. However, due to nearby residential and institutional receptors, social sensitivity is considered moderate.</p> <p>Transmission Line Component:</p> <p>During operation, potential noise sources along the transmission line include:</p> <ul style="list-style-type: none"> • Corona discharge from energized conductors; • Occasional maintenance and inspection activities. <p>Corona discharge may produce a faint hissing or low-frequency hum, particularly during high humidity or rainy conditions. Conductors are designed and constructed to minimize corona effects, and such noise is generally limited and unlikely to exceed ambient background levels.</p> <p>Habitations are located within 500 m of certain sections of the alignment. No ecological sensitivities are present within the RoW.</p>
Embedded measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Maintenance activities scheduled during daytime hours (7:00 AM–6:00 PM). • Substation enclosed within boundary walls. • Landscaping and vegetation along boundary to act as natural sound buffer. • Equipment selected to comply with applicable noise standards. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Selection of conductors designed to minimize corona effects. • Compliance with design specifications to control audible corona noise.



<p>Impact Significance</p>	<p>Substation Component: Operational noise from transformers is continuous but low in intensity and remains within permissible standards. Maintenance-related noise is infrequent and short-term. Although sensitive receptors are present within 500 m, the enclosed design, boundary walls, and compliance with noise norms ensure limited off-site exposure. Accordingly, the magnitude of impact is assessed as Small, and receptor sensitivity as Low. As per the Impact Significance Assessment Matrix, the overall operational phase impact is assessed as Negligible.</p> <p>Transmission Line Component: Corona-related noise from energized conductors is low in intensity and typically noticeable only under specific weather conditions such as high humidity or rainfall. Maintenance noise is infrequent and short-term. Although habitations are present within 500 m of certain sections of the alignment, the overall noise levels are expected to remain comparable to background conditions. Therefore, the magnitude of impact is assessed as Small, and receptor sensitivity as Medium. As per the Impact Significance Assessment Matrix, the overall operational phase impact is assessed as Minor.</p>
<p>Additional mitigation measures</p>	<p>Substation and Transmission Line No additional mitigation measures are considered necessary beyond embedded controls, as operational noise is expected to remain within regulatory limits.</p>
<p>Residual impact significance</p>	<p>Substation and Transmission Line Operational noise impacts are expected to remain within acceptable background levels and will not cause significant disturbance to nearby receptors. Residual Impact Significance: Minor</p>

C. Visual Impacts

<p>Context and receptor</p>	<p>Substation Component: The proposed substation is located within the existing AEGCL premises at Baghjap village over approximately 3.34 ha. The project involves demolition of old staff quarters and removal of trees within the designated area. The development will result in permanent infrastructure such as transformers, gantries, switchyard equipment, control room buildings, and boundary walls. Visual receptors include nearby residential dwellings and community structures located within the area of influence. Since the substation is situated within an already designated utility compound, the surrounding landscape character is partially industrial/utility in nature.</p> <p>Transmission Line Component: The transmission lines (5.47 km for 220/132kV 4 CKT Baghjap LILO and 8.31 km for 220/132kV D/C TATA Line, comprising 17 and 33 towers respectively) introduce vertical structures across agricultural land, vegetation areas, residential zones, and range land. Approximately 0.285 ha of permanent land footprint is associated with tower foundations. Transmission towers are visually prominent due to their height and structural form. Visual receptors include: Residents located within the project footprint and area of influence; Farmers working in agricultural fields; Temporary receptors such as passing motorists; However, the study area already contains existing transmission infrastructure, and the new lines are expected to integrate into the existing utility landscape.</p>
<p>Embedded measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • The substation is developed within an existing utility premises, maintaining land-use continuity. • Removal of dilapidated staff quarters improves overall site appearance. • Landscaping with native tree species and ornamental shrubs along the boundary wall to provide visual screening.



	<ul style="list-style-type: none"> Maintenance of vegetation buffer around the perimeter. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> Alignment designed to avoid dense settlements and forest areas. Integration of new towers within an already modified utility landscape.
Impact Significance	<p>Substation Component: The visual change associated with the substation remains confined within an existing utility footprint and does not introduce a new land-use type into the landscape. Landscaping measures further soften the visual profile over time. Accordingly, the magnitude of visual impact is assessed as Small, and receptor sensitivity as Low, given the pre-existing utility character of the site. As per the approved Impact Significance Assessment Matrix, the overall operational visual impact is assessed as Negligible.</p> <p>Transmission Line Component: Visual perception is inherently subjective and varies among observers. Although transmission towers are visually prominent, the presence of existing transmission lines in the study area reduces the incremental change to the landscape. Community consultations indicate that the project is not perceived as a significant new visual intrusion. Accordingly, the magnitude of impact is assessed as Small, and receptor sensitivity as Low. As per the approved Impact Significance Assessment Matrix, the overall operational visual impact is assessed as Minor.</p>
Additional mitigation measures	<p>Substation Component:</p> <ul style="list-style-type: none"> Develop an aesthetically integrated entrance gate and signage consistent with the rural setting. Incorporate vertical greenery (creepers/green mesh) along boundary walls. Select native plant species in consultation with local authorities. Ensure regular maintenance of greenbelt and boundary landscaping. Install shielded, downward-facing lighting to minimize glare and night-time visual disturbance. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> Ensure uniform tower design and alignment consistency to reduce visual clutter. Maintain vegetation around tower bases where safety permits. Avoid installation of excessive night-time lighting except where required for aviation safety.
Residual impact significance	<p>Substation and Transmission Line</p> <p>No significant change in impact significance is anticipated following implementation of mitigation measures</p>

D. Electromagnetic Fields (EMF)

Context and receptor	<p>Substation Component: During the operational phase, the 220/132 kV AIS substation will generate electromagnetic fields (EMF) due to energized equipment such as transformers, bus bars, switchgear, and incoming/outgoing transmission lines. EMF levels are highest within the switchyard and near energized conductors, and decrease rapidly with distance. Sensitive receptors located within 500 m include residential dwellings, temples, schools, and other community structures. However, the substation is enclosed within a secured boundary wall, restricting public access to areas of higher EMF exposure. The site is not located within any Protected Area (PA), Eco-Sensitive Zone (ESZ), or Critical Habitat, indicating low ecological sensitivity.</p>
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	<p>Transmission Line Component:</p> <p>During operation, the energized 220 kV transmission lines will generate electric and magnetic fields along the Right of Way (RoW). EMF levels are highest directly beneath the conductors and decrease rapidly with horizontal distance.</p> <p>Sensitive receptors include residential dwellings and agricultural fields located within proximity (up to 500 m) of the alignment. However, EMF exposure decreases substantially beyond the RoW boundary. No ecological sensitivities are present within the corridor.</p>
Embedded measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Substation design complies with applicable technical standards and grid safety codes. • Equipment layout ensures adequate spacing between energized components. • Public access is restricted through boundary walls and controlled entry. • EMF exposure at the boundary is maintained within internationally accepted limits (ICNIRP guidelines). <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Tower height and conductor clearance designed as per CEA and grid standards. • RoW maintained in accordance with safety clearances. • Conductor configuration optimized to minimize EMF intensity.
Impact Significance	<p>Substation Component:</p> <p>EMF exposure levels from energized substation equipment decrease significantly with distance and are expected to remain well within internationally accepted public exposure limits (ICNIRP) at the boundary. Although residential receptors are located within 500 m, EMF intensity at such distances is negligible due to rapid attenuation. Accordingly, the magnitude of impact is assessed as Small, and receptor sensitivity as Low. As per the Impact Significance Assessment Matrix, the overall operational phase impact is assessed as Negligible.</p> <p>Transmission Line Component:</p> <p>EMF levels directly beneath the conductors may be measurable but remain within internationally accepted exposure limits. Field strength declines rapidly beyond the Right of Way (RoW) and approaches background levels. Although some habitations are located near sections of the alignment, compliance with design standards and attenuation with distance results in Small magnitude and Low receptor sensitivity. As per the Impact Significance Assessment Matrix, the overall operational phase impact is assessed as Negligible.</p>
Additional mitigation measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Ensure continued compliance with ICNIRP EMF exposure guidelines during operation. • Maintain proper earthing and grounding systems. • Restrict public access to high-voltage areas. • Conduct EMF measurements at boundary, if required, upon commissioning to demonstrate compliance. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Maintain statutory ground clearance and conductor spacing. • Ensure compliance with ICNIRP public exposure limits. • Restrict construction of permanent structures directly beneath conductors within RoW. • Conduct EMF measurement post-commissioning if required.
Residual impact significance	<p>Substation and Transmission Line</p> <p>With compliance to international standards and restricted access, no significant health or environmental impacts are anticipated from EMF exposure. Residual Impact Significance: Negligible</p>

6.4.2 Impacts on Ecological and Biological Environment

The construction and operation of the proposed 220/132kVAir-Insulated Substation will require the

use of approximately 3.34 hectares of land within the existing premises of the 132/33 kV Baghjap Grid Substation. Although the site is located within a developed area adjacent to NH-715A in Baghjap Village, the subproject will involve clearance of vegetation and removal of a trees. This chapter assesses the potential impacts on the local biological environment including flora, fauna, and ecological features and outlines measures to minimize or mitigate any adverse effects.

A. Impacts during Pre-Construction and Construction Phase

Impacts due to Vegetation Clearance	
Context and Receptor	<p>Substation Component:</p> <p>Vegetation clearance will occur during the initial phase of site preparation for the proposed 220/132 kV GIS substation and associated infrastructure such as internal roads and equipment foundations. The project involves the removal of approx. 79 trees representing different species (predominantly fruit-bearing) within the project footprint. Approx. 24 trees from 9 species fall under Schedule-I of the Assam Trees Outside Forest (Sustainable Management) Rules, 2022, and are exempted from prior felling permission. For the remaining trees, prior approval from the Forest Department will be required. For this purpose, AEGCL is required to approach the local forest department and complete the necessary formalities.</p> <p>The vegetation present, although planted and located within a previously developed substation campus, supports functional ecological roles, providing nesting and roosting sites for resident bird species and offering canopy, fruit, and nectar sources for pollinators, frugivores, and arboreal fauna.</p> <p>Although the area is not classified as a Protected Area, Eco-Sensitive Zone, or Critical Habitat, the vegetation holds local ecological value, especially for common avifauna and insect pollinators.</p> <p>Transmission Line Component:</p> <p>The transmission line corridors commonly host coconut trees, bamboo, fruit-bearing trees, other natural vegetation in scattered clusters and crops such as paddy, pulses, oilseeds and vegetables. Vegetation clearance marks the initial phase in developing access or internal roads, as well as excavation for installing tower footings, transmission tower foundations, and associated facilities. Such clearance activities may also impact select areas during the line stringing process.</p> <p>Clearing vegetation from agricultural land, trees, or built-up areas diminishes nesting habitats for birds, reduces shelter from predators, and limits foraging resources, shade, perching areas, and breeding sites. Additionally, vegetation loss negatively impacts soil quality, disrupts the survival of neighboring plant species and burrowing fauna, and reduces food sources for herbivores in the vicinity. The exact requirement of vegetation clearance will be confirmed after the check survey, and any necessary tree enumeration will be undertaken by the EPC contractor in coordination with the Forest Department and obtain all necessary approvals prior to erection works.</p>
Embedded Measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Tree Cutting will be limited to areas strictly necessary for construction and safety clearances. • Avoid felling endangered and near-threatened species during peak breeding or flowering seasons. • Prior permissions for tree felling will be obtained from the Forest Department. • Landscaping is integrated into the project design to restore green cover and visual appeal.



Impacts due to Vegetation Clearance	
	<ul style="list-style-type: none"> • Topsoil from cleared areas will be preserved and reused for landscaping and plantation activities. • Compensatory afforestation will be undertaken as mandated by regulations under the supervision of the Forest Department. • Native nectar- and fruit-bearing species will be planted to restore habitat value for pollinators and birds. • Engage with the Forest Department or local NGOs to ensure survival of planted saplings and monitor growth for at least three years. • Creation of green buffer zones around the substation to serve as a refuge for displaced fauna and enhance biodiversity. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • In tower foundation locations and transmission line corridors, no mature fruiting tree or any other tree that is important for community will be felled. The tower locations will be adjusted to avoid mature trees that are important for the community. In case it is absolutely necessary, chopping and trimming of the branches will be undertaken. • Adequate ground clearance is ensured between the lowest cable and any grounded object, such as trees.
Impact Significance	<p>Substation Component:</p> <ul style="list-style-type: none"> ▪ Magnitude of Impact: Medium due to tree removal affecting habitat, food sources, and shelter for birds, pollinators, and small terrestrial fauna. ▪ Receptor Sensitivity: Medium due to the presence of common avifauna, small terrestrial species, reptiles and amphibians. ▪ Overall Impact Significance: Moderate. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> ▪ The construction of towers and the stringing of transmission lines may result in the chopping, trimming, or clearing of tree species. This could occur during the stringing process or might have already taken place. ▪ Additionally, vegetation clearance may lead to the removal of some shrub and herb species, causing habitat disturbances for local fauna. Vegetation removal in agricultural areas, tree-covered regions, and built-up habitats is expected to occur on a scale that could affect the habitat of various species, including birds, mammals, and some reptiles that rely on these resources. ▪ However, the vegetation being cleared is relatively small in scale. While construction activities may disrupt habitat connectivity for the species utilizing these areas, there remains ample suitable habitat within the region. Any potential impacts are unlikely to compromise habitat viability or functionality significantly. Impacts in agricultural areas are mainly associated with patches of land that provide critical connections to water bodies and vegetation clusters. ▪ Agriculture, trees, and built-up vegetation are widespread in this region, which reduces the likelihood of any long-term disruption to habitat viability or functioning due to vegetation clearance associated with transmission line construction. As such, the magnitude of the impact is considered small. Additionally, the sensitivity of these habitats is deemed low since they primarily support species classified by the IUCN as Least Concern and are relatively common. ▪ While many species dependent on these habitats fall under the Least Concern category, it is worth noting that some bird species protected under IUCN conservation measures are present on-site.



Impacts due to Vegetation Clearance	
	<ul style="list-style-type: none"> This elevates the sensitivity of the site to a medium level. Nonetheless, the described impacts are not anticipated to result in significant population changes for these species, leaving the overall impact magnitude as small. In conclusion, the overall significance of impacts has been assessed as not significant for habitats and minor for species.
Additional mitigation measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Preservation of Topsoil: Topsoil from cleared areas will be carefully preserved and repurposed for landscaping and plantation activities, minimizing soil degradation and promoting vegetation growth. • Protection of Endangered Species: Efforts will be made to avoid felling endangered and near-threatened species, particularly during their peak breeding or flowering seasons, to ensure their survival and ecological contribution. • Compensatory Afforestation: As per regulatory mandates, compensatory afforestation will be undertaken under the supervision of the Forest Department. This includes planting nectar- and fruit-bearing native species to restore habitat value for pollinators and birds. • Monitoring and Sapling Survival: Collaboration with the Forest Department or local NGOs will be established to ensure the survival of planted saplings, with growth monitoring conducted for a minimum of three years. • Creation of Green Buffer Zones: Green buffer zones will be developed around substations to serve as refuges for displaced fauna and to enhance overall biodiversity in the area. <p>Transmission Line Component:</p> <p>The following mitigation measures will help further minimize the significant impact on the habitat and species during the remaining construction activities that involve vegetation clearance:</p> <ul style="list-style-type: none"> • Limit vegetation disturbance and clearance strictly to the designated project activity area. • Enforce a strict ban on using fuelwood or shrubs from surrounding areas as kitchen fuel.
Residual Impact Significance	<p>While the substation construction phase is relatively short, the recovery time to return to pre-project ecological conditions is long. As such, the significance of residual impacts remains moderate despite proposed mitigation measures.</p> <p>For the TL component, removal of vegetation can have a direct and indirect impact on the local ecology. While the impact is limited to the relatively short construction phase of the project, the recovery time to return to pre-project conditions is long and therefore the significance of the residual impacts will remain minor for species.</p> <p>This project emphasizes compliance with regulatory requirements, ecological considerations, and community engagement to minimize adverse effects while ensuring sustainable development.</p>

Impacts due to Construction Activities	
Context and Receptor	<p>Substation Component:</p> <p>The construction activities for the proposed 220/132kV kV AIS at Morigaon may have potential environmental impacts on local habitats and species due to excavation, machinery movement, labor influx, and increased human presence. Key concerns identified include:</p> <ul style="list-style-type: none"> • Excavation for foundations and associated civil works could directly harm burrowing fauna and small terrestrial mammals. • Soil disturbance may alter soil structure and chemistry, potentially affecting microhabitats and nearby plant species. • Noise and vibrations from construction equipment, transport vehicles, and manual labor may stress local fauna, disrupting their natural behaviors such as foraging, mating, nesting,



	<p>and migration.</p> <ul style="list-style-type: none">• The temporary presence of laborers may cause additional pressure on the surrounding biological environment due to:<ul style="list-style-type: none">▪ Increased foot traffic in adjacent areas,▪ Generation of domestic waste that may attract scavengers or degrade habitats,▪ Unauthorized collection of firewood, timber, or non-timber forest products▪ Potential disturbance to local fauna through chasing, feeding, or harming animals.• During site visit and community consultations, no sightings of significant wildlife were observed or reported except some rodents, reptiles, squirrels etc. Common domestic animals (cattle, goats, dogs, cats) are frequently seen, and avifauna is limited to resident birds like mynas, bulbuls, pigeons, crows, and sparrows. Occasional Indian Civet and Foxes sightings during night time were reported but are infrequent and rare around the adjacent areas of the substation.• The project site is not located within or near any Protected Area (PA), Eco-Sensitive Zone (ESZ), or Critical Wildlife Habitat as notified under the Wildlife (Protection) Act, 1972. However, the nearest protected areas (KBAs) Amchang WLS and Pobitora WLS located approximately 14.4 km and 23.5 km from the proposed substation, respectively as verified through the Integrated Biodiversity Assessment Tool (IBAT). Both these KBAs are also recognized as Important Bird Areas (IBAs). One no. of IBA, Jengdia Beel and Satgaon are located approximately 44.9 km away from the proposed substation. Consultation with the nearby community do not reveals any sensitivity in terms of wildlife movement in the subproject area and is thus less likely to have any adverse impact on the nearby protected areas (KBAs/IBAs). <p>Transmission Line Component:</p> <ul style="list-style-type: none">• Construction activities, such as excavation, machinery operation, and increased human and transport movement within the project study area, are evaluated with consideration to their impact on habitats and species.• Excavation for foundations of transmission towers and ancillary facilities is expected to directly affect burrowing and mammalian fauna, while indirectly impacting local flora and fauna due to alterations in soil properties. Such effects are anticipated at each tower footing site yet to be constructed.• The intensified anthropogenic activity can increase stress on local fauna, keeping them on high alert for prolonged durations. This may disrupt crucial behaviors such as breeding, nesting, mating, socializing, and foraging.• Construction-related noise, resulting from human presence and transportation, is likely to cause disturbances to fauna in the surrounding areas.• These impacts are expected to persist during the pending footprint and tower foundation stringing operations for the transmission line.• The proposed transmission lines do not located within or near any Protected Area (PA), Eco-Sensitive Zone (ESZ), or Critical Wildlife Habitat as notified under the Wildlife (Protection) Act, 1972. However, the nearest protected areas (KBAs) Amchang WLS and Pobitora WLS located approximately 14.4 km and 23.5 km from the proposed substation, respectively and these distances further increase along the alignment of both the associated transmission lines, indicating the absence of sensitive ecological zones in the immediate vicinity. Jengdia Beel and Satgaon, one no. of IBA site is located approximately > 44.9 km away from the proposed lines. <p>All identified IBA/KBA sites are situated beyond the 10 km buffer of the proposed subproject and do not intersect the transmission line alignment. Accordingly, no direct habitat loss, fragmentation, or disturbance to IBA/KBA-designated areas is anticipated.</p>
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<p>Embedded Measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> Excavation activities and other construction activities are limited to designated foundation areas, with prompt backfilling to minimize exposure of soil and reduce risks to burrowing fauna. Confined movement of machinery and labor to approved access roads and work zones. Provision of basic sanitation and solid waste collection facilities at labor camps or worksites to maintain hygiene and prevent environmental degradation. Construction activities are scheduled during daytime hours to limit disturbance to nocturnal animals. Use of well-maintained machinery with noise suppressors to reduce noise and vibration impacts. Prohibition on hunting, trapping, chasing, feeding, or harming wildlife by construction workers. Worker induction and awareness training on biodiversity protection, wildlife sensitivity, and code of conduct. Immediate restoration and landscaping of disturbed areas following completion of construction activities. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> Excavation for tower foundations limited to the smallest practicable area, with immediate backfilling after foundation works. Construction activities restricted to approved right-of-way (RoW) and access paths to prevent unnecessary habitat disturbance. Proper management of construction debris and domestic waste at tower sites to avoid environmental degradation. Progressive site restoration after completion of tower erection and stringing activities. In-house training provided to the labour force and supervisory staff for situations dealing with wildlife encounters, as part of TL works.
<p>Impact Significance</p>	<p>Substation Component:</p> <p>The magnitude of impact from construction activities is considered <i>medium</i>, given the localized nature of the disturbance, potential for noise, vibration, and anthropogenic pressure, and temporary land disturbance. The receptor sensitivity is <i>low</i>, as the site is not located within or adjacent to any Protected Area, Eco-Sensitive Zone, or Critical Habitat, and the surrounding biodiversity primarily comprises common resident fauna and domesticated species. Due to the absence of sensitive or threatened species and the implementation of embedded mitigation measures such as restricting activities to designated areas, providing sanitation facilities, and minimizing off-site disturbances, the overall impact significance is assessed as <i>minor</i>.</p> <p>Transmission Line Component:</p> <ul style="list-style-type: none"> The impacts of construction activities on agriculture, crops, trees, vegetation, and fauna are being carefully evaluated. Excavation poses potential risks to soil quality in the area, as well as adverse effects on burrowing species, neighboring flora, herbivores, and small carnivores (foxes, civets etc.). Burrowing animals, including reptiles, ground-roosting birds, and those using lizard burrows, may face direct disruption due to excavation activities. Additionally, mammalian species are at risk of falling into open ditches prepared for tower footings, potentially resulting in injuries. Increased human activity associated with construction can lead to heightened stress levels among mammals, birds, and reptiles in areas near tower installation and

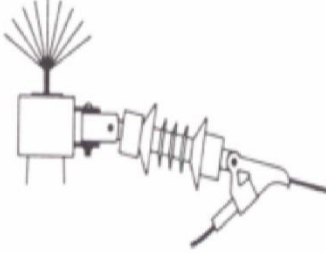



	<p>stringing activities.</p> <ul style="list-style-type: none"> • Mammals, in particular, are sensitive to elevated noise levels caused by construction. Their enhanced auditory perception may make them more vulnerable to disturbances, which could negatively impact mating and breeding behaviors in species that communicate or locate mates using sound. • The impact magnitude of these activities is assessed as small. • The sensitivity of the habitats is considered low since they predominantly support species classified under the IUCN Least Concern category and are commonly found. All KBAs/IBAs also located beyond 10 km buffer and do not intersect the proposed alignments; no direct or indirect impacts anticipated. • Species reliant on agricultural land, trees, built-up areas, and rangeland habitats (such as reptiles, birds, and mammals) also fall within this category. • However, the site hosts certain bird species that are protected under the IUCN Conservation Status, which elevates the overall sensitivity of the site to medium. • Despite this consideration, the described impacts are not anticipated to significantly alter the population dynamics of these species. • Accordingly, the impact magnitude is still deemed small. In summary, the overall impact significance has been assessed as not significant for habitats while being minor for individual species.
<p>Additional mitigation measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Avoiding construction during early morning and late evening hours to reduce disruption to crepuscular fauna. • Conducting environmental awareness programs for workers to promote understanding of local biodiversity and discourage harmful actions (e.g., harming or feeding wildlife). • Prohibiting the use of open fires and preventing fuelwood collection from nearby vegetation. • Instructing laborers to avoid contact with local wildlife and refrain from hunting or tree cutting. • Implementing solid waste and wastewater management protocols at labor camps and construction sites to prevent indirect impacts on surrounding fauna. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Avoid conducting construction and transportation activities at night, between 6:00 pm and 6:00 am. • Install temporary barriers with wire mesh around excavated areas to prevent mammals from falling in. • Maintain proper housekeeping practices for construction activities by conducting regular daily cleanups. • Enforce strict policies against poaching, trapping, and hunting among employees and contractors. • Promote greater awareness about local fauna through training sessions, posters, and similar initiatives for staff and laborers.
<p>Residual Impact Significance</p>	<p>Substation Component:</p> <p>The implementation of the outlined mitigation measures will significantly reduce ecological impacts during the construction phase. However, some residual impacts, primarily attributed to noise, human presence, and machinery movement, are unavoidable. These impacts are anticipated to be minor, localized, and temporary, resulting in limited disturbances to flora and fauna. Importantly, considering the distance of nearby KBAs/IBAs (>10 km), no indirect</p>

	<p>or cumulative impacts on sensitive ecological receptors are anticipated and hence, the overall significance of residual impacts remains <i>minor</i>.</p> <p>Transmission Line Component:</p> <p>The implementation of suggested mitigation measures can significantly reduce the impacts from construction activities but there will still be some impacts due to noise and anthropogenic movement. Also, while short-term disturbance to common fauna may occur during tower foundation and stringing works, these effects are reversible and restricted to small, discrete locations. All identified KBAs and IBAs are located well beyond the 10 km buffer and do not intersect the alignment; therefore, no residual impacts on protected areas, important bird habitats, or wildlife corridors are expected. The residual impacts for species will remain minor.</p>
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B. Impacts during Operation Phase

Impacts on biological environment at operation stage	
Context and Receptor	<p>Substation Component:</p> <p>During the operation phase, the 220/132 kV Morigaon AIS functions as a controlled and secure facility with restricted access. Activities are limited to routine monitoring, periodic maintenance, and site management. The site is located on previously cleared and developed land, and human presence is substantially lower than during construction.</p> <p>Transmission Line Component:</p> <p>During the operation stage, the transmission lines will have a negligible impact on biological receptors. Routine activities will primarily involve periodic patrolling, inspection, and maintenance, resulting in very limited human presence along the alignment. No additional vegetation clearing is anticipated beyond occasional trimming to maintain statutory safety clearances, which will be localized and controlled. The presence of transmission towers and conductors is not expected to obstruct wildlife movement, as the alignment does not intersect any protected areas (KBAs), important bird habitats (IBAs), or wildlife corridors. However, potential disturbance to avifauna due to the physical presence of conductors is expected to be minimal. Some potential impact includes:</p> <ul style="list-style-type: none"> • Collision may happen for birds that make regular and repeated flights between roosting and feeding areas in proximity to power lines. Stretch nearby the water bodies is vulnerable to bird collision. Avifaunal species forages nearby in and around the river for their daily needs. • Some birds also utilize the transmission towers for nesting by placing the nests across wires or using holes in the tower itself.
Embedded Measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Use of compact GIS system that generates minimal noise, reducing disturbance to nearby fauna. • Landscaping with native vegetation to enhance ecological compatibility. • Restricted and controlled access. • Regular vegetation maintenance within site boundary. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Alignment optimization to avoid major wetlands and sensitive habitats. • Sufficient ground clearance to minimize interaction risk. • Adequate conductor spacing and tower design to reduce electrocution risk. • Installing perch rejecter (Upright “whisk brooms” - Picture 1) on the cross arms. • In order to mitigate and minimize collision of birds, power line markers should be used (Picture 2), which reduce the risk by increasing the visibility of overhead lines to birds (Sporer et al. 2013).

	<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center;">Picture 1: Perch Rejecter Picture 2: Power line markers</p>
<p>Impact Significance</p>	<p>Substation Component:</p> <p>Given its location on previously developed land, low-noise operation, restricted access, and limited human activity, the magnitude of impact is small. With low receptor sensitivity, the overall impact significance during operation is assessed as negligible.</p> <p>Transmission Line Component:</p> <p>Considering the potential for bird collision but absence of critical habitats within the corridor, the magnitude of impact is assessed as small. With medium receptor sensitivity, the overall impact significance during operation is assessed as minor, subject to implementation of mitigation measures.</p>
<p>Additional mitigation measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • Enhancement of landscaping efforts by planting additional native species around the substation boundary to improve habitat quality and act as a natural noise and visual buffer. • Wherever feasibly use of fully shielded, motion-sensor lighting to minimize light pollution and reduce disturbance to nocturnal fauna. • Scheduling of vegetation trimming and grass cutting outside of sensitive periods such as bird breeding seasons to protect ground-nesting species. • Conducting periodic environmental awareness training for operational and maintenance staff to promote biodiversity conservation practices. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Installation of Bird Flight Diverters (BFDs) in high-risk spans, especially near wetlands and river crossings. • Avoidance of nesting or roosting sites during maintenance. • Seasonal avifaunal monitoring during peak migratory periods. • Environmental awareness training for operational staff.
<p>Residual Impact Significance</p>	<p>Substation Component:</p> <p>With embedded and additional mitigation measures in place, residual impacts during operation are expected to remain negligible.</p> <p>Transmission Line Component:</p> <p>Following installation of bird diverters, perch rejecter alignment optimization, and seasonal monitoring, the residual impact on avifauna is expected to be reduced to negligible to minor, and not significant.</p>

6.4.3 Impacts on Occupational Health and Safety

A. Impacts during Construction Phase



Impacts on Occupational Health and Safety during Construction stage	
Context and receptor	<p>Substation Component:</p> <p>Construction of the 220/132 kV Morigaon AIS involves excavation, foundation works, steel structure erection, equipment installation, and commissioning activities. These activities present occupational health and safety (OHS) risks including working at heights, operation of heavy machinery, electrical hazards, handling of hazardous materials, and exposure to extreme weather conditions (heat stress during summer and slippery conditions during monsoon).</p> <p>Key Risks Identified:</p> <ul style="list-style-type: none"> • Falls from heights during gantry and structure erection. • Risks arising from improper erection or unsafe use of scaffolding and ladders. • Electric shock and electrocution during commissioning near live components. • Trench collapse, falling objects, and civil work-related injuries. • Machinery-related accidents. • Burns and eye injuries during welding and cutting works. • Slip, trip, and fall hazards during monsoon conditions. • Heat stress and dehydration. • Exposure to cement, chemicals, fuel, dust, and noise. • Health risks due to inadequate sanitation or housekeeping. <p>Transmission Line Component:</p> <p>Transmission tower foundation works, tower erection, and stringing operations require working at significant heights and handling heavy materials. Approximately 50 workers will be involved in tower erection and stringing activities.</p> <p>Key Risks Identified:</p> <ul style="list-style-type: none"> • Falls from heights during tower erection and stringing. • Improper installation or unsafe use of scaffolding, ladders, and temporary platforms. • Electric shock and electrocution during commissioning. • Slip and trip hazards, particularly during monsoon rainfall. • Heat stress and fatigue during extreme weather. • Manual handling injuries. • Increased vulnerability of local workers engaged in foundation activities.
Planned measures	<p>Substation Component:</p> <ul style="list-style-type: none"> • Deployment of trained and certified personnel for specialized tasks. • Mandatory use of appropriate PPE (helmets, safety shoes, gloves, protective eyewear, safety harnesses, and fall arrest systems). • Use of certified scaffolding systems installed and inspected by competent persons. • Conduct of pre-job safety briefings and daily toolbox talks. • Barricading, signage, and access control to restrict unauthorized entry. • Dust suppression during concrete mixing and material handling. • Safe enclosure of moving parts of hoists and equipment. • Provision of first-aid kits and emergency response arrangements. • Prominent display of emergency contact numbers and hospital directions. • Implementation of a comprehensive Health and Safety (H&S) Plan by the EPC contractor. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Mandatory use of PPE by all workers. • Safety induction training at joining and daily toolbox talks. • Engagement of trained and experienced personnel for tower erection and



	<p>stringing.</p> <ul style="list-style-type: none"> • Use of fall protection systems during height-related activities. • Adjustment of work schedules during extreme heat and heavy rainfall with appropriate provision of adequate rest breaks. • Enforcement of manual lifting limits. • Installation of danger sign boards and anti-climbing devices after stringing. • Maintenance of a Workers' Grievance Redress Mechanism (GRM) register at site.
<p>Impact Significance</p>	<p>Substation Component:</p> <p>The magnitude of occupational health and safety impacts during the construction of the proposed substation is assessed as medium. This is due to the inherent risks associated with working at heights, exposure to live electrical components, heavy lifting, handling of hazardous materials such as cement and welding equipment, and increased likelihood of slip and trip hazards, especially during the monsoon season. The receptor sensitivity is high, as construction workers are directly exposed to these risks and any lapse in safety can result in serious injury or even fatality. Considering the medium magnitude of risks and high sensitivity of the workforce, the overall significance of the impact is assessed as Major.</p> <p>Transmission Line Component:</p> <p>Tower erection and stringing activities involve significant height-related risks. Considering the medium magnitude of potential impacts and high receptor sensitivity (including involvement of local labor), the overall impact significance is assessed as Major.</p>
<p>Additional mitigation measures</p>	<p>Substation Component:</p> <ul style="list-style-type: none"> • The contractor shall develop and implement a concise procedure/work instruction for the erection, inspection, and safe use of scaffolding, ladders, and working at heights. • All scaffolding shall be erected on stable foundations, properly braced, fitted with guardrails and toe boards, and inspected regularly by a competent person. • Scheduling work during cooler hours in peak summer months to reduce heat stress. • Regular H&S audits and monitoring of contractor performance. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Application of a documented procedure/work instruction for erection and safe use of scaffolding, ladders, temporary platforms, and fall protection systems. • Periodic inspection of scaffolding and height-access systems by a competent person. • Six-monthly refresher training focused on working at heights and electrical safety. • Enhanced supervision of local workers involved in foundation works.
<p>Residual impact significance</p>	<p>With implementation of robust mitigation measures, including documented scaffolding procedures, mandatory PPE, training, supervision, and continuous monitoring, the likelihood and severity of accidents will be substantially reduced. However, due to the inherently hazardous nature of construction activities and potential human error, some residual risk remains.</p> <p>Accordingly, the residual impact significance for both Substation and Transmission Line construction activities is assessed as moderate, requiring continued vigilance and monitoring throughout the construction period.</p>

B. Impacts during Operation Phase

Impacts on Occupational Health and Safety during Construction stage	
Context and receptor	<p>Substation Component:</p> <p>The operation stage of the 220/132 kV GIS substation, managed by AEGCL, presents several occupational health and safety risks for operation and maintenance personnel, despite the facility's restricted access and controlled conditions. Key risks include electrical hazards, such as arc flashes, electrocution, and contact with energized components, transformer explosions or fires, SF₆ gas leakage posing asphyxiation and environmental hazards, slips and falls during maintenance, and emergency response challenges during natural disasters.</p> <p>Transmission Line Component:</p> <p>Workers/Community health and safety during the operations phase may be affected by several factors, including:</p> <ul style="list-style-type: none"> • Traffic and machinery movement during maintenance activities. • Potential tower collapses. • Incidents of wire breakage. • Exposure to herbicides or pesticides applied for Right-of-Way (RoW) maintenance. • Generation of Electro-Motive Force (EMF) and resulting electromagnetic interference. • Risks of electrocution These impacts are expected to primarily affect individuals utilizing the land within the RoW area.
Planned measures	<p>Substation Component:</p> <p>To mitigate these risks, the following measures will be implemented:</p> <ul style="list-style-type: none"> • Only trained and authorized personnel will have access to the substation. • A comprehensive firefighting system, including fire extinguishers, alarms, and suppression systems, will be installed. • GIS equipment is designed to minimize exposure to live parts and SF₆ gas leakage through enclosed compartments and pressure monitoring systems. • Warning signs and danger labels will be placed near high-voltage equipment. • Emergency response plans and evacuation procedures will be established, with emergency contact numbers prominently displayed. <p>Transmission Line Component:</p> <ul style="list-style-type: none"> • Raising public awareness and providing education, along with implementing physical precautionary measures, will help minimize risks during operations. Additionally, appropriate warning signs will be placed on all sides of the tower. • After the stringing work is finalized, notices and permanent anti-climbing devices will be mounted on the tower to enhance safety. • The commencement date for electricity transmission, including its safety considerations, will be announced locally ahead of time.
Impact Significance	<p>Substation and Transmission Line Component:</p> <p>The receptor sensitivity is medium because the affected individuals are trained operational staff exposed to high-voltage equipment, hazardous gases, and confined operational environments. Their roles inherently involve exposure to critical safety risks. Considering the medium magnitude of impact and medium receptor sensitivity, the overall impact significance is assessed as Moderate.</p>
Additional mitigation measures	<ul style="list-style-type: none"> • To further reduce risks, the following additional measures will be implemented during the operation of both the proposed substation and transmission lines: •



	<ul style="list-style-type: none"> • Development and enforcement of Standard Operating Procedures (SOPs) for all routine and emergency Operation & Maintenance (O&M) activities in line with AEGCL's Safety Manual. • Implementation of a lock-in lock-out (LOTO) protocol to prevent accidental energization during maintenance. • Systematic recording of all occupational incidents, accidents, and near-miss events, with root cause analysis (RCA) conducted for corrective actions. • Regular safety training, mock drills, and emergency response exercises for operational staff. • Mandatory use of Personal Protective Equipment (PPE) such as insulated gloves, arc-flash protective suits, helmets, goggles, and safety shoes. • Monitoring, handling, and recycling of SF₆ gas using leak detection sensors and recovery units. • Preventive and predictive maintenance schedules for transformers, switchgear, and protection systems to minimize malfunction risks. • On-site first aid kits and trained first responders, with hospital contact details readily available. • Installation and regular testing of lightning arrestors and surge protection devices. • Periodic safety audits with prompt corrective actions. • Transparent reporting and investigation of near-misses, unsafe conditions, or incidents. • Conducting health awareness initiatives for the local community, emphasizing topics such as electrical safety, risks associated with climbing towers, appropriate actions to take in the event of a wire snapping or tower collapse, and other related precautions. • Organizing awareness programs in schools to educate students about the hazards posed by transmission lines and the necessary steps to follow during emergencies. • Ensuring that the local community has access to the project's established grievance redressal mechanism.
<p>Residual impact significance</p>	<p>With the implementation of these mitigation measures, the residual impact significance is reduced to Minor. While some level of occupational risk remains due to the nature of the work in high-voltage installations, these risks are manageable through consistent monitoring, training, and adherence to preventive practices. After the implementation of the additional mitigation measures, the impact significance is expected to be reduced to negligible.</p>

6.4.4 Impacts on Socio-economic Environment

A. Impacts during Pre-construction and Construction Phase

A. Socio-economic Impact on local community due to construction works	
<p>Context and receptor</p>	<p>SS</p> <p>Since the proposed 220/132kV Baghjap Substation in Morigaon will be constructed within the existing premises of AEGCL, which is already owned by the utility, there will be no requirement for additional land acquisition. As a result, there will be no displacement or relocation of individuals, households, or communities, and no loss of private assets or livelihoods. This eliminates the need for any resettlement or compensation measures, significantly reducing the potential for land-related disputes or social conflict. This greatly minimizes the potential for adverse social impacts.</p> <p>Currently, AEGCL staff quarters consist of six buildings with a total of 25 flats located within the substation premises. Of these, 10 flats are occupied, and 15 are vacant. AEGCL staff members and their families reside in these quarters, which are situated within the</p>



	<p>designated area for the construction of the 220/132 kV AIS substation at Baghjap in Morigaon. The residents are adult personnel directly employed by AEGCL; some live with their families, while others reside alone (Details are provided in Appendix 15). At the current stage, construction of new staff quarters for relocation of existing staff and their families is not envisaged under this project. The affected staff and their families will be relocated to rented accommodation, and those relocated will be entitled to House Rent Allowance (HRA) in accordance with the applicable AEGCL's official employee service rules and benefit provisions.</p> <p>Consultations were held on 08/01/2026 with the Residential Engineer, and the staff and their family members currently residing on-site were present. Once construction begins, those living in the quarters will need to be relocated to rented accommodations outside the substation. Potential risks related to child labour were also discussed, and the Residential Engineer assured that strict compliance with child labour laws will be maintained throughout the project. Additionally, the project will provide job opportunities for local residents.</p> <p>There is one well, along with a water tank, pump house, and filter plant, all located inside the substation and used by the AEGCL. These structures will be demolished due to the proposed work.</p> <p>TL</p> <p>For both the proposed lines, the Baghjap LILO line traverses through 5 villages while the TATA Line is spread through 6 villages in Morigaon District.</p> <p>Physical displacement or loss of residential structures is not anticipated for any private landowner. However, project activities may result in economic displacement as damage and loss to crops is anticipated due to transportation of materials, foundation and tower erection works, temporary access road creation, and transmission line stringing. The joint verification for identification of landowners for proposed LILO and TATA transmission line for tower footing area has to be completed by concerned revenue Circle, subsequent to the check survey.</p> <p>Compensation will be provided to affected landowners after completion of the identification of landowners and the approval of the Land Scheduling Report from concerned Circle Offices and before commencement of works. Land is not acquired for the project as per Electricity Act of 2003, and ownership remains with the landowners. However, there will be permanent restriction of land use for tower footings area. Agricultural activities may continue in the RoW area post-construction, except at tower base locations, where farming is discouraged due to electrical safety concern.</p>
<p>Mitigation Measures</p>	<p>SS</p> <p>The proposed Grid Substation will be constructed entirely on land already owned by AEGCL; therefore, no land acquisition or major mitigation measures related to land take are required. However, to ensure safe and uninterrupted construction activities, the existing on-site staff will be temporarily relocated to rented accommodations available in the vicinity during the construction phase. A relocation period of 60 days will be provided to facilitate a smooth transition. The rental costs will be borne by the staff in accordance with AEGCL's House Rent Allowance (HRA) policy. Upon completion of the project, newly constructed staff quarters within the substation premises will be allotted for permanent accommodation. The relocation and housing arrangements have been carefully planned and discussed with the concerned individuals during consultations held on January 8, 2026. This proactive approach ensures minimal disruption to staff, avoids adverse social impacts, and addresses potential labor-related concerns effectively.</p> <p>TL</p>

	<p>Compensation is provided for tower footing at 200% and RoW corridor at 30 % of the land value. Crop compensation will be based on the crop damaged at the time of the tower foundation work and stringing activity. Crop compensation will be determined based on the damage caused during tower foundation work and stringing activities. The payment will follow the rates set by the relevant departments, such as agriculture, horticulture, and forestry, and will be aligned with market value and RAP guidelines. The assessment of crop and tree losses will be conducted collaboratively by the relevant line department, Circle Offices, AEGCL, PMC, and the EPC contractor, in the presence of the affected landowners, to ensure fair compensation.</p>
<p>Impact Significance</p>	<p>SS The proposed construction of the 220/132kV Baghjap Substation is planned within an existing substation complex under the Assam Electricity Grid Corporation Limited (AEGCL). As the construction activities are confined to this established site, the impact on the local community has been assessed as minor. The sensitivity of the surrounding receptors is also evaluated as low.</p> <p>TL Construction activities near the tower base are expected to cause a one-time loss of crops. Despite efforts to schedule most construction work during the dry season, certain activities, such as building transmission tower foundations, erecting towers, and stringing transmission lines, may require the movement of personnel, machinery, and equipment across agricultural fields leading to the tower sites. This activity could result in damage to standing crops not only at the tower base and along the Right of Way (RoW) of the transmission line but also in nearby agricultural plots. Such damage would temporarily affect cultivators' incomes. No physical displacement or loss of residential structures for private landowners is anticipated. Furthermore, no impact on Protected Cultural Resources (PCRs), Common Property Resources (CPRs), or archaeological and historical sites has been identified based on the check survey. However, schools, places of worship, and a marketplace are located outside the RoW and remain unaffected. The full extent of the impact on landholdings within the RoW will be determined after completing a socio-economic survey and 100% Census Survey of all affected households in accordance with the approved check survey report. Since most community members and villagers primarily rely on agriculture for their livelihoods, the overall significance of the impact is considered medium.</p>
<p>Additional mitigation measures</p>	<p>SS Based on the Impact Significance Assessment Matrix, the combination of a small magnitude of impact and low receptor sensitivity leads to the conclusion that the overall significance of the impact is negligible. Consequently, no additional mitigation measures have been identified as necessary for this project.</p> <p>TL Every effort will be made to prevent crop damage, with construction activities scheduled during the off-season. Furthermore, an Abbreviated/Resettlement Action Plan (A/RAP) will be developed for the transmission line route in alignment with the relevant guidelines outlined in the Environmental and Social Management Planning Framework (ESMPF). Compensation will also be provided to affected households and individuals prior to the commencement of work. Additionally, a Grievance Redress Mechanism (GRM) will be implemented to allow affected parties to voice any concerns they may have.</p>
<p>Residual impact significance</p>	<p>Furthermore, no residual impacts are anticipated as a result of this proposed construction. This ensures that the project aligns with minimal disruption to the local environment and community.</p> <p>The residual impact significance of the impact on private land owners in Tower Base Area and below conductors during Stringing Exercise is anticipated as moderate.</p>

B. Impact on cultural, religious, or heritage structures	
Context and Receptor	There are no significant cultural, religious, or designated heritage structures located within or in the immediate vicinity of the proposed Baghjap 220/132 kV substation site in Morigaon. However, a small temple dedicated to Lord Shiva is located within the substation premises. This temple was originally constructed for use by AEGCL staff residing in the now-abandoned staff quarters. The temple will not be demolished during the construction work.
Mitigation Measures	To facilitate the construction of the Baghjap 220/132 kV AIS substation, the existing staff quarters and water tank along with the filter and pump house located within the project site will be relocated within the substation campus. Moreover, no known archaeological or heritage sites are present within the proposed substation area, there remains a remote possibility of chance finds during excavation or construction activities. In the event that any artifacts, structures, or other materials of potential archaeological significance are discovered, all construction work in the immediate vicinity will be halted immediately. The relevant cultural heritage authorities will be notified, and the site will be secured to prevent disturbance. Work will only resume once a qualified expert assesses the find and appropriate measures are taken in accordance with national regulations and heritage protection guidelines. Project personnel will be trained on the chance finds procedure as part of their environmental and social awareness training. This precautionary approach ensures that any unexpected discoveries are handled responsibly and in compliance with applicable laws.
Additional mitigation measures	To ensure the respectful handling of cultural and religious elements within the Baghjap 220/132 kV AIS Substation site, several additional mitigation measures will be implemented. During the transition phase, workers and contractors will be oriented and sensitized on the importance of local cultural and religious values. Additionally, an accessible Grievance Redress Mechanism (GRM) and Internal Complaint Committee (ICC) will be in place to address any concerns raised by staff or nearby residents regarding cultural or social impacts. These measures will ensure that the project proceeds in a way that respects community sentiment, supports social harmony, and upholds cultural integrity.
Residual impact significance	The residual impact significance is expected to remain negligible

Economic Loss to private land owners within RoW due to imposition of land use restrictions	
Context and receptor	The economic loss to private landowners within the RoW can be determined after conducting a socio-economic survey and 100% Census Survey of all affected households, which will be based on the approved check survey report. The alignment will primarily traverse agricultural land, leading to the loss of areas used for paddy (rice) cultivation. In accordance with the MoP guidelines and the Government of Assam's notification on land compensation for tower footing and RoW Corridor on 10th March 10, 2017, as well as the new guidelines issued by the Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) & Government of Assam Power Department notification from Dispur, Guwahati-6, dated the 04-11-2024 for compensation payment for land within the RoW and base areas have been introduced. These guidelines were developed based on a report submitted by a committee chaired by the Special Secretary of the Union Power Ministry. The report highlighted resistance from landowners and farmers to the construction of transmission lines, who demanded higher compensation due to the reduction in land value beneath towers and within the corridor.
Mitigation Measures	Compensation for RoW area will be paid to the individual land owners as per compensation procedures and in line with RAP. Further, in line with the guidelines of Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) & Government of Assam



	Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024. which stipulates compensation of 200% for tower footing area and 30% for RoW.
Impact Significance	The land within the Right of Way (RoW) is currently used primarily for agriculture, with crop heights not affecting safety clearance, allowing continued cultivation. While some road-facing plots have potential for future non-agricultural use, restrictions on land-use will have a lasting impact on such conversions. However, these areas were largely avoided during the check survey, and as a result, the overall impact is considered as Small .
Additional mitigation measures	-
Residual impact significance	The residual impact significance of the impact on private land owners within RoW due to imposition of land use restrictions is assessed as low .

C. Impacts Due to Migrant Labour

Context and Receptor	The construction of the 220/132KVBaghjap AIS Substation and associated transmission line is expected to create short-term employment opportunities for the local population, particularly in unskilled and semi-skilled roles such as site clearing, material handling, and basic construction support. The use of local labor not only supports livelihood generation in the surrounding communities but also fosters positive relationships between the project and local stakeholders. However, in instances where the contractor engages migrant labor from outside the area, certain social impacts may arise. These include potentials train on local infrastructure and services, cultural or social tensions between local residents and migrant workers, and increased demand for basic amenities such as clean water, sanitation, and housing.
Mitigation Measures	<p>SS To mitigate potential social impacts associated with the involvement of migrant labor, the contractor will implement effective workforce planning and management strategies. Temporary facilities for accommodation, water supply, sanitation, and waste management will be adequately provided to meet workers' needs. To address and reduce the risk of cultural or social tensions, awareness programs will be organized to promote positive community relations, understanding of local customs, and respectful behavior. All workers will participate in orientation sessions covering topics such as gender-based violence (GBV), sexual exploitation and abuse (SEA), and child protection. Additionally, a comprehensive Code of Conduct will be established, and sensitization on the GBV Code of Conduct will be conducted in the local language by the PMU/PMC for the EPC and their workforce. The Code of Conduct shall be duly signed and understood by all workers and will clearly outline expectations regarding appropriate behavior and zero tolerance for Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH). A grievance redress mechanism will also be set up to promptly address concerns raised by local communities or workers. These measures aim to maintain social harmony, ensure the well-being of the workforce, and prioritize community safety throughout the project's duration.</p> <p>TL As expected, unskilled laborers are likely to be recruited from the local villages, whereas semi-skilled and skilled laborers may be hired from other districts in Assam. Labor camps will be established near the tower foundation works, with</p>



	<p>the contractors responsible for setting them up. Employing laborers from similar cultural backgrounds minimizes the potential for cultural clashes with the local population and provides an economic boost to small village businesses as they gain new customers.</p>
<p>Impact Significance</p>	<p>SS - The potential social impact from the involvement of migrant labor is assessed to be minimal, as the majority of the workforce will consist of local labor, and the influx of external labor will be limited. Additionally, since the labor camp will be established within the existing AEGCL boundary, the likelihood of interaction-related tensions with nearby communities is considerably reduced, leading to low receptor sensitivity. Based on the Impact Significance Assessment Matrix, the combination of a small magnitude of impact and low receptor sensitivity indicates that the overall significance of the impact is negligible.</p> <p>TL - As this impact is restricted to the construction phase and the proportion of workers population is anticipated to be minimum; the impact magnitude is assessed as small. The labour camps shall usually be established in close vicinity of the village settlements; the sensitivity of the local community is assessed as low. As per the impact significant assessment matrix a combination of small impact magnitude with low receptor sensitivity results in impact significance as small to low.</p>
<p>Additional mitigation measures</p>	<p>SS</p> <p>The contractor will be required to submit a monthly Environmental and Social (E&S) monitoring report, which will also include compliance with labor camp maintenance as per IFC performance standards (Appendix-16), including hygiene, waste disposal, safety, and living conditions. A separate Labor Grievance Register will be maintained to document and address any labor-related complaints.</p> <p>TL</p> <p>The EPC contractor appointed for the project holds the responsibility of ensuring proper accommodation facilities for the labor force. The essential requirements outlined in the Environmental and Social Management Plan (ESMP) concerning labor accommodation include the following:</p> <p>The contractor must provide adequate water supply, sanitation, drainage, and medical health facilities at the labor campsite. - Workers, staff, and laborers must be equipped with necessary personal protective equipment (PPE), including safety goggles, helmets, safety belts, earplugs, masks, and similar gear. All construction equipment and vehicles must have functional reverse warning horns to ensure safety. - Electrical safety measures must be implemented by the contractor, such as double earthing for heavy electrical machinery and equipment, and the installation of Earth Leakage Circuit Breakers (ELCB) for all electrical systems.</p> <p>The contractor must adhere strictly to safety regulations concerning scaffolding, ladders, working platforms, gangways, stairwells, excavations, trenches, and ensure safe access and exit pathways. - Paint containing lead or lead-based products must not be used unless presented in the form of ready-made paint or paste.</p> <ul style="list-style-type: none"> ▪ Face masks should be made available to workers when paint is being applied via spray methods or when surfaces containing dry lead paint are being rubbed or scraped. - Key areas including 'hard hat,' 'no smoking,' and other

	<p>high-risk zones must be clearly marked by the contractor. Non-compliance with PPE usage should be addressed with a zero-tolerance policy.</p> <ul style="list-style-type: none"> ▪ First-aid provisions must be maintained at all construction sites. ▪ An effective emergency response system should be established and maintained by the contractor. ▪ A dual-bin waste segregation system (biodegradable and non-biodegradable) should be set up at labor accommodations, with workers encouraged to adopt proper waste disposal practices. <p>The contractor must identify existing facilities for waste disposal in the area or establish safe disposal pits for biodegradable waste. Non-biodegradable waste should be securely stored and transported to the nearest municipal waste disposal facility. These measures are critical to fostering a safe and sustainable working and living environment for all laborers involved in the project.</p> <p>Additional mitigation measures will be implemented to address potential negative impacts associated with migrant labor. These include: - Adequate monitoring to ensure the contractor adheres to applicable rules, regulations, and all provisions outlined in the contractual agreement with the EPC contractor. - Enforcing the implementation of the GBV Code of Conduct (CoC) for all workers involved in the project. - Conducting health check-ups for migrant workers prior to the commencement of construction activities. - Providing access to the project's grievance redressal mechanism for both local communities and laborers, enabling them to report and address GBV-related issues effectively.</p>
<p>Residual impact significance</p>	<p>The residual impact significance will remain minimal.</p>

D. Impact on Community Health and Safety

<p>Context and Receptor</p>	<p>Substation: The risk to the health and safety of the local community during the construction phase of the proposed 220/132kV Baghjap AIS Substation in Morigaon, may arise from several activities, including the generation of construction waste, dust and noise emissions, accidental spillage of hazardous materials such as oils, and the movement of vehicles and equipment that could lead to traffic-related accidents or injuries, particularly if community members are present near the construction site.</p> <p>There is one more potential risk to the community arising from the presence of armed security guard hired at the substation site. The armed security guard has been selected through a rigorous process (physical and medical) overseen by the concerned District Commissioner and the senior Superintendent of Police, who ensured that the candidate was fully fit and eligible for the job. This process also ensures the proper functioning of the arms. As a mitigation measure, an Armed Security Guards Management Plan has been prepared and attached as Appendix 13.</p> <p>Additionally, the site contains 25 nos. of staff quarters, which will be demolished as part of site clearance. Visual inspection during the baseline survey confirmed that these structures do not contain asbestos-containing materials (ACMs) or any other hazardous substances. However, as the substation will be constructed entirely within the existing secured premises of AEGCL and community access will be restricted. This significantly reduces the likelihood of direct exposure to construction-related hazards.</p> <p>Transmission Line: It includes project site workers, settlements in the close proximity of the project site, which will be exposed to health impacts from the project activities. The construction phase activities such as construction of transmission lines and movement of material and personnel may result in impacts on the health and safety of the community, as the line mostly is passing through the villages.</p>
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<p>Mitigation Measures</p>	<p>To ensure community health and safety during the construction of the Substation and transmission line, a comprehensive set of mitigation measures will be implemented. Access to the construction site will be strictly regulated through fencing, deployment of security personnel, and installation of warning signage to prevent unauthorized entry. The movement of heavy vehicles will be limited to a maximum speed of 20 km/hr in proximity to schools, colleges, hospitals, and other busy areas. Additionally, transportation of construction materials will be scheduled to avoid peak school and office hours, specifically from 7:30 AM to 9:30 AM and 2:00 PM to 3:00 PM IST.</p> <p>Dust suppression will be carried out through regular water sprinkling, and materials will be transported in covered trucks. Noisy construction activities will be restricted to day light hours (6am to 6 pm IST) in compliance with noise regulations to minimize disturbances to the local population</p> <p>The EPC should conduct continuous awareness raising and training activities to ensure that workers abide by the Code of Conduct. Moreover, the Code of Conduct should be in local language (Assamese) and signed by each workers/labour. The establishment of a Grievance Redress Mechanism (GRM) will also include provisions to address grievances related to Gender-Based Violence (GBV) sensitively and confidentially.</p> <p>The demolition of any abandoned structures will follow the Construction and Demolition Waste Management Plan outlined in Appendix 14. The EPC contractor will estimate the quantity of demolition waste in advance and ensure its transportation along designated routes to prevent road damage.</p> <p>Additionally, topsoil will be preserved for reuse in landscaping or greenbelt development, and construction materials will be stored within the designated project area to avoid impacts on adjacent land. Public awareness campaigns and emergency preparedness measures will also be put in place to ensure the safety of nearby communities and effective environmental management during the Construction phase.</p>
<p>Impact Significance</p>	<p>The construction of the substation and transmission line may pose potential risks to community health and safety, primarily due to increased movement of heavy vehicles and machinery, noise and dust generation, demolition of existing structures, and potential unauthorized access to the construction site. These activities can result in road safety concerns, minor respiratory issues, and accidental injuries if not properly managed. Thus, the Magnitude of Impact is assessed as Medium.</p> <p>However, as the substation site is located within the secured boundary of AEGCL and away from densely populated areas, the overall risk to nearby communities is considered low.</p> <p>According to the Impact Significance Assessment Matrix, a combination of a medium magnitude of Impact with low receptor sensitivity leads to the conclusion that the overall significance of the impact is Minor.</p>
<p>Additional mitigation measures</p>	<p>Periodic community consultations will be held to address concerns proactively, and a community grievance mechanism will be established to ensure timely resolution of any health or safety-related complaints.</p>
<p>Residual impact significance</p>	<p>The residual impact significance will remain negligible.</p>

B. Impacts during Operation Phase

A. Impact on Community Health and Safety

<p>Context and receptor</p>	<p>During the operations phase, the substation is expected to have minimal direct impact on community health and safety, as it will be a secured facility with access restricted to authorized personnel only. Potential risks include electrical hazards, such as accidental contact with high-voltage equipment, movement of traffic and machinery for maintenance, tower falling, and noise from transformers and other operational equipment affecting the nearby community.</p>
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<p>Planned /Implemented Mitigation Measures</p>	<p>To ensure community safety during operations, the substation will implement strict access controls, including secure fencing and surveillance systems, to prevent unauthorized entry. Prominent warning signs highlighting electrical hazards will be clearly displayed. Regular maintenance and inspections of equipment will be conducted to minimize noise and prevent electrical faults or leaks. Emergency response plans will be developed and coordinated with local authorities. Additionally, ongoing community awareness programs will educate residents about safety precautions and provide information on whom to contact in case of emergencies. Ensuring a safe environment around the substation throughout its operational lifespan.</p>
<p>Impact Significance</p>	<p>The impact on community health and safety is considered negligible, as during the operations phase, the movement of heavy vehicles and machinery, along with noise and dust generation, will be limited. Moreover, due to the controlled and secure nature of the substation site within the existing AEGCL boundary, restricted access, robust safety protocols, and regular equipment maintenance significantly reduce the risk of accidents or exposure to electrical hazards for the surrounding community. Noise levels are expected to remain low and within permissible limits, further minimizing disturbances. Collectively, these factors ensure that the substation's operation poses minimal health and safety risks to nearby residents during the operational phase. According to the Impact Significance Assessment Matrix, a combination of negligible magnitude. The impact, combined with low receptor sensitivity, leads to the conclusion that the overall significance of the effect is negligible.</p>
<p>Additional mitigation measures</p>	<p>To further mitigate potential risks to community health and safety, the project will implement health and safety awareness programs for the local community, emphasizing electrical safety and emergency preparedness. Targeted awareness campaigns will be conducted in nearby schools to educate children about the potential hazards associated with the substation, providing clear guidance on appropriate actions during emergencies. The local community will also have access to the project's established grievance redress mechanism, ensuring that concerns are addressed promptly. Additionally, periodic engagement with community representatives will be held to reinforce safety protocols and share updates. Emergency contact information will be prominently displayed around the facility, and mock drills may be organized in collaboration with local authorities to enhance community preparedness. These measures aim to raise awareness, ensure transparency, and promote long-term safety. Safety and trust between the project team and the surrounding communities.</p>
<p>Residual impact significance</p>	<p>Post the implementation of the mitigation measures, the impact significance is expected to be reduced to negligible.</p>



Chapter 7: Environmental and Social Management Plan (ESMP) & Monitoring Plan (ESMoP) and Budget

7.1 Environmental and Social Management Plan

This chapter presents the Environmental and Social Management Plan (ESMP) formulated to address the potential environmental and social impacts identified for the project. It further describes the administrative framework established to ensure the effective implementation of mitigation measures and the systematic monitoring of their performance. The detailed Environment and Social Management Plan for the proposed 220/132kV AIS at Morigaon and the proposed 220kV 4 CKT Baghjap LILO and 220kV D/C TATA Transmission lines are provided below in **Table 36** and **Table 37**.

In addition, this chapter also elucidates the Environmental and Social Monitoring Program (ESMoP) to ensure that mitigation measures and management commitments are effectively implemented and remain responsive throughout the project lifecycle. A detailed Monitoring Program is provided in **Table 38**.

Further, the budget required to implement the ESMP and ESMoP are shown in **Table 39**.

Table 36: Environment and Social Management Plan for the proposed 220/132kV (2x160 MVA) Baghjap AIS at Morigaon

S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
DURING PRE-CONSTRUCTION PHASE								
1	Site selection, Survey, Alternate analysis	<ul style="list-style-type: none"> ▪ The existing location owned by AEGCL will be utilized to avoid the need for land acquisition, thereby minimizing the environmental impact and preventing resettlement requirements. ▪ Key planning activities include: - Conducting elevation, slope, and land feature mapping for effective substation layout design. ▪ Assessing soil types and stability to determine suitable foundation designs. ▪ Defining zones for excavation of pits required for equipment, buildings, and support structures. ▪ Selecting areas within the site for secure storage of construction 	Substation land	<ul style="list-style-type: none"> ▪ The chosen site for the 220/132kV AIS at Morigaon, is located within the existing AEGCL 132/33kV Baghjap Grid Substation premises, ▪ This eliminates the need for land acquisition, thereby avoiding complications related to resettlement or displacement. ▪ However, there are several challenges to consider: <ul style="list-style-type: none"> ○ There are six numbers of two-story buildings comprising of 25 flats. Of these, 16 flats are occupied while 9 are vacant. Five AEGCL staff members along-with their families, and 11 bachelor staff members currently reside in the staff quarters, which is planned to be demolished to make way for 	<p>Accommodation and Site Safety</p> <ul style="list-style-type: none"> ▪ Arrange temporary rented accommodation for AEGCL staff currently residing in existing quarters during construction, ensuring timely completion of new staff quarters for permanent relocation. ▪ Install secure fencing and controlled access systems around the construction area to prevent unauthorized entry and enhance public safety. <p>Vegetation and Biodiversity Protection</p> <ul style="list-style-type: none"> ▪ Limit tree felling 	PIU /EPC Contractor	PMC, PIU & PMU (AEGCL)	Once during Substation siting survey and design



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>materials, ensuring vegetation and drainage systems remain unaffected.</p> <ul style="list-style-type: none"> ▪ Identifying and tagging trees that may require removal due to construction activities. - Surveying existing buildings or structures on-site to assess demolition requirements. ▪ Planning internal routes for construction traffic and equipment movement within the site. 		<p>construction of the proposed AIS.</p> <ul style="list-style-type: none"> ○ They will be accommodated in rented houses in a nearby village. ▪ Public access to the construction area could present safety risks to the surrounding community. ▪ The marking of about 79 trees will result in habitat loss for various species, including birds, insects, reptiles, and small mammals. ▪ Natural microhabitats and nesting sites are at risk of disruption, potentially reducing local ecological diversity. ▪ Surveys of dilapidated structure (staff quarters and associated structures), are expected to generate dust, noise, and debris. ▪ Initial land preparation activities, such as marking and leveling, may disturb natural contours and lead to erosion. ▪ These considerations 	<p>to essential cases only, with prior approval from the Forest Department.</p> <ul style="list-style-type: none"> ▪ Avoid removal of endangered or near-threatened species, particularly during peak breeding or flowering seasons. ▪ If removal of sacred trees is unavoidable, carry it out respectfully following appropriate consultations. ▪ Implement compensatory afforestation in accordance with regulatory requirements under Forest Department supervision. ▪ Plant native, nectar-bearing, and fruit-bearing species 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
				highlight the need for careful planning to mitigate environmental and community impacts during the project's implementation.	<p>during the post-construction phase to restore habitat value.</p> <ul style="list-style-type: none"> ▪ Maintain and monitor planted vegetation for at least three years after plantation. <p>Soil and Land Management</p> <ul style="list-style-type: none"> ▪ Preserve topsoil from cleared areas and reuse it for plantation and landscaping. ▪ Confine all construction activities within project boundaries to prevent impacts on nearby agricultural or ecologically sensitive land. <p>Waste and Dust Management</p> <ul style="list-style-type: none"> ▪ Ensure all construction and demolition activities comply with the 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					Construction and Demolition (C&D) Waste Management Plan (Appendix 14). <ul style="list-style-type: none"> Carry out regular water sprinkling during demolition and clearing activities to control dust generation. 			
2	Development of Baseline	Collection of air, surface water, groundwater, soil, and noise samples at receptor level.	In the vicinity of Substation Land (500m radius around the SS)	<ul style="list-style-type: none"> There may be minor and short-term disruptions to the local soil or vegetation at the sampling sites. Temporary noise could arise from the operation of sampling equipment or the movement of the monitoring team. Additionally, there is a possibility of minor disturbances to nearby residents as a result of the sampling activities. 	<ul style="list-style-type: none"> Sampling will be carried out following standard protocols to ensure minimal disruption to the site. Any disturbed soil or vegetation will be restored after the sampling process. Local residents or stakeholders will be informed in advance of the sampling activities. 	EPC Contractor (through a NABL accredited/PCB (Assam) approved laboratories)	PMC, PIU & PMU (AEGCL)	Witness during sampling



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
3	Substation Layout & Design, and Site preparation	<ul style="list-style-type: none"> ▪ Development of benches within the substation through strategic excavation and filling to accommodate equipment installation and voltage-level segregation. ▪ Conducting a comprehensive topographic survey and preparing a detailed Site Grading Plan. ▪ Designing internal roads, pathways, and entry/exit points to facilitate smooth movement of vehicles and personnel. ▪ Planning stormwater drainage systems, sumps, and trenches to mitigate the risk of flooding during the monsoon season. ▪ Designing cable trenches and a robust earthing grid layout to ensure operational safety 	Substation	<ul style="list-style-type: none"> ▪ Disruption of soil layers leading to erosion and siltation risks during excavation and embankment activities. ▪ Dust emissions caused by clearing, grading, and vehicular movement, negatively impacting air quality. ▪ Potential changes to the local water flow due to alterations in natural drainage patterns. ▪ Noise and vibrations generated by heavy machinery and compaction processes, potentially disturbing nearby communities or wildlife. ▪ Soil compaction reducing water infiltration capacity and limiting future landscaping opportunities. ▪ Risk of stagnant water formation due to improper grading, encouraging mosquito breeding. ▪ Removal of 79 native trees, leading to vegetation reduction 	<p>Site Planning and Land Disturbance Control</p> <ul style="list-style-type: none"> ▪ Restrict excavation strictly to the defined project footprint within AEGCL premises. ▪ Identify designated areas for temporary stockpiling, material storage, and vehicular movement to minimize unnecessary soil disturbance. ▪ Carry out site grading and bench development using slope stabilization measures such as gabions, toe walls, and proper soil compaction. <p>Erosion, Drainage, and Soil</p>	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring during the layout and design phase



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>and prevent electrical hazards.</p> <ul style="list-style-type: none"> ▪ Strategically positioning firewalls and fire extinguishing systems, while ensuring access for firefighting vehicles. ▪ Allocating and integrating green spaces and buffer zones to enhance visual appeal and support ecological balance. ▪ Installing perimeter fencing or a compound wall for the protection of assets and safety of the premises. ▪ Tree removal where necessary to meet construction requirements. ▪ Potential demolition of pre-existing structures, if required. 		<p>and habitat loss.</p> <ul style="list-style-type: none"> ▪ Disturbance to microhabitats and disruption of nesting sites. ▪ Environmental impact arising from dust and debris due to the potential demolition of existing structures. • Site preparation activities such as clearance, excavation, and ground levelling may disturb natural soil strata and alter soil structure. • Excavation and grading works may increase the risk of localized soil erosion and degradation. • Accidental leaks or spills of oil, lubricants, diesel, and hydraulic fluids from construction machinery may result in soil contamination. • Construction and demolition (C&D) 	<p>Management</p> <ul style="list-style-type: none"> ▪ Install temporary silt fences, sediment traps, and stormwater diversion channels to control erosion and prevent sediment runoff. ▪ Design stormwater drainage systems in line with natural flow patterns and maintain them regularly to prevent blockages. ▪ Stockpile excavated topsoil separately for reuse in green belt development and erosion control. <p>Air, Noise, and Machinery Management</p> <ul style="list-style-type: none"> ▪ Maintain construction 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
				<p>waste including concrete debris, scrap metal, wooden pallets, and packaging materials may cause localized soil pollution if not properly managed.</p> <ul style="list-style-type: none"> ▪ Safety hazards posed by excavation equipment, deep pits, and working at heights during fencing and layout implementation. ▪ Increased pressure on local resources and services due to the presence of construction workers. 	<p>machinery properly to reduce noise emissions and limit operational hours (6 am to 6 pm) to minimize disturbance to nearby communities.</p> <ul style="list-style-type: none"> ▪ Sprinkle water on unpaved roads and exposed surfaces, particularly during dry months (December to April), to control dust. <p>Worker Safety and Facilities</p> <ul style="list-style-type: none"> ▪ Provide fencing and clear signage around excavation areas, train workers in safety procedures, and supply necessary personal 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					protective equipment (PPE). <ul style="list-style-type: none"> ▪ Locate worker accommodation and associated facilities within the substation construction site. Biodiversity and Vegetation Management <ul style="list-style-type: none"> ▪ Avoid cutting endangered or near-threatened plant species, especially during peak breeding or flowering periods. ▪ Restrict tree felling to essential cases with prior approval from the Forest Department. ▪ Undertake compensatory afforestation in accordance with regulatory requirements 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>under Forest Department supervision.</p> <ul style="list-style-type: none"> Restore habitat value after construction by planting native, nectar-rich, and fruit-bearing species. <p>Waste and Site Restoration</p> <ul style="list-style-type: none"> Follow standard demolition practices to manage debris and dust in line with the Construction and Demolition Waste Management Plan. Incorporate landscape restoration measures into overall project planning. 			
4	Sizing of Equipment, Type and Capacity	<ul style="list-style-type: none"> Selecting transformers, breakers, isolators, and other equipment based on voltage, current requirements, and 	Substation land	<p>Land Disturbance and Excavation Effects</p> <ul style="list-style-type: none"> The use of large equipment often necessitates deep or expansive foundations, which can significantly 	<p>Excavation and Soil Protection</p> <ul style="list-style-type: none"> Limit excavation to the minimum necessary to reduce soil erosion and 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>system configuration.</p> <ul style="list-style-type: none"> ▪ Planning equipment placement and spacing to maintain appropriate electrical clearances and facilitate ease of operation. ▪ Developing an effective grounding and earthing design to safely dissipate fault currents and ensure the safety of personnel. ▪ Incorporating provisions for future expansion by allocating space and designing layouts to accommodate potential capacity upgrades. 		<p>affect soil stability and modify topography. Increased Oil Storage Risks</p> <ul style="list-style-type: none"> ▪ The size and capacity of oil-filled transformers could elevate the likelihood of spillage, fire hazards, and environmental contamination if proper containment measures are not in place. 	<p>prevent sediment runoff into surrounding areas.</p> <p>Oil Spill Prevention and Containment</p> <ul style="list-style-type: none"> ▪ Install impervious oil containment pits with adequate capacity to hold the full volume of oil. ▪ Construct these pits using oil-resistant, non-permeable materials and equip them with oil-water separators to manage potential transformer oil leaks or spills effectively. <p>Efficient Land Use and Layout Planning</p> <ul style="list-style-type: none"> ▪ Optimize equipment placement to ensure a compact and efficient layout, minimizing land use while maintaining 			

S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					required electrical clearances.			
FACILITIES SET-UP								
5	Temporary workers' camp	<ul style="list-style-type: none"> ▪ Setting up temporary shelters and kitchens for workers. ▪ Utilizing water resources for drinking, cooking, bathing, and washing purposes. ▪ Production of domestic wastewater and sewage. ▪ Managing the disposal of kitchen waste along with solid non-biodegradable materials like plastics and packaging. ▪ Storage and removal of construction-related debris within or around the camp premises. ▪ Burning waste materials or biomass as a fuel source for cooking. ▪ Collecting and using firewood or timber 	Workers camp	<ul style="list-style-type: none"> ▪ Soil and water contamination due to uncontrolled waste disposal. ▪ Groundwater depletion or pollution from untreated sewage. ▪ Loss of local flora and fauna due to poaching and wood harvesting. ▪ Risk of human-wildlife conflict. ▪ Vector-borne diseases (e.g., malaria, dengue) from poor drainage or stagnant water. ▪ Air pollution due to burning of waste and biomass. ▪ Health risks for workers due to unhygienic conditions and lack of medical access. ▪ Social tensions with local host communities due to cultural insensitivity, competition over local resources or misconduct. ▪ Visual and noise disturbance to nearby residents and possibly 	<p>Camp Location and Planning</p> <ul style="list-style-type: none"> ▪ Locate labour camps within the subproject premises and obtain approval from the PIU/PMC in accordance with IFC performance standards. <p>Sanitation, Water, and Hygiene</p> <ul style="list-style-type: none"> ▪ Provide adequate sanitation facilities (minimum 1 toilet per 10 workers) with appropriate wastewater treatment systems such as bio-toilets or soak pits. ▪ Ensure a safe and reliable supply of clean drinking water. ▪ Install proper drainage systems 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular Inspection and monitoring



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>sourced from nearby areas.</p> <ul style="list-style-type: none"> ▪ Engaging in activities like hunting, poaching, or fishing by workers for personal consumption. ▪ Generating noise, dust, and light pollution due to camp operations. ▪ Interaction and engagement with local communities. ▪ Building temporary sanitation solutions such as pit latrines, soak pits, and similar facilities. 		<p>wildlife, if any.</p> <ul style="list-style-type: none"> ▪ Increased fire risk due to unsafe cooking or electrical practices. ▪ Contractors must have their own Labour Management Plan. 	<p>to prevent waterlogging and mosquito breeding.</p> <ul style="list-style-type: none"> ▪ Maintain regular cleaning and disinfection of camp areas. <p>Health and Welfare</p> <ul style="list-style-type: none"> ▪ Conduct monthly health check-ups and provide access to first-aid facilities. ▪ Provide clean energy sources (e.g., LPG) for cooking. ▪ Conduct regular training on hygiene, sanitation, and respectful interaction with local communities. <p>Waste and Environmental Management</p> <ul style="list-style-type: none"> ▪ Establish an effective waste management system including segregation, collection, and safe disposal. 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<ul style="list-style-type: none"> ▪ Ensure camp lighting is downward-directed and minimized to reduce disturbance to fauna. ▪ Prohibit hunting, poaching, and collection of firewood through a clearly defined code of conduct. <p>Safety and Emergency Preparedness</p> <ul style="list-style-type: none"> ▪ Install firefighting equipment (e.g., fire extinguishers and sand buckets) at appropriate locations. ▪ Display emergency contact numbers and install signage and safety warnings in local languages. <p>Labour Management and Grievance Redressal</p> <ul style="list-style-type: none"> ▪ Enforce a strict 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>worker Code of Conduct, including zero tolerance for gender-based violence (GBV).</p> <ul style="list-style-type: none"> Establish a grievance redress mechanism (GRM) with clear procedures and a dedicated register for labour-related complaints. 			
6	<p>Procurement of construction materials from Borrow areas and quarries.</p> <p>Transportation and unloading of material at site, storage and workshop</p>	<ul style="list-style-type: none"> Identification and operation of borrow areas and quarries (in coordination with regulatory authorities). Extraction and transportation of sand, aggregates, stones, and earth materials to site. Site preparation for material storage, workshop and maintenance areas, including additional vegetation clearance and tree cutting. Construction of 	<p>Borrow areas and quarry sites.</p> <p>Construction site, Stores, machine shops</p>	<ul style="list-style-type: none"> Land degradation may occur due to excavation in borrow areas and the establishment of storage or workshop facilities. Additional tree felling and vegetation removal may lead to habitat loss for local flora and fauna. Improper storage or handling of oils, chemicals, paints, lubricants, and wastewater from workshops may result in soil and water contamination. Material transport and unloading activities may increase dust, noise, and vibration levels. 	<p>Borrow Area and Quarry Management</p> <ul style="list-style-type: none"> Prepare and implement a Borrow Area and Quarry Management Plan in line with regulatory requirements. Source materials only from approved borrow areas and licensed quarries. Avoid extraction from ecologically sensitive areas, forests, or locations near 	EPC Contractor	PMC, PIU & PMU(AEGCL)	Continuous monitoring during procurement and transportation of construction materials



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		temporary sheds for storage of construction materials, oils, fuels, lubricants, paints, chemicals, etc.		<ul style="list-style-type: none"> Increased traffic, particularly along narrow roads, may raise the risk of accidents and cause disruptions to nearby communities 	<p>water bodies.</p> <p>Materials Storage and Pollution Control</p> <ul style="list-style-type: none"> Store construction materials, fuels, and chemicals in designated paved and bunded areas with roofing and clear labeling. Provide soak pits and oil/grease traps to manage effluents from workshops and storage yards. Design storage areas with provisions for stormwater runoff control and spill containment. Regularly collect and dispose of solid and hazardous waste through authorized vendors. <p>Fire and Occupational Safety</p> <ul style="list-style-type: none"> Equip workshops, storage areas, 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>and refueling stations with firefighting equipment and sand buckets.</p> <ul style="list-style-type: none"> ▪ Conduct fire safety training and designate emergency response personnel. ▪ Provide appropriate personal protective equipment (PPE) for workers handling fuels, chemicals, or undertaking cutting and welding activities. ▪ Install proper signage, lighting, and safety barriers around storage and unloading areas. <p>Transport and Traffic Management</p> <ul style="list-style-type: none"> ▪ Develop and implement a Traffic Management Plan identifying sensitive 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					locations, alternative routes, and speed control measures. <ul style="list-style-type: none"> Ensure all transport vehicles comply with pollution control standards and maintain valid fitness certificates. Environmental and Social Safeguards <ul style="list-style-type: none"> Prohibit unnecessary or additional vegetation clearance. Obtain prior consent and provide compensation for any loss of crops or agricultural land (zirat) in accordance with the entitlement provisions of the ESMPF. 			
DURING CONSTRUCTION PHASE								
7	Excavation, RCC, Foundations, Control Room, Pathways,	<ul style="list-style-type: none"> Pits for foundations of equipment, transformers, gantries, switchyard structures, and the 	Substation	<ul style="list-style-type: none"> Construction activities present a range of environmental, health, and social risks that require careful 	Site and Soil Management <ul style="list-style-type: none"> Stabilize excavated areas through proper 	EPC Contractor	PMC, PIU & PMU(AEGCL)	Regular monitoring during construction



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	Earthing & Switchyard Structures	<p>control room are excavated using both mechanical equipment and manual labour.</p> <ul style="list-style-type: none"> ▪ Steel reinforcement is shaped, positioned, and secured at foundation locations, followed by the placement of reinforced cement concrete (RCC) to provide structural strength for foundations, control rooms, and trenches. ▪ Construction of the control room is undertaken along with cable trenches, cable trays, drainage systems, internal roads, walkways, and foundation supports to create an integrated site layout. Switchyard structures, transformers, and related electrical components are installed and properly earthed in 		<p>management to minimize potential impacts.</p> <ul style="list-style-type: none"> ▪ Accidental leaks of fuel or oil from machinery, along with improper storage or disposal of chemicals, can contaminate soil, surface water, and groundwater. ▪ Excavation and soil stockpiling may lead to sediment-laden runoff during rainfall, which can disrupt drainage systems, damage aquatic ecosystems, and destabilize soil, especially in sloped areas. ▪ Construction debris such as concrete waste, metal scraps, and packaging materials, if not properly managed, can degrade land and water quality, while uncontrolled disposal of excess soil or muck may block natural drainage, alter terrain, and cause localized flooding and soil degradation. ▪ Activities such as excavation, concreting, material transport, and diesel engine operation also contribute to 	<p>compaction and backfilling.</p> <ul style="list-style-type: none"> ▪ Avoid excavation during heavy rainfall and cover exposed soil with tarpaulins or vegetation to reduce erosion. ▪ Install silt fences, sediment traps, and bunds to control runoff and prevent soil displacement. ▪ Ensure effective drainage to prevent waterlogging and designate specific areas for equipment washing with wastewater collection facilities. ▪ Preserve topsoil separately for reuse in landscaping. <p>Waste, Materials, and Pollution Control</p> <ul style="list-style-type: none"> ▪ Segregate construction waste and 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>line with safety requirements to ensure reliable operation.</p> <ul style="list-style-type: none"> ▪ Diesel-powered machinery, including excavators, concrete mixers, vibrators, and transport vehicles, is used during construction activities. ▪ Excavated soil is temporarily stockpiled near work areas for reuse where feasible or disposed of in an appropriate manner. ▪ Cable trays and ducts are laid within prepared trenches throughout the substation area to support organized routing and connectivity. ▪ Construction materials and heavy equipment are transported across terrain that may be uneven, unpaved, or sloped, requiring careful handling to 		<p>increased dust and noise levels, potentially disturbing nearby communities and wildlife and causing respiratory problems or discomfort, particularly among vulnerable groups such as children and the elderly.</p> <ul style="list-style-type: none"> ▪ Workers may face multiple occupational hazards, including injuries from manual handling, falls, dust exposure, contact with hazardous substances, electrical risks, and fire hazards from operations like welding and cutting. Increased transport demand may lead to traffic congestion, higher accident risks, and restricted public access, ▪ While interactions between migrant workers and host communities may give rise to social tensions, including risks of gender-based violence, sexual exploitation, and cultural misunderstandings. ▪ There is also the possibility of 	<p>dispose of it at authorized landfills or recycling facilities.</p> <ul style="list-style-type: none"> ▪ Maintain machinery regularly to prevent leaks and reduce emissions, and use low-emission equipment wherever feasible. ▪ Suppress dust by sprinkling water on exposed surfaces, cover stockpiles, and monitor air and noise levels in sensitive locations. ▪ Store fuel and chemicals securely in banded areas with impermeable surfaces to prevent contamination. ▪ Train workers in spill response procedures, keep 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		maintain safe and efficient site operations.		<p>encountering wildlife—such as snakes—or inadvertently discovering archaeological or culturally significant materials during construction.</p> <ul style="list-style-type: none"> ▪ Therefore, comprehensive management measures are essential to prevent harm to biodiversity, protect community well-being, and safeguard cultural heritage. 	<p>spill response kits available on-site, avoid refueling on bare soil, and conduct regular inspections.</p> <p>Occupational Health and Safety (OHS)</p> <ul style="list-style-type: none"> ▪ Develop and implement an Occupational Health and Safety (OHS) Management Plan. ▪ Provide and enforce the use of personal protective equipment (PPE), including helmets, gloves, safety boots, masks, and ear protection. ▪ Conduct regular training on safety procedures, emergency response, and electrical safety. ▪ Maintain first-aid kits and fire extinguishers on-site. ▪ Install fencing 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>and warning signs around hazardous areas and restrict public access to construction zones.</p> <ul style="list-style-type: none"> ▪ The EPC should follow the Guidelines for erection of scaffolding and safe use of temporary ladders (Appendix-17) and SoP on Working at Heights (Appendix-18). <p>Community Health, Safety, and Engagement</p> <ul style="list-style-type: none"> ▪ Appoint a community liaison officer and establish a grievance redressal mechanism. ▪ Schedule high-noise and heavy-traffic activities during less disruptive hours, preferably between 6 am 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>and 6 pm.</p> <ul style="list-style-type: none"> ▪ Prepare and implement a Traffic Management Plan in coordination with local authorities. ▪ Use appropriate signage and deploy flagmen to ensure safe movement of vehicles and pedestrians. ▪ Transport materials during non-peak hours, provide alternative pedestrian routes, and maintain emergency access at all times. <p>Labour Welfare and Social Management</p> <ul style="list-style-type: none"> ▪ Orient migrant workers on local customs and expected conduct. ▪ Enforce a worker Code of Conduct, establish a labour grievance 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>mechanism, and implement a Gender Action Plan to address risks of gender-based violence and sexual exploitation.</p> <ul style="list-style-type: none"> ▪ Arrange regular health check-ups and awareness sessions for workers. <p>Biodiversity and Cultural Heritage Protection</p> <ul style="list-style-type: none"> ▪ If wildlife is observed on-site, stop work immediately and inform the Forest Department for appropriate action. ▪ In case of discovery of archaeological or culturally significant materials, halt work in the affected area and notify district authorities and relevant heritage agencies to 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					ensure proper protection and management.			
ERECTION WORKS								
8	<ul style="list-style-type: none"> Transport of Power transformers to the site. Unloading and installation of power transformers. Assembly and installation of substation bus bars and bus couplers. Installation of transformer bays, line bays, and terminal gantries. Filling of transformer oil and safe storage and handling of battery water, battery banks, and related chemicals. Internal wiring and connection of control room 	<ul style="list-style-type: none"> Heavy power transformers are transported to the substation site using flatbed trailers via existing roads and bridges. Upon arrival, transformers are carefully unloaded and positioned on designated transformer bays using appropriate lifting equipment to ensure safe and secure placement. Bus bars, bus couplers, and related components are then installed and connected to establish efficient electrical pathways. Transformer bays and line bays are installed, and incoming and outgoing line terminal gantries are constructed to support the overall 	Access routes to the substation site including transformer bays, battery room, switchyard, control room, and storage areas	<ul style="list-style-type: none"> Risk of injuries or fatalities due to inadequate use of personal protective equipment (PPE), insufficient worker training, or unsafe installation and erection practices. Potential soil and water contamination resulting from spills or leaks of transformer oil, fuels, chemicals, or battery water. Air pollution and increased greenhouse gas emissions due to possible SF₆ gas leakage. Fire risks arising from short circuits or overloaded electrical systems. Possibility of social tensions between migrant workers and host communities, including risks of gender-based violence (GBV), sexual exploitation and abuse (SEA), and cultural misunderstandings. 	<p>Transport and Community Safety</p> <ul style="list-style-type: none"> Schedule transportation during off-peak hours to minimize disruption to local communities. <p>Worker Safety and Training</p> <ul style="list-style-type: none"> Ensure all workers wear complete personal protective equipment (PPE), including helmets, gloves, safety boots, eye protection, and high-visibility clothing. Conduct mandatory safety inductions and regular training on safe lifting, rigging, and electrical work practices. Assign only qualified and 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	<p>panels.</p> <ul style="list-style-type: none"> Storage and proper management of SF₆ gas cylinders. 	<p>electrical infrastructure.</p> <ul style="list-style-type: none"> Transformers are filled with insulating oil to prepare them for commissioning and ensure proper operation. water, battery banks, and other required chemicals are stored and managed on-site in accordance with safety standards. Electrical connections are established and internal wiring within control room panels is configured for different bays and equipment to ensure proper system integration. SF₆ gas cylinders used in circuit breakers and switchgear are stored, handled, and monitored carefully to maintain operational reliability and prevent safety risks. 			<p>experienced personnel to operate cranes, perform rigging, and carry out electrical installations.</p> <p>Storage and Handling of Oils, Fuels, and Chemicals</p> <ul style="list-style-type: none"> Construct covered, concrete, and bunded storage areas for transformer oil, fuels, battery water, and chemicals to prevent soil contamination and runoff. Store fuels and hazardous materials away from worker accommodations and public areas, with proper hazard labeling and fire protection measures. <p>Fire and Electrical Safety</p>			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<ul style="list-style-type: none"> ▪ Inspect and maintain firefighting equipment regularly, including fire extinguishers, fire blankets, and alarm systems. ▪ Install electrical safety systems such as circuit breakers and protective relays, and test them periodically to ensure proper functioning. <p>SF₆ Gas Management</p> <ul style="list-style-type: none"> ▪ Store SF₆ cylinders in secure, well-ventilated areas with restricted access. ▪ Conduct regular inspections of gas handling equipment using appropriate leak detection tools. ▪ Train personnel in safe SF₆ handling and emergency response 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>procedures.</p> <ul style="list-style-type: none"> ▪ Maintain detailed records of SF₆ inventory, usage, and any leak incidents to monitor and reduce emissions. <p>Labour Management and Social Safeguards</p> <ul style="list-style-type: none"> ▪ Orient migrant workers on local cultural norms and expected behaviour. ▪ Enforce a comprehensive worker Code of Conduct. ▪ Establish a labour grievance redressal committee and implement a Gender Action Plan to address risks of gender-based violence and sexual exploitation or abuse (GBV/SEA). <p>Health Monitoring and Institutional Coordination</p> <ul style="list-style-type: none"> ▪ Conduct monthly 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>health check-ups and awareness programmes for workers.</p> <ul style="list-style-type: none"> Coordinate with local authorities and environmental agencies to ensure regulatory compliance and effective. 			
POST-CONSTRUCTION AND COMMISSIONING PHASE								
9	<ul style="list-style-type: none"> Energize and commissioning of power transformers to establish auxiliary power supply. Installation of communication systems, including power line carrier communication (PLCC). Connection and termination of incoming transmission lines to substation 	<ul style="list-style-type: none"> Assembly, oil filling, and commissioning of the power transformer Installation of connectivity and internal wiring in control room panels Establishing jumpers and spacers between incomer lines, substation bus bars, transformers, isolators, current transformers, potential transformers, and circuit breakers Mounting accessories on power cables Soil restoration, 	<p>Switch yard area designated for transformer installation and charging operations</p> <p>Control room and switchyard allocated for communication and wiring-related tasks</p> <p>Complete substation premises utilized for line connection, restoration work, and green belt development</p>	<ul style="list-style-type: none"> Leakage of transformer oil may lead to contamination of soil and groundwater. Inadequate slope management and blocked drainage systems can cause soil erosion and increased surface runoff, while leftover construction materials and debris may pollute the environment and hinder vegetation growth. Improper transformer installation or oil leakage may create risks of fire, explosions, or electric shock. Installation of communication 	<p>Oil Spill and Environmental Protection</p> <ul style="list-style-type: none"> Construct concrete-lined containment pits around transformer foundations to capture any oil leakage and prevent contamination of soil and water. Stabilize slopes, clear drainage channels of obstructions, and restore topsoil after construction to maintain 	EPC Contractor, PIU AEGCL	PMC & PMU (AEGCL)	Continuous monitoring during the commissioning phase, followed by periodic checks (e.g., quarterly) during the operational phase



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	equipment.	<p>slope stabilization, and green belt development in affected areas</p> <ul style="list-style-type: none"> Testing and commissioning of all substation systems 		<p>systems and electrical components may result in accidents or injuries if safety measures are insufficient.</p> <ul style="list-style-type: none"> Additional risks include electrical hazards from accidental contact with high-voltage equipment, as well as noise generated by transformers and other operational machinery that may disturb nearby communities. 	<p>environmental integrity.</p> <ul style="list-style-type: none"> Develop green belts using native plant species to improve soil stability and support ecological balance. After construction, carry out thorough site cleaning, ensure safe waste disposal, and implement landscaping measures to restore vegetation. <p>Operational and Worker Safety</p> <ul style="list-style-type: none"> Maintain functional firefighting systems on-site and conduct regular safety audits. Ensure that only trained and authorized personnel 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>perform high-risk activities.</p> <ul style="list-style-type: none"> ▪ Enforce strict safety procedures, including the use of personal protective equipment (PPE), work permit systems, lockout/tagout procedures, and clearly marked hazard zones. <p>Community Safety and Emergency Preparedness</p> <ul style="list-style-type: none"> ▪ Implement strict access control measures, secure fencing, and surveillance to prevent unauthorized entry to the substation. ▪ Display clear and prominent warning signage indicating electrical hazards. ▪ Conduct routine equipment 			



S. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>maintenance to minimize noise and prevent operational failures.</p> <ul style="list-style-type: none">▪ Coordinate emergency response plans with local authorities and conduct community awareness programmes to inform nearby residents about safety precautions and emergency contact information.▪			

Table 37: Environment and Social Management Plan for 220kV 4 CKT Baghchap LILO and 220kV D/C TATA Transmission Lines

Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
PRE-CONSTRUCTION PHASE								
1	Route Survey	<ul style="list-style-type: none"> Identification and enumeration of trees proposed for removal, delineation of areas requiring soil excavation for tower foundations, selection of quarry development sites, and designation of locations for stacking construction materials, among other preparatory activities. Every effort should be made to minimize impacts on public or private structures, utility infrastructure, and common property resources. 	Tower Base and RoW of Transmission line	Potential effects may include impacts on private and agricultural land, as well as associated livelihoods; alterations to physical features such as topography; potential loss of biodiversity; and disruption of public utility infrastructure.	<ul style="list-style-type: none"> Determine the most suitable route alignment and tower foundation locations to minimize impacts on private property, public utilities, common property resources, and biodiversity. Where disturbances to public utilities or shared resources are unavoidable, provide advance notice to affected communities about the expected timing and duration of disruptions, and ensure prompt restoration of services to minimize inconvenience. 	Surveyor	PMC, PIU & PMU (AEGCL)	Regular monitoring during the survey phase, especially in ecologically sensitive areas.
2	Forest Case Preparation and Preliminary Survey	<ul style="list-style-type: none"> Identify and mark trees and vegetation to be removed at tower foundation sites, carry out trimming within the right-of-way, and clear access routes leading to 	Tower	<ul style="list-style-type: none"> The construction process could significantly affect physical resources and the topography, particularly in hilly regions. It may result in the loss of tree cover, 	<ul style="list-style-type: none"> Secure all required clearances from the appropriate authorities, such as those responsible for railways, roadways, airports, and other relevant agencies. Plan and implement 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring during marking and preparation activities

Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>transmission tower locations.</p> <ul style="list-style-type: none"> Assess potential impacts on forest-dependent communities, where applicable. 		<p>which, in turn, could lead to erosion, landslips, and landslides.</p> <ul style="list-style-type: none"> These changes can alter the landscape, creating features such as gullies and ridges, thereby causing considerable topographical impacts. 	<p>compensatory afforestation in coordination with the Forest Department, ensuring alignment with regional watershed development plans.</p>			
3	Detailed Surveys	<p>Identification of landowners along transmission line corridors and at tower locations, including those situated on agricultural land, within forest areas, and in portions of houses or buildings affected by tower foundations.</p>	Tower Base and RoW of Transmission line	<ul style="list-style-type: none"> Potential impacts may include effects on private and agricultural land, associated livelihoods, and possible resettlement requirements. Additional concerns include alterations to physical features such as topography, potential loss of biodiversity, soil erosion, and the risk of landslips or landslides in the area. 	<ul style="list-style-type: none"> Proposed tower locations may be shifted horizontally or laterally to avoid routing transmission lines directly over residential properties or existing assets that could negatively impact landowners, and provide safety clearance. 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Monitoring as required during the preconstruction phase, especially for tower locations in various terrains.
4	Soil Investigation, other environmental baseline	<p>Soil samples are collected either manually or using machinery, alongside the collection of water from wells or nearby water</p>	Tower Base	<ul style="list-style-type: none"> Minor impact of collection of soil samples on topography or pollution of water 	<ul style="list-style-type: none"> Avoid selecting marshy areas, low-lying zones, riverbeds, or regions prone to earth slips, as these pose risks to the 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Continuous monitoring during the preconstruction phase,



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	information	sources within the RoW area.		source during sample collection	stability of foundations. <ul style="list-style-type: none"> Establishing a baseline for development will aid in regularly monitoring environmental parameters throughout the construction phase. This approach minimizes potential negative impacts on environmental resources in the area, including air quality, noise levels, groundwater quality, and surface water quality during the construction process. 			with periodic assessments
FACILITIES SET-UP								
5	Temporary Workers' Camps	<ul style="list-style-type: none"> The area can be potentially impacted by the indiscriminate disposal of kitchen waste, sanitary waste, scrap materials, and other non-recyclable or unusable refuse. Inadequate solid and liquid waste management within worker camps, including accidental spills, may lead to 	Workers' Camp	<ul style="list-style-type: none"> Discharge of untreated oils, wastewater, and sewage from camps into rivers, water bodies, or drainage systems can seriously degrade surface and groundwater quality and harm downstream aquatic life. Contaminated river water downstream 	Camp Location and Environmental Safeguards <ul style="list-style-type: none"> Contract provisions should specify minimum setback distances for construction camps from water bodies, protected areas, and other sensitive locations. Worker Facilities and Welfare <ul style="list-style-type: none"> The EPC contractor may 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring, at least weekly, during the construction phase



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>contamination of nearby rivers and streams.</p> <ul style="list-style-type: none"> Additional concerns include wildlife poaching, fishing, and collection of firewood by workers. 		<p>may become unfit for bathing or drinking purposes.</p> <ul style="list-style-type: none"> Camp-related activities may also damage surrounding ecosystems through practices such as wildlife poaching and the use of timber for firewood, resulting in ecological degradation. 	<p>provide liquefied petroleum gas (LPG) cylinders for worker use, such as cooking.</p> <ul style="list-style-type: none"> The contractor must ensure adequate washing and sanitation facilities are available for all workers. <p>Management and Compliance</p> <ul style="list-style-type: none"> A Labour Camp Management Plan and a Construction Waste Management Plan will be prepared and implemented. 			
6	Transportation and unloading of material at site, storage and workshop	<ul style="list-style-type: none"> Preparation and grading of land for the development of storage areas. Transport of construction materials and equipment to different locations, with heavy cranes used for loading and unloading at designated sites such as storage yards and tower foundations. Handling and disposal of various waste streams, including sanitary waste, scrap materials, non- 	Construction Sites, Workshops, stores, machine shops and access roads	<ul style="list-style-type: none"> Nuisance to the residents arises due to noise, vibrations, and dust from ongoing activities. Activities such as soil leveling and vehicular emissions adversely affect air quality and noise levels in the surrounding area. Additionally, the cutting of trees and soil erosion pose significant threats to the terrestrial ecology of the region. Improper handling of workshop waste 	<p>Site Selection and Environmental Protection</p> <ul style="list-style-type: none"> Locate material storage yards and workshops away from environmentally sensitive areas. <p>Vehicle and Pollution Control</p> <ul style="list-style-type: none"> Ensure all vehicles operating on-site comply with applicable pollution control standards. <p>Worker Safety</p> <ul style="list-style-type: none"> Mandate the use of personal protective equipment (PPE) for material handling and 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring during material handling activities



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		recyclable waste, oils, sewage, machinery slurry, and oil leaks from transport vehicles. <ul style="list-style-type: none"> Welding, cutting, and fabrication of raw materials as part of construction activities. 		contributes to environmental degradation by introducing unplanned solid waste, unsafe wastewater, and other liquid discharges. These pollutants can flow into water bodies and drainage systems, severely impacting groundwater quality and aquatic ecosystems in the affected areas.	all workshop activities. Traffic Management <ul style="list-style-type: none"> Prepare and implement a Traffic Management Plan (TMP), including mapping of sensitive locations such as schools, healthcare facilities, community structures, and market areas. 			
DURING CONSTRUCTION PHASE								
7	Pit Marking, digging of foundation	Clearing land for tower installation in agricultural fields or hilly regions can pose challenges such as encountering unsuitable soil types. This often necessitates larger and contour-specific tower foundations. In areas like marshy lands, hilly terrains, or river basins, pile foundations may be required to ensure stability. Additional	Tower Foundation	<ul style="list-style-type: none"> Construction activities may affect physical features and terrain, including the loss of trees, which can increase the risk of soil erosion, landslips, and landslides, particularly in hilly areas. Such disturbances may alter landforms, leading to the development of gullies and ridges. Surface runoff and oil leaks from construction 	Site Selection and Foundation Planning <ul style="list-style-type: none"> Ensure adequate drainage and appropriate soil conditions to reduce tower foundation requirements, while considering terrain contours, tower alignment, distance from trees, and proximity to sensitive areas. Noise Control <ul style="list-style-type: none"> Implement measures to minimize noise levels at excavation sites. 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring during excavation activities



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		considerations include the stacking of excavated soil and the use of digging machinery for foundation work.		<p>machinery may degrade groundwater and surface water quality, adversely affecting aquatic ecosystems.</p> <ul style="list-style-type: none"> Air quality and noise levels may also worsen due to excavation activities, machinery operation, and the stockpiling of loose soil. The loss of agricultural land can significantly impact the human environment by affecting livelihoods and access to resources. 				
8	Construction of Foundation, Revetment Construction of Foundation, Revetment	<ul style="list-style-type: none"> Excavation and concrete pouring for tower foundations Surface runoff from stockpiled soil and potential oil leaks from machinery and vehicles Challenges with steep slopes and unsuitable soil conditions observed 	Tower Base	<ul style="list-style-type: none"> Surface runoff and oil leaks from excavation machinery may negatively affect groundwater and surface water quality, as well as harm aquatic ecosystems. The site's steep terrain and unsuitable soil conditions require the construction of large, contour-specific tower foundations, along with specialized 	<p>Soil Restoration and Management</p> <ul style="list-style-type: none"> Restore loosened foundation soil by compacting and ramming it back into place. Dispose of or spread excess soil in locations that do not interfere with natural drainage patterns. <p>Revetment and Structural Protection</p> <ul style="list-style-type: none"> Provide weep holes in 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Continuous monitoring during construction, with periodic assessments



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
				<p>revetment measures to ensure stability.</p>	<p>revetment structures to allow water or moisture to drain freely, reducing pressure buildup and preventing structural damage.</p>			
				<ul style="list-style-type: none"> ▪ Injuries or health issues impacting workers or members of the public; ▪ Accidents or unexpected incidents; ▪ Gender-based violence or sexual exploitation; ▪ Possible tensions or disputes between migrant workers and local communities. 	<ul style="list-style-type: none"> ▪ An Occupational Health and Safety (OHS) Management Plan should be developed by the EPC Contractor as part of the CESMP. This plan must then be implemented by the designated OHS officer of the EPC Contractor. ▪ Additionally, the OHS officer of the EPC Contractor is responsible for organizing occupational health and safety awareness programs. These programs should include topics such as AIDS and other sexually transmitted diseases (STDs). ▪ Furthermore, any potential conflicts between migrant workers and local inhabitants should be addressed proactively. ▪ This can be achieved through conducting 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Continuous monitoring during construction, with periodic assessments



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					workshops for workers to educate them on local customs and codes of conduct.			
ERECTION WORKS								
9	Pre-Erection Checks	<ul style="list-style-type: none"> Relocation of distribution lines, water supplies, and tree removal within the designated right of way. Payment of compensation for tower base and transmission line corridor as assessed by the revenue circle or district administration. 	Tower base and Right of Way	<ul style="list-style-type: none"> Temporary power outages caused by the disconnection of distribution lines can lead to disruptions for the local population. Essential services, such as water supply and other utilities, may also be adversely affected as a result of these interruptions. 	<ul style="list-style-type: none"> Ensure the re-routing of public utilities impacted by the transmission line, including distribution lines, power lines, and telecom lines. Provide compensation for land, zirat, and other relevant assets prior to the initiation of construction activities, as required. 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring during the pre-erection phase, especially when utility lines are being rerouted
10	Erecting towers, arms, Erection, Tightening and Punching	Positioning and assembling tower sections, lifting and aligning members, installing panels sequentially from the base upward while maintaining vertical alignment through temporary bracing and checks, secure by bolts and fasteners. Lifting Cross-arms, aligning and fixing at designated levels, structural bolts systematically tightened to specified torque and	Tower	<ul style="list-style-type: none"> Improper tower erection presents serious safety hazards and may result in injuries to both workers and nearby residents. Use of untrained personnel further increases the risk of accidents and fatalities. Adverse weather conditions can undermine tower stability during erection or stringing 	<p>Safety Measures and Training</p> <ul style="list-style-type: none"> Workers must consistently use PPE, as required for the job/tasks Strict adherence to safety protocols is essential throughout the tower erection process The EPC contractor should provide comprehensive on-site training for both staff and nearby residents. <p>Tower Design and</p>	EPC Contractor	PMC, PIU & PMU (AEGCL)	Continuous monitoring during tower erection, with frequent checks on safety measures



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		rechecked to ensure uniform load distribution and stability, bolts are punched or marked to confirm completion, support inspection, and prevent tampering, verified and recorded.		<p>operations.</p> <ul style="list-style-type: none"> ▪ Uneven stringing loads or strong winds may lead to partial or complete structural collapse. ▪ 	<p>Stability</p> <ul style="list-style-type: none"> ▪ The EPC contractor is responsible for ensuring the tower structure is designed to prevent accidents, including partial or complete collapse, during erection and stringing. ▪ The EPC contractor is responsible for ensuring the tower structure is erected in accordance with the design specifications to prevent accidents, including partial or complete collapse, during erection and stringing. ▪ This includes factoring in potential risks such as uneven stringing loads and extreme wind conditions to ensure structural stability. 			
11	Earthing, clipping and fixing of accessories, installation of OPGW (Optical Ground Wire)	Earthing is installed to ensure effective grounding and electrical safety of the tower structure. Conductors and hardware are securely clipped in place, and necessary	Tower	<ul style="list-style-type: none"> ▪ Electrical Hazards: Improper earthing or faulty connections can lead to electric shocks, short circuits, or equipment damage. ▪ Accidents from 	<ul style="list-style-type: none"> ▪ The EPC contractor must ensure: ▪ Electrical Hazards: Ensure proper design and installation of earthing systems, conduct regular inspections, and verify 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Regular monitoring during the installation of earthing and accessories



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		accessories are fixed according to design specifications. The Optical Ground Wire (OPGW) is then installed, properly tensioned, and connected to provide both lightning protection and reliable communication functionality.		<p>Falling Objects: Accessories, conductors, or hardware may fall during installation, posing risks to workers.</p> <ul style="list-style-type: none"> ▪ Tension-Related Failures: Incorrect tensioning of the OPGW or earth wires may cause snapping, structural damage, or operational failures. ▪ Soil Instability: Inadequate backfilling around earthing points can result in soil erosion, runoff, or reduced grounding effectiveness. ▪ Worker Safety Risks: Absence of proper personal protective equipment (PPE) increases vulnerability to electrical and mechanical hazards. ▪ Environmental Impacts: Disturbance of soil during installation may affect local drainage or vegetation if not 	<p>all connections before energizing. Use insulated tools and follow standard electrical safety protocols.</p> <ul style="list-style-type: none"> ▪ Accidents from Falling Objects: Securely fasten all accessories, conductors, and hardware during installation. Establish exclusion zones beneath active work areas and provide overhead protection where needed. ▪ Tension-Related Failures: Apply correct tensioning procedures for OPGW and earth wires, using calibrated equipment. Train personnel on safe handling and installation techniques, and conduct pre-tensioning checks. ▪ Soil Instability: Backfill earthing pits properly with compacted soil, and implement erosion control measures such as slope stabilization or 			



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
				properly managed.	temporary barriers to prevent runoff. <ul style="list-style-type: none"> ▪ Worker Safety Risks: Provide and enforce the use of appropriate PPE, including helmets, gloves, safety boots, and harnesses for work at heights. Conduct regular safety training and toolbox talks. ▪ Environmental Impacts: Plan installation activities to minimize soil disturbance, maintain natural drainage patterns, and restore vegetation or topsoil where disturbed. Monitor for any erosion or sedimentation issues and implement corrective measures promptly. 			
POST-CONSTRUCTION AND COMMISSIONING PHASE								
12	Stringing and final sagging and tensioning of earth-wire and power conductor, Testing and Commissioning	Stringing of cables onto the erected towers and attaching accessories can be carried out either manually or with the assistance of appropriate equipment. Additionally, further	Tower Line	<ul style="list-style-type: none"> ▪ Risk of injuries from handling heavy conductors, tools, and accessories, including falls from height during manual or equipment-assisted stringing. 	<ul style="list-style-type: none"> ▪ Ensure proper tension is maintained between the tensioner and the puller to keep the conductor elevated, avoiding contact with the ground or other potential obstructions 	EPC Contractor	PMC, PIU & PMU (AEGCL)	Continuous Monitoring during stringing operations



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
		<p>lopping of trees may be necessary within the Right of Way (ROW) to ensure proper clearance and safety compliance.</p>		<ul style="list-style-type: none"> ▪ Accidental contact with live conductors during testing or commissioning can lead to electric shocks or short circuits. ▪ Incorrect sagging or tensioning may cause snapping of conductors or earth wires, leading to structural damage, equipment failure, or injuries. ▪ Accessories, clamps, or conductors may fall during installation, posing risks to workers below. ▪ Additional tree lopping may affect local flora and fauna, potentially causing habitat disturbance or erosion within the ROW. ▪ Failure of stringing or tensioning machinery could result in accidents or operational delays. ▪ Improperly managed activities near inhabited areas may 	<p>that may cause damage.</p> <ul style="list-style-type: none"> ▪ Scaffolding must be employed when stringing operations involve crossing roads, rivers, channels, telecommunication lines, overhead power lines, railway tracks, fences, or walls. ▪ The number of trees requiring lopping should be determined in advance. ▪ Worker Safety and Fall Prevention: Ensure all personnel wear appropriate Personal Protective Equipment (PPE) including helmets, gloves, safety boots, and harnesses. Use safety nets, guardrails, and fall arrest systems for work at heights. Provide training on safe handling of conductors, tools, and accessories. ▪ Electrical Safety: De-energize lines during installation wherever possible. Follow lockout/tagout 			



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
				pose hazards to nearby residents, including accidental contact with sagging wires or falling debris.	<p>procedures, use insulated tools, and clearly mark live areas. Conduct regular electrical safety briefings.</p> <ul style="list-style-type: none"> ▪ Tensioning and Sag Control: Apply proper sagging and tensioning procedures using calibrated equipment. Conduct pre-tensioning checks and monitor loads to prevent snapping of conductors or earth wires. ▪ Falling Object Prevention: Secure all accessories, clamps, and conductors during installation. Establish exclusion zones beneath active work areas and use warning signs to alert personnel. ▪ Environmental Protection: Minimize tree lopping within the ROW. Retain critical habitat trees where feasible and implement erosion control measures such as temporary barriers, 			



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>silt fences, or soil stabilization.</p> <ul style="list-style-type: none"> ▪ Equipment Safety: Conduct regular inspections and maintenance of stringing and tensioning machinery. Train operators in safe use and emergency shutdown procedures. ▪ Community Safety: Maintain proper clearance from inhabited areas, enforce safety barriers, and provide public awareness about ongoing construction activities. Schedule high-risk operations during off-peak hours to reduce hazards to local residents. ▪ Monitoring and Supervision: Deploy supervisors to ensure compliance with safety and environmental protocols, and implement a reporting system for near-misses and incidents for timely corrective action 			



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
				<ul style="list-style-type: none"> ▪ Birds may collide with newly strung conductors or tensioned earth wires, especially during flight along the Right of Way (ROW). ▪ Improperly installed or closely spaced conductors can pose electrocution hazards to perching or flying birds. ▪ Additional tree lopping within the ROW may lead to loss of nesting or roosting sites, reducing available habitat for local bird species. ▪ Noise and human activity during stringing, tensioning, and testing may disturb feeding, nesting, or migratory patterns. ▪ The combination of habitat loss, increased risk of collision, and disturbance may result in long-term impacts on local 	<ul style="list-style-type: none"> ▪ Collision Prevention: Install bird diverters, markers, or visibility enhancements on newly strung conductors and tensioned earth wires to reduce collision risks. ▪ Electrocution Reduction: Maintain safe spacing between conductors, insulate exposed parts, and follow avian-safe tower design guidelines to prevent bird electrocutions. ▪ Habitat Conservation: Minimize tree lopping within the ROW where possible; retain key nesting and roosting trees outside the immediate construction footprint. ▪ Disturbance Management: Schedule stringing, tensioning, and testing activities to avoid peak breeding or migration periods. Limit noise and human activity near sensitive habitats. ▪ Monitoring and 	EPC Contractor /PIU & PMU (AEGCL)	PIU & PMU (AEGCL)	Throughout operations



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
				avifauna populations.	<p>Adaptive Measures: Conduct regular monitoring of bird activity in the ROW to identify high-risk areas and adjust mitigation strategies accordingly.</p> <ul style="list-style-type: none"> ▪ Restoration and Compensation: Where tree removal is unavoidable, implement compensatory tree planting with native species and create alternative roosting/nesting structures to restore habitat. <hr/> <ul style="list-style-type: none"> ▪ Deflectors and line markers must be installed at the designated location of the transmission line, which spans 10 km within the vicinity of a wildlife sanctuary or a potential migratory bird route. Additionally, sag lines should be maintained at a height of 9 meters, and barbed wire should be placed around towers in areas with animal 			



Sl. No.	Activity	Tasks	Location	Potential Impacts	Mitigation measures	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
					<p>populations.</p> <ul style="list-style-type: none">▪ Regular monitoring of the transmission line is essential, particularly for bird strikes during operation, with the use of deflectors as needed.▪ If monitoring indicates an increase in bird carcasses in specific areas of the transmission line, additional bird flappers may need to be installed.▪ A systematic record-keeping routine for documenting bird carcasses, including details on numbers, species, and seasons, must be maintained by AEGCL. These records should be analyzed regularly to assess the necessity for enhanced mitigation measures.			



7.2 Environmental and Social Monitoring Program

In tandem with the ESMP, the systematic and timely monitoring of real-time environmental and social data is indispensable for a comprehensive understanding of a project's impact and the effectiveness of mitigation measures. This ESMoP is designed to facilitate the timely collection and analysis of pertinent data, ensuring that the implementation of the ESMP remains responsive and adaptive throughout the project's entire lifecycle. The details of the Monitoring Program are described in **Table 38**.

Table 38: Environment and Social Monitoring Program

Environmental & Social Component	Project stage	Parameters to be monitored	Location	Standards	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
1. Air Quality	Pre- construction stage	PM10, PM2.5, SOx, NOx, along with Meteorological parameters like - temperature Humidity, wind speed, wind direction etc.	Substation and Transmission Line	National Ambient Air Quality Standards (NAAQS), CPCB	EPC Contractor by CPCB/ SPCB approved or NABL Accredited laboratory	PMC, PIU & PMU (AEGCL)	Once
	Construction Stage						Twice a year (Pre-monsoon and Post monsoon)
	Operation Stage (Commissioning Stage)						Once
2. Water Quality (Both Surface Water and Ground Water)	Pre- construction stage	As per IS:10500 (PH, Colour, Odour, Taste, TDS, Conductivity, Turbidity, BOD, COD, Total Hardness, Alkalinity, Nitrate, Sulfate, Fluoride, Chlorine, Arsenic, Copper, Cadmium, Lead, Iron, Zinc, Coliform, E. coli.	Substation and Transmission Line	As per IS: 10500	EPC Contractor by CPCB/SPCB approved or NABL Accredited laboratory	PMC, PIU & PMU (AEGCL)	Once
	Construction Stage						Twice a year (Pre-monsoon and Post monsoon)
	Operation Stage (Commissioning Stage)						Once
3. Noise	Pre- construction stage	Noise level (dB level) On hourly basis for 24hours	Substation and Transmission Line	As per CBCB and WHO guidelines	EPC Contractor by CPCB/SPCB approved or NABL Accredited laboratory	PMC, PIU & PMU (AEGCL)	Once
	Construction Stage						Twice a year (Pre- monsoon and Post monsoon)
	Operation Stage (Commissioning Stage)						Once
4. Soil	Pre- construction stage	PH, Moisture, Conductivity, Oxidation	Substation and Transmission Line	As per CBCB and IS guidelines	EPC Contractor by CPCB/SPCB	PMC, PIU&PMU (AEGCL)	Once



Environmental & Social Component	Project stage	Parameters to be monitored	Location	Standards	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	Construction Stage	Reduction, Potential, Nitrogen, Phosphorous, Sulphate, Chloride, Total Organic Carbon, Nitrate, Arsenic, Cadmium, Lead, Iron, Zinc, Copper, Total Coliform.			approved or NABL Accredited laboratory		Twice a year (Pre-monsoon and Post monsoon)
	Operation Stage (Commissioning Stage)						Once
5. Traffic	Pre- construction stage	Number & type of vehicles being used for procurement of construction materials and supply items	At identified sensitive locations/ stakeholders	Record keeping of vehicles used to identify increased Traffic load in localities	EPC Contractor	PMC, PIU&PMU (AEGCL)	Continuous activity
	Construction Stage			Log book for in-out time of vehicle on site	EPC Contractor	PMC, PIU&PMU (AEGCL)	Continuous activity
	Operation Stage (Commissioning Stage)			Maintenance of Logbook for in-out time of vehicle on site	PIU (AEGCL)	PMU(AEGCL)	Continuous activity
6. Tree Cutting	Pre- construction stage	Conducting a detailed survey of the transmission line route and preparing a finalized layout plan for the selected substation area, including an enumeration of trees.	Substations & Transmission line routes	Documentary evidence of tree counting to be maintained by the surveyor and the EPC contractor.	EPC Contractor	PMC, PIU&PMU (AEGCL)	Continuous activity
	Construction Stage	Developing an inventory of trees prior to the commencement of transmission line stringing and before initiating substation construction.		Trees to be marked by the relevant departmental authority whenever cutting or pruning is required, in the presence of EPC contractor and AEGCL officials. Obtaining necessary approvals from the Forest Department for any tree cutting activities.	EPC Contractor	PMC, PIU&PMU (AEGCL)	Continuous activity



Environmental & Social Component	Project stage	Parameters to be monitored	Location	Standards	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	Operation Stage (Commissioning Stage)	Performing pruning or removal of trees as part of routine maintenance activities.		Ensuring the maintenance of minimum clearance between conductors and trees. Securing all applicable clearances from the Forest Department as required.	PIU (AEGCL)	PMU(AEGCL)	Continuous activity
7. Carcass	Pre-construction stage	Visual inspection for substation location	Transmission Line	Reporting to concerned forest/ wildlife authority identification of species. Record to be maintained for number of carcasses	EPC Contractor, PIU AEGCL	PMU, AEGCL	Continuous activity
	Construction stage	Visual inspection for substation location	Transmission Line		EPC Contractor	PMC, PIU&PMU (AEGCL)	Continuous activity
	Operation Stage	Visual inspection for substation location	Transmission Line		PIU (AEGCL)	PMU(AEGCL)	Continuous activity
8. Grievance Mechanism (incl. GBV, SEA, SH)	Pre- construction stage	Formation of Grievance Redressal Committee	All Project Locations	Notification of formulation of GRM and GRC and display of GRM procedures in project locations	EPC Contractor, PMC, PIU and PMU	PIU&PMU (AEGCL)	Continuous activity
	Construction Stage	Working files of GRC and GRM records			EPC Contractor	PMC, PIU&PMU (AEGCL)	Continuous activity
	Operation Stage (Commissioning Stage)	Working files of GRC and GRM records			EPC Contractor	PMC, PIU&PMU (AEGCL)	Continuous activity
9. Stakeholder Engagement	Pre-construction stage	Mapping of stakeholders	Substation and Transmission Line routes	Consultation record with mapped stakeholders (minutes of Consultation and Attendance sheet)	PIU(AEGCL)/PMU/PMC	AEGCL-PMU/ AEGCL Field officials & PMC	Continuous activity
	Construction stage	Listing of identified stakeholders	Substation and Transmission Line routes	Consultation record with mapped stakeholders (minutes of Consultation and Attendance sheet)	Contractor/ PMC/ AEGCL	AEGCL- PMU/ AEGCL Field officials & PMC	Continuous activity



Environmental & Social Component	Project stage	Parameters to be monitored	Location	Standards	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	Operation Stage	Identified stakeholders at project pre construction and construction stage	Substation and Transmission Line routes	Consultation record with mapped stakeholders (minutes of Consultation and attendance sheet)	AEGCL Field Officers	AEGCL-PMU/ AEGCL Field officials & PMC	Continuous activity
10. Compensation	Pre-construction stage	Identification of project-affected people. Assessment and documentation of crop damage, including marking of affected trees and preparation of related inventory.	Transmission Line	Adherence to The Indian Electricity Act, 2003, and The Telegraph Act, 1885 for compensation related to tower footings and transmission line right-of-way (RoW).	PMC, PIU & PMU (AEGCL), EPC Contractor	PMC, PIU & PMU (AEGCL)	During detailed route survey and identification of land parcel
	Construction stage	Mapping and listing of project-affected persons, including details of crop damage (area in m ²), land acquisition (area in m ²), and inventory, along with disbursement of compensation where applicable.	Transmission Line		EPC Contractor, PMC & PIU (AEGCL)	PMC, PIU & PMU (AEGCL)	Before commencement of work in area of impact
	Operation Stage	Marking and enumeration of trees requiring pruning or cutting to maintain safe clearance between trees and conductors.	Transmission Line		PIU (AEGCL)	PIU & PMU (AEGCL)	Continuous activity
11. Livelihood	Pre-construction stage	Identification of any impact on livelihood due to acquisition of land, crop damage and zirat damage.	Transmission Line	Adherence to The Indian Electricity Act, 2003, and The Telegraph Act, 1885 for compensation related to tower footings and transmission line right-of-way (RoW).	Revenue Department & AEGCL concerned divisional officer, PMC, EPC Contractor	AEGCL PMU/PMC & AEGCL Field Officials	Once during detailed route survey and identification of land parcel for Substation



Environmental & Social Component	Project stage	Parameters to be monitored	Location	Standards	Implementing Responsibility	Monitoring Responsibility	Monitoring Frequency
	Construction stage	Identification of any impact on livelihood due to loss of land (area m2) land utilization pattern, crop damage (area m2 and type of crop) and zirat damage (Inventory development)	Transmission Line		Revenue Department & AEGCL concerned divisional officer, PMC, EPC Contractor	PMU/PMC & AEGCL Field Officials	Before commencing construction work
	Operation Stage	Identification of any impact on livelihood due to acquisition of land, crop damage and zirat damage (inventory development)	Transmission Line		Revenue Department & AEGCL concerned divisional officer	PMU/PMC & AEGCL Field Officials	AEGCL Continuous activity
12. Restoration	Pre-construction stage	Identification, marking, and documentation of potential damage to public utilities and public or private property anticipated during the construction phase.	All project locations	Adherence to The Indian Electricity Act, 2003, and The Telegraph Act, 1885 for compensation related to tower footings and transmission line right-of-way (RoW).	Revenue Department & AEGCL concerned divisional officer, PMC, EPC Contractor	AEGCL– PMU/PMC & AEGCL Field Officials	Once during detailed survey of transmission Line and identification of land parcel for substation location
	Construction stage	Restoration of affected public utilities and public/private property to their original condition or to an improved state.	All project locations		Revenue Department & AEGCL concerned divisional officer, PMC	AEGCL– PMU/PMC & AEGCL Field Officials	Continuous activity
	Operation Stage	Ensuring full functionality of restored or relocated public utilities and public/private property.	All project locations		Revenue Department & AEGCL concerned divisional officer	AEGCL PMU/PMC & AEGCL Field Officials	Continuous activity

7.3 Budget for Implementation of ESMP and ESMoP

The Environmental and Social Management Plan (ESMP) for the 220/132kV Baghja 2 x 100 MVA Air-Insulated Substation has been structured to prioritize both cost-efficiency and sustainability. Central to the ESMP is a "least-cost" approach, which ensures that all mitigation measures are implemented effectively without compromising the environmental and social well-being of the area. Proper allocation of resources under this plan is essential to mitigate potential risks to the environment and surrounding communities. Neglecting these measures could result in significant negative consequences, including environmental degradation and adverse social impacts.

The cost estimates for the ESMP have been developed through a comprehensive evaluation of potential impacts across all project stages—pre-construction, construction, and operation. These estimates include critical components such as environmental monitoring, capacity building, awareness initiatives, and training programs. The detailed cost breakdown, as outlined in Table 18, ensures that financial resources are allocated strategically to address the most pressing environmental and social concerns. This approach not only reinforces the project's commitment to sustainability but also ensures compliance with regulatory standards and community expectations.

Table 39: Budget (estimates) for Implementation of ESMP and ESMoP

Sl. No.	Description	Quantity	Unit	Rate	Amount
				(INR)	(INR)
A.	Environment and Social Management Plan				
1	Waste water management	1	Lump-sum		3,575,000
2	Waste management	1	Lump-sum		480,000
3	Air pollution and dust control	1	Lump-sum		572,000
4	Noise control	1	Lump-sum		5,000,000
	Sub-Total (A)				9,627,000
B.	Environmental Monitoring (Pre-construction Stage)				
1	Air Quality test (at 3 locations - SS, TL-1, TL-2)	3	No.	25,000	75,000
2	Water Quality (Surface and Ground water) test (at 3 locations - SS, TL-1, TL-2)	3	No.	25,000	75,000
3	Noise Levels monitoring (at 3 locations - SS, TL-1, TL-2)	3	No.	10,000	30,000
4	Soil Quality test (at 3 locations - SS, TL-1, TL-2)	3	No.	15,000	45,000
	Sub-Total (B)				225,000
C.	Environmental Monitoring (Construction Stage)				
1	Air Quality (Twice a year for 3 year) (at 3 locations - SS, TL-1, TL-2)	18	No.	25,000	450,000
2	Water Quality (Twice a year for 3 year) (at 3 locations - SS, TL-1, TL-2)	18	No.	25,000	450,000
3	Noise Levels (Twice a year for 3 year) (at 3 locations - SS, TL-1, TL-2)	18	No.	10,000	180,000
4	Soil Quality (Twice a year for 3 year) (at 3 locations - SS, TL-1, TL-2)	18	No.	15,000	270,000
	Sub-Total (C)				1,350,000
D.	Environmental Monitoring (Operation Stage)				
1	Air Quality test (at 3 locations - SS, TL-1, TL-2)	3	No.	25,000	75,000



Sl. No.	Description	Quantity	Unit	Rate	Amount
				(INR)	(INR)
2	Water Quality (Surface and Ground water) test (at 3 locations - SS, TL-1, TL-2)	3	No.	25,000	75,000
3	Noise Levels monitoring (at 3 locations - SS, TL-1, TL-2)	3	No.	10,000	30,000
4	Soil Quality test (at 3 locations - SS, TL-1, TL-2)	3	No.	15,000	45,000
Sub-Total (D)					225,000
E.	Capacity building (Training/ Workshops) and Health Awareness Camp				
1	Training on Implementation of ESMP for PIU (Once per year for 3 years) and EPC contractors (Twice a year for 3 years)	9	No.	2,00,000	18,00,000
2	Health & Safety Awareness Camp: Pre-Construction - Once, Construction - 2 times/year for 3years, Operation - Once	8	No.	50,000	4,00,000
3	Training on Implementation of GRM and Gender Action Plan for PIU and EPC (Bi-annually for 3 years)	6	No.	20,000	1,20,000
4	Training on Occupation Health and Safety for PIU and EPC (Quarterly for 3 years)	12	No.	20,000	2,40,000
Sub-Total (E)					25,60,000
Total (A+B+C+D+E)					13,987,000

Chapter 8: Climate Risk and Vulnerability Assessment

8.1 Introduction

This Climate Risk and Vulnerability Assessment (CRVA) has been prepared for the proposed 220/132kV (2X160 MVA) Air Insulated Substation (AIS) planned in Morigaon, Assam and its associated transmission lines. The assessment adheres to the guidelines outlined in the Asian Infrastructure Investment Bank's (AIIB) "Methodology for Assessing the Alignment of AIIB Investment Operations with the Paris Agreement (2023)¹⁵".

Assam is prone to natural hazards such as cyclonic storms, floods, landslides, river erosions, earthquakes etc. as listed in the Assam State Disaster Management Plan (2022, Vol. I). Heavy torrential rainfall is common in Assam, which often results in flooding along the Brahmaputra River. The exposure to such hazards is sometimes aggravated by earthquakes as Assam is in one of the most seismically active regions in the World. Climate change could impact all the outputs and activities under the proposed subproject at Morigaon, including the sub-station infrastructure, associated transmission line infrastructure and other facilities (Package E) under Phase II of AISTSEP. The primary aim of this CRVA section is to identify potential climate and geophysical risks that could impact the proposed substation and transmission lines, assess its vulnerability to these risks, and recommend appropriate adaptive strategies to strengthen its resilience against environmental and climate-related challenges. Outlined below are key climatic parameters considered during the design phase for the proposed substation and transmission Lines, along with remedial measures implemented to address identified risks.

8.2 Temperature Rise

A. Substation Component:

Impact: A rise in temperature can significantly impact power substations by reducing equipment efficiency, increasing the risk of failures, and shortening the lifespan of critical components. High temperatures can cause overheating in transformers, circuit breakers, and other electrical equipment, leading to insulation degradation, increased resistance, and potential breakdowns. Overheated transformers may experience oil degradation, reducing their cooling capacity and increasing the likelihood of faults. Additionally, excessive heat can cause metal expansion, leading to loose connections and increased electrical losses.

Adaptation: To mitigate the impact of rising temperatures several cooling systems, such as forced air ventilation are adopted to help regulate transformer and switchgear temperatures in GIS substations. High-temperature-resistant materials, such as advanced insulation and heat-resistant conductors, improve durability. Smart grid technology, including real-time temperature monitoring and predictive maintenance, allows for proactive adjustments to prevent overheating. Enhanced grounding and fire protection systems further safeguard against thermal stress-related failures. These adaptations collectively enhance substation resilience against rising temperatures and climate change challenges

¹⁵ <https://www.aiib.org/en/about-aiib/who-we-are/partnership/download/Methodology-for-Assessing-the-Alignment-of-AIIB-Investment-Operations-with-the-Paris-Agreement.pdf>



for this subproject.

B. Transmission Line Component:

Impact: Rising temperatures can cause conductors to elongate, leading to reduced ground clearance for transmission lines. This phenomenon significantly heightens the risk of flashovers and system failures.

Adaptation: To mitigate this issue, the sagging of transmission lines can be minimized by using high-temperature low-sag (HTLS) conductors. These conductors are designed with materials that can withstand higher operating temperatures while maintaining minimal sag. During project planning, specifications for HTLS conductors may need to be included to ensure resilience against heat-related challenges. Additional measures could involve strengthening transmission towers and their foundations to withstand extreme heat, applying protective coatings to insulators to reduce dust accumulation, and upgrading conductors where necessary. For new lines, aluminum conductor steel-reinforced (ACSR) or all-aluminum alloy conductors (AAAC) provide a cost-effective alternative compared to HTLS, offering economic benefits while addressing general design needs.

8.3 High Winds and Storms

A. Substation Component:

Impact: High winds and cyclonic storms pose significant risks to power substations, leading to widespread disruptions and damage. Strong winds can topple transmission towers, uproot poles, and bring down power lines, causing short circuits and outages. Flying debris can strike critical equipment like transformers, circuit breakers, and insulators, leading to mechanical failures and fires. Heavy rainfall and storm surges associated with cyclones can flood substations, damaging electrical components and causing prolonged power failures.

Adaptation: GIS (Gas-Insulated Switchgear) substations are used wherever necessary as they are more resilient than AIS (Air-Insulated Switchgear). Structural reinforcements, such as wind-resistant fencing, reinforced concrete walls, and storm-rated roofs, help protect critical equipment from debris and extreme wind forces. Secure anchoring of transformers, breakers, and other components prevents displacement or damage. Additionally, robust grounding and lightning protection systems help mitigating the electrical hazards caused by storm-induced faults. Vegetation management around substations further reduces the risk of falling trees or debris impacting infrastructure.

B. Transmission Line Component:

Impact: Risk associated with high winds and storms primarily involve mechanical damage directly inflicted on overhead lines, towers, and poles, or indirectly caused due to debris blown against exposed grid components. For transmission lines, strong winds can induce galloping of live cables, which may result in dangerous flashovers when cables touch or come too close to one another. Additionally, high winds may topple trees onto overhead lines or short-circuit distribution grid cables positioned closer to the ground.

Adaptation: To mitigate these risks, several adaptation strategies can be implemented. These include engineering transmission towers to resist the maximum anticipated wind load, conducting more



frequent inspections and maintenance to ensure structural integrity, rerouting lines along roads or through open fields, intensifying tree-trimming practices, and enhancing storm and hurricane forecasting capabilities. These measures are part of an existing adaptation toolkit that will likely need broader application as climate challenges intensify. The latest version of Indian Standard IS 802-2015 (Part 1/Sec 1) introduces several updates aimed at safeguarding tower designs against failures inherent in older codes. Key modifications include:

1. Specification of drag coefficients for evaluating wind loads on towers across various sections, along with adjustments based on different solidity ratios.
2. Revised load combinations for sag-tension evaluations of conductors, ground wires, and optical ground wires (OPGW), inclusive of climate-induced loads.
3. Consideration of narrow-front winds specifically for suspension towers.
4. Updated loading conditions for suspension towers, which now account for 75% Extreme Design Temperature (EDT) wind when calculating wire loading.
5. Inclusion of additional load cases for wire loading based on wind direction angles of 0°, 30°, and 45°.
6. Modernization of material requirements for bolts and nuts used in tower construction.
7. Mandating tower testing in compliance with relevant Indian standards and monitoring until stipulated waiting periods are fulfilled.

Adherence to these updated provisions is expected to optimize tower designs; however, it should be noted that these amendments may impact design margins. Achieving a balance between safety, cost-effectiveness, and performance remains the primary objective.

8.4 Thunder & Lightning Risk

A. Substation Component:

Impact: Lightning strikes can have severe impacts on power substations, potentially causing equipment damage, power outages, and safety hazards. When lightning directly strikes a substation or induces high-voltage surges through transmission lines, it can damage transformers, circuit breakers, insulators, and other critical components. These surges may lead to insulation breakdown, short circuits, or even fires, resulting in costly repairs and prolonged downtime. Additionally, repeated lightning strikes can degrade equipment over time, reducing the reliability of the power grid.

Adaptation: To mitigate the impact of lightning strikes in power substations, several design adaptations are implemented to enhance protection and ensure system reliability. Lightning arresters are installed at key points to divert high-voltage surges safely into the ground, preventing damage to sensitive equipment. Grounding systems with low-resistance earthing help dissipate lightning energy efficiently, reducing the risk of insulation failure and electrical faults. Shielding methods, such as overhead ground wires or lightning masts, are strategically placed to intercept strikes before they reach critical infrastructure. Additionally, surge protection devices are integrated

into control and communication circuits to prevent transient overvoltage's from affecting sensitive electronic systems. Proper insulation coordination and the use of bushings with high dielectric strength further enhance resilience.

B. Transmission Line Component:

Impact: Thunder and lightning pose significant climate-related risks by potentially causing transmission lines to trip, rendering them temporarily inoperable. The extremely high voltages generated by a lightning strike can result in short circuits, which risk causing permanent damage to conductors, insulators, and transmission structures. When lightning strikes near or directly on a line conductor, it produces ionized gases that can lead to short-circuit faults as the system's electrical protection mechanism disconnects the affected circuit. Such flashover incidents are projected to become more frequent in many regions due to increasing lightning activity.

Adaptation: To mitigate these vulnerabilities, essential adaptation measures include installing earthing systems, spark gaps, and surge arresters. Lightning arresters, commonly referred to as surge protectors, are installed where wires enter a structure to safeguard both the transmission lines and individuals in proximity. These devices are placed between each electrical conductor in a power system and the ground. While they prevent the normal flow of current to the ground, they offer a protective pathway for high-voltage lightning currents, thus bypassing connected equipment. The primary goal of lightning arresters is to limit voltage surges when a communication or power line experiences a lightning strike or is impacted by nearby strikes

8.5 Flooding

A. Substation Component:

Impact: Flooding can have severe impacts on power substations, leading to widespread power outages, equipment damage, and safety hazards. When floodwaters inundate a substation, they can short-circuit electrical components, corrode metal parts, and contaminate insulation materials, reducing their effectiveness. Transformers, circuit breakers, and switchgear may fail, requiring costly repairs or replacements. Additionally, prolonged exposure to water can compromise structural integrity and increase the risk of electrical fires or explosions. Flood-induced power disruptions can also affect critical infrastructure such as hospitals, water treatment plants, and communication networks, amplifying the overall impact on communities.

Adaptation: Most of the substation locations including Newly proposed 220/132 kV (2X160 MVA) AIS Substation at Morigaon (Package E) under Phase II of AISTSEP are away from flood prone area. For low lying substation locations, the area/critical equipment (transformers and control panels) levels are raised sustainably to avoid logging of water. Installing water-resistant barriers and drainage systems will reduce the risk of water infiltration. During preparation of contour plan, Finished Ground Level (FGL) is fixed by considering the Highest Flood level (HFL) data of that area.

B. Transmission Line Component:

Impact: Flooding due to heavy rainstorms and storms poses significant challenges for power transmission systems. One potential mitigation strategy involves rerouting transmission lines to less exposed regions, although this adjustment comes with its own set of trade-offs. Intense rains can



lead to flashover faults in high-voltage insulators and trigger short circuits in high-voltage circuit breakers. Moreover, severe flash flooding has the potential to erode the foundations of towers, leading to their collapse.

Adaptation: While rerouting lines may reduce exposure to these risks, it typically results in increased line length and necessitates the use of pile foundations along alternative routes. To mitigate vulnerability, several measures can be employed, such as improving the design of insulators, selecting installation sites with care, and implementing enhanced maintenance practices. Equipment at ground level is particularly vulnerable to surges, but this risk can be minimized by redesigning insulators, relocating installations away from hazard-prone areas, and reinforcing structural elements.

In flood-prone zones, it is advisable to use pile-type foundations for transmission towers based on comprehensive soil investigation reports and updated high-flood data.

Additional measures include incorporating proper revetments, employing geo-synthetic materials in foundations, applying concrete encasements around stubs in waterlogged areas, and utilizing corrosion-resistant coatings. Where necessary, chimney coping for tower foundations should also be prioritized to prevent stub rusting.

While the design of individual transmission components has evolved, the core materials used—such as steel (bare, painted, or galvanized), cast iron, aluminum alloys, and copper alloys—have remained largely unchanged. To extend the lifespan of transmission systems and improve corrosion resistance, these materials are treated with specialized coatings, inhibitors, and other protective solutions. Such enhancements ensure greater durability and resilience of power transmission infrastructure against climatic challenges.

8.6 Landslides

A. Substation Component:

Impact: Landslides can have a devastating impact on power substations by causing structural damage, equipment failure, and service disruptions. When a landslide occurs near or within a substation, it can bury electrical equipment, displace transmission towers, and damage foundations, leading to power outages and costly repairs. Soil movement can also compromise underground cables, disrupt grounding systems, and increase the risk of short circuits or electrical faults. In extreme cases, landslides may make substations completely inoperable, requiring extensive rebuilding efforts.

Adaptation: The proposed substation is located on stable ground, away from known landslide-prone areas. However, proper slope stabilization techniques, such as retaining walls, terracing, and soil nailing, can help to prevent soil movement. Additionally, adequate drainage systems, including surface water diversion channels and subsurface drainage will reduce water accumulation that may trigger landslides. Foundations are also reinforced with deep piling or rock anchors to enhance stability.

B. Transmission Line Component:

Impact: The collapse of the towers could have been a result of landslides induced by prolonged rainfall over several weeks. These landslides likely led to the erosion or displacement of the supporting soil, which may have caused structural deformation in the towers.

Adaptation: Investigate the feasibility of implementing effective drainage systems, protective measures, or retaining walls around tower foundations in hilly areas to prevent such incidents in the future.

8.7 Earthquakes

A. Substation Component:

Impact: Earthquakes can have severe impacts on power substations, leading to widespread power outages and infrastructure damage. Strong ground shaking can cause structural failure of transformers, circuit breakers, and busbars, while soil liquefaction can destabilize foundations. Seismic forces may also damage insulators, control panels, and transmission lines, disrupting electricity supply to homes, businesses, and critical facilities. Additionally, fires or explosions may occur due to oil leaks from damaged transformers, further escalating the risks.

Adaptation: When selecting the most suitable method for retrofitting and enhancing the lateral load-resisting capacity of structures, it is essential to consider the entire system, including site characteristics, foundations, and both structural and non-structural components, as per IS 1893 (Part 1): 2002. Notably, evaluating geotechnical properties, soil conditions, and foundation types plays a crucial role in determining the most effective retrofitting approach.

While situated in Seismic Zone V, AEGCL incorporates earthquake-resistant design principles in its substations to ensure structural integrity and operational reliability during seismic events. Substations are designed following the seismic zoning criteria outlined in the Bureau of Indian Standards (IS 1893) and site-specific seismic hazard assessments. Key measures include the use of reinforced concrete foundations, base isolation systems where necessary, and flexible connections in equipment to absorb ground motion without damage. Structures such as control buildings, gantries, transformers, and switchgear are engineered with ductile detailing and seismic anchorage to reduce the risk of tipping or displacement. Equipment layout also considers separation gaps to prevent pounding during quakes.

B. Transmission Line Component:

The behavior of steel transmission towers under the influence of seismic and wind loads has been analyzed through large deformation and elasto-plastic studies, as reported in an international journal. For seismic analysis, specific earthquake parameters were considered.

The findings indicate that during seismic events, the maximum displacement of the tower occurs without causing buckling in the main leg members, in contrast to the response observed under wind load conditions.

The performance of transmission line towers was further assessed using non-linear time history analysis, particularly for towers situated on sloped terrain. This investigation considered variations in tower height, bracing systems, and the inclusion of base isolators. The SAP2000 software was



employed for these analyses. Results revealed that equipping towers with non-linear rubber isolators significantly enhances their ability to withstand seismic forces.

Additionally, the use of eccentric bracing systems was found to be more effective compared to X or V bracing systems. In conclusion, this study determined that such transmission towers are structurally safe even under severe earthquake conditions (Zone 5), meeting both serviceability and collapse resistance criteria.

8.8 Conclusion

The proposed subproject exemplifies a forward-thinking approach to infrastructure development, integrating robust engineering standards and climate-resilient materials to ensure long-term durability. Designed to withstand Assam's challenging tropical climate and seismic activity, it incorporates structural reinforcements, corrosion-resistant materials, and advanced insulation for enhanced stability and efficiency. While future climate variations present ongoing challenges, the project's adaptability, proactive monitoring, and commitment to resilience will ensure its sustained reliability. By prioritizing safety and environmental considerations, this infrastructure stands as a testament to sustainable and future-ready development.

Chapter 9: Institutional Arrangement for Monitoring and Reporting

9.1 Introduction

The Assam Electricity Grid Corporation Limited (AEGCL) serves as both the Executing Agency (EA) and the Implementation Agency (IA) for the Phase-II Project. The project is managed through a structured framework involving the Project Management Unit (PMU) at the headquarters and Project Implementation Units (PIUs) at the field level. The PMU, led by the Chief General Manager (PP&D) as the Project Director, operates under the overall supervision of AEGCL's Managing Director. The PMU is supported by personnel from various functions, including Project Planning and Design, Procurement and Contracts, Environmental and Social Staff, Administration, and Finance.

At the field level, the PIUs are headed by the Deputy General Manager (DGM) of respective T&T Circles, acting as Project Authorities. Divisional-level operations are managed by Assistant General Managers (AGMs), who act as Project Managers under the supervision of their respective DGMs.

The AEGCL has engaged M/s. WAPCOS Limited, a Government of India undertaking under the Ministry of Jal Shakti, as the Project Management Consultant (PMC) to provide technical and managerial inputs for implementing the AIIB-funded project.

9.2 Institutional Arrangements for Environmental and Social (E&S) Compliance Monitoring

The institutional framework for ensuring E&S compliance is detailed in **Table 40**:

Table 40: Institutional framework to ensure E&S Compliance

Entity	Officials
Project Management Unit (PMU)	<ol style="list-style-type: none"> 1. Chief General Manager (PP&D) cum Project Director. 2. Chief General Manager (O&M) for LAR, CAR and UAR. 3. General Manager, (EAP) HQ 4. DGMs (EAP) HQ 5. AGMs (EAP) (4) 6. Environmental & Social Specialist (2+2) 7. Concerned DMs/AMs 8. Concerned JMs
Project Implementation Unit (PIU)	<ol style="list-style-type: none"> 1. General Manager for LAR, CAR and UAR T&T Zone. 2. Deputy General Manager cum Project Authority –T&T Circle 3. Assistant General Manager cum Project Manager (Divisional Officers) 4. Designated officers (DM/AM) to look after E&S Components.
Project Management Consultants (PMC)	<ol style="list-style-type: none"> 1. Team Leader (1) 2. Environmental Expert (1) 3. Social Expert (1) 4. Health Safety Officer (1) 5. E&S Support staff (3+3)

Entity	Officials
Contractor	<ol style="list-style-type: none">1. Project Manager2. Community Consultation Officer3. Health and Safety Officer (HSE)4. Environmental Officer

All designated officers will work on a full-time basis for the entire project duration. The staffing pattern will be ensured by the concerned EPC contractor upon contract signing with AEGCL.

9.3 Roles and Responsibilities

9.3.1 Project Management Unit (PMU)

The PMU, led by the Project Director, will oversee all E&S aspects of the project. Key responsibilities include:

- Reviewing and finalizing Environmental and Social Impact Assessments (ESIAs), Environmental and Social Management Plans (ESMPs), Resettlement Plans (RPs), and Indigenous Peoples Plans (IPPs).
- Monitoring E&S compliance during project execution.
- Preparing semi-annual and annual E&S compliance reports for submission to AIIB.
- Coordinating with PMC, EPC contractors, and government agencies to ensure proper integration of safeguard provisions in contract documents.
- Conducting E&S compliance training for relevant staff.

9.3.2 Project Implementation Unit (PIU)

The PIU is responsible for implementing E&S policy guidelines at the field level. Key tasks include:

- Managing E&S components to ensure compliance with AIIB policies.
- Conducting environmental and social surveys to mitigate adverse impacts.
- Liaising with local authorities for necessary approvals.
- Preparing compliance reports through site visits.

9.3.3 Project Management Consultant (PMC)

The PMC will provide technical support to the PMU in managing E&S safeguards. Responsibilities include:

- Preparing subproject-specific ESIs, ESMPs, RPs, and IPPs.
- Conducting public consultations and community engagement activities.
- Ensuring compliance with AIIB policies and integrating climate change mitigation measures into project design.
- Delivering capacity-building training programs for PMU, PIU, and contractor personnel.

9.3.4 EPC Contractor

The contractor is responsible for implementing the ESMP and ensuring compliance with all related E&S requirements. Key activities include:

- Preparing a Contractor's ESMP (C-ESMP) and obtaining necessary approvals from AIIB before initiating civil works.
- Conducting baseline environmental and social studies.
- Organizing public consultations and addressing grievances.
- Ensuring workers' health and safety through regular training programs.

9.4 Monitoring of ESMP and ESMoP Compliance

To ensure adherence to environmental and social standards, the project must comply with the Environmental and Social Management Planning Framework (ESMPF), ESIA-ESMP, and all other Bank-approved instruments. Monitoring responsibilities are divided among PMU, PMC, and contractors.

Key Monitoring Activities:

- Ensuring full compliance with ESMPF, ESIA-ESMP, and legal agreements.
- Conducting regular environmental monitoring of air quality, noise levels, soil, and water during pre-construction, construction, and operation phases.
- Identifying non-compliance issues and implementing corrective actions promptly.
- Submitting periodic performance reports to AIIB at least once per year.

Contractor Compliance Requirements:

Contractors must prepare and execute a C-ESMP that includes:

- Traffic Management Plan to minimize disruptions to local communities.
- Water Resource Protection Plan to safeguard drinking water sources from contamination.
- Wastewater Management Plan for safe treatment and disposal.
- Gender-Based Violence/Sexual Exploitation & Abuse Prevention Plan.

9.5 Reporting Mechanism

The reporting process is outlined below and depicted in **Figure 28**:

1. Contractors submit monthly E&S progress reports to PMC/PMU detailing ESMP implementation status.
2. PMC submits comprehensive biannual progress reports to AIIB on behalf of AEGCL. Reports include descriptions of activities, compliance status, timelines, costs, and mitigation measures.

In cases of unsatisfactory implementation of ESMP measures, AEGCL may engage external experts to verify monitoring reports and recommend corrective actions.

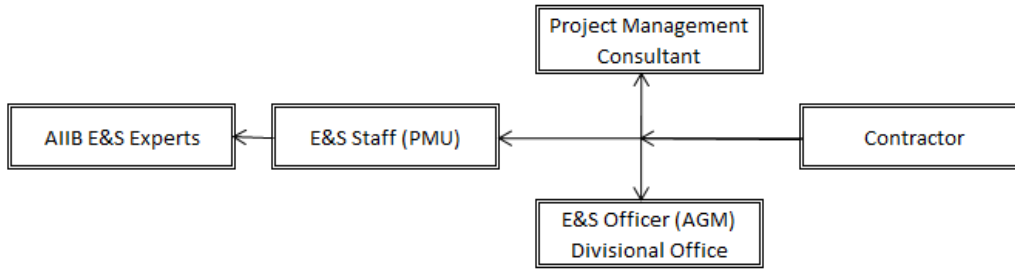


Figure 28: Schematic for Reporting Mechanism

9.6 Training Programs & Capacity Building

A series of training programs will be conducted as per the approved ESMPF to enhance stakeholder capacity in implementing E&S safeguards effectively.

Table 41: Training Schedule

S.No.	Types of Training	Number of Trainings
1	Training on Implementation of ESMP for: PIU: Once per year for 3 years and EPC contractors: Twice per year for 3 years	9
2	Health & Safety Awareness Camp: Pre-Construction - Once Construction - 2 times / year for 3 years Operation – Once	8
3	Training on Implementation of GRM and Gender Action Plan (Bi-annually for 3 years)	6
4	Training on Occupation Health and Safety (Quarterly for 3 years)	12

These training sessions will be conducted by E&S experts from PMC and PMU, supplemented by external specialists as necessary.

9.7 Conclusion

The institutional framework established by AEGCL ensures robust management of environmental and social safeguards throughout the Phase-II project lifecycle. With clear roles, responsibilities, monitoring mechanisms, reporting lines, and capacity-building initiatives in place, AEGCL aims to achieve full compliance with AIB policies while minimizing adverse environmental and social impacts.

This report summarizes the key aspects of institutional arrangements and E&S compliance monitoring for the Phase-II project implementation under AEGCL’s leadership. It underscores AEGCL’s commitment to sustainable development in alignment with international best practices.

Chapter 10: Stakeholder & Public Consultation and Information Disclosure

10.1 Introduction

The Asian Infrastructure Investment Bank (AIIB) underscores the critical importance of transparency and meaningful stakeholder engagement in its Environmental and Social Framework (ESF). As part of its commitment, AIIB mandates that clients actively engage stakeholders throughout the project lifecycle, ensuring consultations are inclusive, accessible, timely, and culturally appropriate. Adequate and understandable information must be provided to stakeholders to facilitate their participation in decision-making processes. The ESF also requires the establishment of project-level grievance redress mechanisms to address concerns promptly and effectively.

AIIB's Environmental and Social Standard 1 (ESS 1) specifies that clients must disclose draft environmental and social assessment reports and related documentation early in the project preparation phase. Such disclosures must be conducted in a timely, inclusive, and culturally sensitive manner, using language that is understandable to affected communities and relevant stakeholders. This approach ensures that stakeholders can identify and address environmental and social risks, including issues related to involuntary resettlement, Indigenous Peoples, and community health and safety. ESS 2 emphasizes fair compensation and livelihood restoration for affected individuals in cases of land acquisition or displacement, while ESS 3 mandates culturally appropriate consultation and the Free, Prior, and Informed Consent (FPIC) of Indigenous communities when their rights, lands, or resources are impacted.

The process of stakeholder engagement during project preparation has been designed to incorporate concerns and suggestions from communities and other stakeholders. A comprehensive stakeholder analysis has been conducted to assess the socio-political environment surrounding the project. This analysis serves several purposes:

- Identifying stakeholder interests, concerns, societal risks, and potential conflicts of interest.
- Recognizing relationships among stakeholders to foster cooperation and mitigate adverse influences.
- Highlighting key groups or individuals who require information during project execution.
- Developing a framework for participatory planning and implementation of project activities, including community development interventions.

The identification and inclusion of stakeholders in the decision-making process are essential for prioritizing, analyzing, and addressing issues effectively. This approach enables the creation of management systems and strategies that address the concerns and expectations of various stakeholders.

This chapter provides a detailed profile of the key stakeholder groups identified for the project, their primary concerns, and their relative influence on project outcomes. Through these efforts, AIIB aims to uphold its commitment to sustainable development while fostering trust and collaboration with all stakeholders.

10.2 Stakeholder Identification

A stakeholder is defined as “an individual, group, or organization, who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project.” “Stakeholder Analysis” is the process of sorting identified stakeholder groups according to their impact on the project and the impact the project will have on them. This information is then used to assess the manner in which the interests of the stakeholders or the project's impact on them should be addressed in the project development plan or its operation. The identification of stakeholders and their inclusion in the decision-making process is thus essential in the process of prioritizing, analyzing and addressing issues; and in creating management systems and strategies to address the concerns/ expectations of various stakeholders.

10.3 Stakeholder Mapping and Analysis

Stakeholder mapping and analysis form integral parts of project planning and implementation, especially for infrastructure initiatives like the proposed 220/132kV Baghjap substation in Morigaon. These processes involve systematically identifying the individuals, groups, or organizations that could influence or be impacted by the project. Key stakeholders typically comprise local residents, government bodies, local administrative councils, self-help groups (SHGs), service providers, women, and other vulnerable populations.

After identifying stakeholders, they are evaluated based on their interest in the project and their potential level of influence on its results. This classification allows grouping stakeholders by their influence and priority using the criteria outlined below:

1. **High Influence:** This group includes stakeholders that significantly affect the project or are highly impacted by it. Their involvement is crucial in decision-making and project engagement.
2. **Medium Influence:** Stakeholders within this category have a moderate level of involvement or interest. While their engagement is important, it is not as critical as it is for stakeholders with high influence.
3. **Low Influence:** These stakeholders exhibit limited impact on or interest in the project, making their engagement a lower priority.

Intermediate classifications—such as low-to-medium or medium-to-high influence—reflect variations that may arise due to specific project-community interactions or changing circumstances.

Given the fluid nature of stakeholders’ interests across a project’s lifecycle, identifying all stakeholders and determining their precise influence at the outset can pose challenges. It is, therefore, essential to approach stakeholder mapping as an evolving “live document.” By updating and modifying this document periodically, it can more accurately reflect ongoing stakeholders’ engagement needs and changing dynamics at every stage of the project.

Adopting a flexible, inclusive strategy for stakeholder mapping and analysis will empower the project proponent to engage meaningfully with all interested parties, supporting stronger decision-making and contributing to successful project outcomes.

Table 42: Stakeholder Consultation Mapping

Category	Stakeholder	Influence of the project on Stakeholder / Influence of the Stakeholder on project	Concerns and expectations from the Project	Influence Rating
(i) Project-Affected Parties	Primary Stakeholder: - People living adjacent to substation sites	Potential exposure to construction disturbances (noise, dust, traffic); safety and access concerns.	<p>1. Project Scope and Community Awareness:</p> <ul style="list-style-type: none"> - The consultation addressed the scope of construction activities, land use for the substation, potential local employment opportunities, and the roles and responsibilities of AEGCL and the EPC contractor. - Awareness was raised about the Grievance Redressal Mechanism (GRM) and Gender-Based Violence (GBV) risk mitigation strategies, emphasizing preventive measures, community vigilance, and accessible reporting channels. <p>2. Mitigation of Construction Impacts:</p> <ul style="list-style-type: none"> - Discussions focused on minimizing disruptions to nearby educational institutions, ensuring safe vehicular movement, and implementing effective dust and noise control measures during construction. - Safety and access concerns were highlighted, with commitments made to address these issues proactively. <p>3. Cultural Sensitivity and Land Ownership:</p> <ul style="list-style-type: none"> - The project team emphasized its respect for local cultural and religious traditions, which was positively received by community members. - Community members confirmed that the proposed substation land is fully owned by AEGCL, free 	<ul style="list-style-type: none"> - Influence of Stakeholders: Low - Influence of Project: Medium to High



Category	Stakeholder	Influence of the project on Stakeholder / Influence of the Stakeholder on project	Concerns and expectations from the Project	Influence Rating
			<p>of encumbrances, and enclosed within a secured boundary. This was further validated through physical site verification conducted by project officials to prevent encroachment.</p> <p>4. Community Feedback and Support: - The local community expressed strong support for the project, recognizing its potential benefits. Constructive suggestions were provided to enhance safety measures and promote livelihood opportunities during implementation. Photographs and attendance sheet are appended in Appendix – 19 & Appendix 20.</p> <p>5. Private Land Owners: - Persons affecting directly and indirectly by the transmission line project.</p>	
	Local livestock owner (impact on grazing land -if any)	Impact on grazing land (if any)	On 08/01/2026, 07/02/2026 and 10/02/2026 a site visit was conducted at Baghjap, Junbil, Bantjai gaon, Kharbeel, Bangfor and Tegheria to engage with local livestock owners residing near the proposed substation site and associated transmission line. During the discussions, it was highlighted that the substation compound is enclosed by a concrete boundary wall, preventing livestock from entering the premises for grazing. The livestock owners confirmed that sufficient alternative grazing land is available in the vicinity,	Influence of Stakeholder: Low Influence of Project: Low



Category	Stakeholder	Influence of the project on Stakeholder / Influence of the Stakeholder on project	Concerns and expectations from the Project	Influence Rating
			<p>and they do not foresee any challenges arising from restricted access to the substation area. However, on the transmission line, the location will be barricaded during the construction period for tower footing and stringing work.</p> <p>The stakeholders emphasized the need for regulating vehicular movement during the construction phase to ensure the safety of livestock that may roam near the site. This feedback underscores the importance of implementing appropriate safety measures and maintaining clear communication with the local community throughout the project development process.</p>	
	<p>Primary Stakeholder: - AEGCL staff staying in the quarters to be demolish</p>	<p>May required to relocate temporarily due to the demolition of the existing staff quarter</p>	<p>In the substation campus, there are six two-story residential buildings. One building contains a single flat, three buildings each have 12 flats, and two buildings also each have 12 flats.</p> <p>Consultations were conducted on 08/01/2026 with 10 AEGCL staff members and their family members (comprising 4 families with 17 members and 6 individual staff) currently residing in the staff quarters designated for demolition to facilitate the proposed substation construction. The staff confirmed that their stay is temporary (Details of persons staying in the staff</p>	<p>Influence of Stakeholder: Low Influence of Project: Medium</p>



Category	Stakeholder	Influence of the project on Stakeholder / Influence of the Stakeholder on project	Concerns and expectations from the Project	Influence Rating
			<p>quarter is given in Appendix 15). They are fully aware of the planned demolition and raised no objections to vacating the premises. During the construction period, they plan to arrange rental accommodation in the nearby area. A 60-day relocation period will be provided, and rental costs will be borne by staff as per AEGCL's HRA policy. Upon project completion, they expect to be relocated to newly constructed staff quarters within the substation premises, as confirmed during consultations with PIU officials.</p> <p>One well and a water storage tank with a filter and pump house are also located inside the substation; these are currently functional and will be demolished. During the construction period, a separate water connection will be obtained from the PHE department, or a borewell will be constructed at a new location with prior approval from the Central/State Ground Water Board.</p> <p>During discussion with the RE, for transmission line work for 220kV 4CKT Baghjap LILO and 220kV D/C Tata Line are passing through the villages of Baghjap, Junbil, Banthai Gaon, Kharbeel, Bangfor and Tegheria.</p> <p>Photographs of consultation with PIU officials from AEGCL and</p>	



Category	Stakeholder	Influence of the project on Stakeholder / Influence of the Stakeholder on project	Concerns and expectations from the Project	Influence Rating
			staffs residing in quarters is appended in Appendix 21 & Appendix 22.	
	Primary Stakeholder: - Directly or indirectly affected by the Project	Cultural and land-use considerations; protection of customary rights.	<p>Consultations were held on 08/01/2026 with community peoples residing near the proposed substation site at Baghjap, which comprises a diverse mix schedule tribe community of Assam. In Morigaon district, the Tiwa Autonomous Tribe constitutes the majority in population and is governed under the State Autonomous Council Act of Assam but not categorized under the provisions of Indigenous Tribe communities, but not found near the substation and the associated transmission line. Hence, the impact on the indigenous tribal community is expected to be minimal.</p> <p>Further on 7th & 10th February 2026, consultations were undertaken at Junbil, Bangfor, Tegheria villages in respect of transmission line.</p>	Influence of Stakeholder: Low Influence of Project: Low
	Local institution (near access roads and within the 1000 meter of the construction site for substation and 500 m for transmission line RoW)	May face disruption due to transport of materials and workforce movement during construction activity.	On 3rd, 8th January and 7 th , 10 th February 2026, stakeholder consultations were held at Swahid Surya Bora Girls H.S. School, in Baghjap, located 950 meters from the substation, and at the Baghjap Panchayat office, situated 1.4 kilometers from the proposed substation. Discussions were conducted with the Head Master and Head Teacher of Girls H.S.	Influence of Stakeholder: Low Influence of Project: Medium

Category	Stakeholder	Influence of the project on Stakeholder / Influence of the Stakeholder on project	Concerns and expectations from the Project	Influence Rating
			<p>School, Tegheria LP School and Boro LP School Bangfor and Panchayat Pradhan of Baghjap Panchayat (Photographs are attached in Appendix-19 and Appendix 20).</p> <p>The project team presented an overview of the substation project, detailing its purpose, the implementing agency (AEGCL), funding source, and the anticipated implementation timeline. Stakeholders at both locations raised important concerns about the need to regulate vehicular movement during construction, including Strict speed limits and adjusted work schedules have been implemented to avoid disruptions during school and office hours.</p>	

List of key Stakeholders:

Stakeholder category/ Group	Key Stakeholder
<i>Primary Stakeholder</i>	
Local Community	Local Community People
Other Primary Stakeholders	AEGCL
	Project Affected Person (directly and indirectly)
	AIIB
<i>Secondary Stakeholder</i>	
Institutional Stakeholders	District Administration
	Forest Department
	Tribal Development Department
	Panchayat/ Municipal Office
Other Secondary Stakeholder	Contractors

10.4 Public Consultation

On 03rd, 8th January and 7th, 10th February 2026, public consultation sessions were conducted near the proposed site for the 220/132 kV AIS substation project and two transmission line viz, 220 kV 4 CKT Baghjap LILO and 220 kV D/C TATA Line. The sessions included participation from local residents residing within a 500-meter radius of the study area for both the substation and

transmission line projects in the villages of Baghjap, Junbill, Banthai Gaon, Bangfor, and Tegheria, as well as family members of AEGCL staff residing in the staff quarters (who will be relocated to rented accommodations). The primary purpose of the consultation was to engage with the community, gather feedback, and raise awareness on key aspects of the project. A public consultation questionnaire format which was used during the visit is attached in **Appendix 2**.

The community expressed strong support for the substation development, emphasizing interest in unskilled job opportunities and small business prospects during the construction phase. Awareness was raised on critical topics such as Gender-Based Violence (GBV) risk mitigation, the Grievance Redress Mechanism (GRM), and the Gender Action Plan (GAP). These initiatives were well received by participants, who also appreciated the project's inclusive approach and acknowledgment of local customs.

Participants openly shared their views on the proposed project, discussing potential impacts and offering suggestions to address any adverse effects. No significant social or environmental concerns were raised during the discussions. Local residents highlighted their enthusiasm for the project's timely implementation, citing expectations of improved electricity supply and employment opportunities as key benefits.

The consultation process was documented thoroughly, with a structured questionnaire used to collect feedback. The consultation demonstrated a strong community endorsement for the project and reinforced the importance of stakeholder engagement in ensuring its successful implementation.

Table 43: Summary of Public Consultation for Substation

Issues Discussed	People's views and perceptions
General Perception	The majority of community members were unaware of the proposed substation setup and its associated activities prior to the consultation. Some had heard about the project but were uncertain about the specific details of its components. Nearly all respondents expressed positive and supportive attitudes toward the construction of the proposed substation and its associated activities.
Support of local people for the construction of proposed substations and associated activities	Most of the communities expressed their support for the construction of the proposed substation, recognizing its significant potential benefits for the local population. They appreciate the Government of India's efforts to improve electrification and understand that the proposed substation is a crucial component of this initiative. They are hopeful that the project will resolve electricity problem such as low voltage and irregular power supply. Additionally, most community members emphasized that the project should not have any adverse impact on their safety.
Critical issue and concern By the local people for the substation locations	Most of the communities expressed no critical issues regarding the establishment of the proposed substation.
Project site selection criteria	As the proposed 220/132 kV Baghjap substation is located within the premises of the existing 132/33 kV substation, the community did not raise any social or environmental concerns during the consultation process. However, some community members suggested that necessary precautions should be taken to ensure the safety of people during the construction phase.



Issues Discussed	People's views and perceptions
Employment potential in the construction of substations	Across the communities, the majority felt that during the construction and operation of substations, there may be opportunities for local unemployed individuals to engage in self-supporting business activities, such as establishing small hotels, tea stalls, grocery shops, and similar ventures. Some community members requested involvement not only in unskilled labor but also in supervisory roles. They expressed concern that construction work is generally handed over to companies that bring their own labor force from outside the area. They hoped that, instead of hiring migrant workers, local residents would be given employment opportunities. Additionally, some believed that the project would ensure an improved and more reliable power supply, which could encourage the development of small and medium-sized businesses in the area.
Socio economic standing: land use, cropping pattern	The major sources of livelihood for the communities were agriculture, wage labour and small business. Most of the communities practiced one time cropping in a year, mainly paddy and vegetable cultivation.
Source of drinking water	The primary source of drinking water was hand pumps. Other sources included water supplied by the PHE department, as well as a small number of ring wells and bore wells. Some of the households reported that they experience little scarcity of water during the summer season. At other times, water availability was generally good due to a high-water table. However, in a few villages, residents complained about the taste of the drinking water, which was attributed to high iron content.
Negative impact on food grain, availability/land use	As the proposed 220/132 kV Baghjap substation is located within the boundaries of the existing 132/33 kV substation, it will have no negative impact on community land use or food grain production.
Will project cause wide spread imbalance by cutting fruit and commercial trees in the Locality	Approx. 206 trees, including both timber and fruit-bearing varieties, will need to be felled for the construction of the proposed 220/132KV Baghjap substation inside the boundary of the existing 132/33kVsubstation. These trees are proposed to be felled to allow for site clearance and the commencement of construction activities. No cutting of trees outside the subproject boundary is anticipated.
Will project cause health and safety issues	The community feedback and site observations regarding the construction of the substation indicate no significant health or safety concerns. However, some community members emphasized the importance of implementing necessary precautions to ensure public safety during the construction phase.
Protected areas	Furthermore, based on the site assessment and community input, it has been confirmed that the proposed subproject site is neither located within nor adjacent to any designated Protected Areas (PAs), Eco-Sensitive Zones (ESZs), or Critical Habitats. This ensures that the project does not pose environmental risks to sensitive ecological zones.
Will project setting change migration pattern of animals	None of the communities consulted were aware of the presence of any migratory birds or animals in their localities or near the proposed substations. Therefore, they did not anticipate any impacts on animals, birds or their habitats resulting from the construction of the proposed substations.
Migration pattern	The majority of communities reported outward migration of the younger generation, especially boys, to large cities in search of employment. The most popular migration destinations were Bangalore, for security guard and helper jobs, and Gujarat, Maharashtra, Hyderabad, and other locations for factory work. There are a few cases of migration to the capital cities of northeastern states in search of employment.



Issues Discussed	People's views and perceptions
Perceived benefits from project	The majority of the community members believe that the proposed substation will help alleviate the prevailing energy crisis, including load shedding and low voltage issues in the region. For some, it is expected to improve rural electrification and provide an impetus for the establishment of small and medium-sized businesses in the area. At the community level, residents hope the project will address problems related to low voltage and irregular power supply to households.
Perceived loss	No loss of Land or crop is anticipated for the construction of the proposed substation.

Consultations/ meetings with identified stakeholder's during the course of the visit has been done for transmission line schemes. The intensive deliberations provided a platform for two-way communication between the team of consultants and the stakeholder groups. This in turn helped in developing an understanding of the perceptions of stakeholders with regards to the project and also allowed for a means of recording their feedback. The key points discussed with each of these stakeholders are provided in below table.

Summary of Public Consultation for Transmission Line

Sl. No.	Stakeholder Category	Key Points Discussed	Findings of the Consultations
Local Community			
1	Village- Baghjap No. of Participants- 09 Village- Junbil No. of Participants- 5 Village- Bantjai Gaon No. of Participants- 7 Village- Kharbeel No. of Participants- 5 Village- Bangfor No. of Participants- 10 Village- Tegheria No. of Participants- 11 Date- 08.01.2026 (Details added in Appendix – 20)	<ul style="list-style-type: none"> ● Current engagement scenario-livelihood options; ● Basic amenities in the village- electricity, drinking water, etc. ● Health scenario in the village and distances of Hospitals/ Clinics ● Perception of local community towards the project. 	<ul style="list-style-type: none"> ● The households in all these villages consist of a mixed community population, including Assamese, Tiwa, Muslims, and others. Scheduled Caste and Scheduled Tribe populations are notably present in the Mayang Block, with the Tiwa Autonomous Tribe community predominantly found in the Morigaon District. ● Agriculture is the primary occupations. Paddy, mustered, and vegetables are the crops they used to cultivate in a yearly manner. Th the off-season, farmers work as daily wage labours or engage in the handloom sector in the local and outside market. ● Local people were briefed about the proposed TL alignment may traverses through this village area as the substation is located in the Baghjap village. Local people have raised their concerns about practicing agriculture below transmission line tower. They are informed that manually agriculture can be undertaken below the transmission tower. During consultation, some of villagers raised concern on devaluation of land falling in transmission lines. They were also informed that if the land falling within the RoW of transmission line compensation will be provided will be provided to those affected land owners towards diminution of land value. ● During consultation, local people have expressed their hope that this project will improve electricity supply condition in their area which experiences frequent load shedding. In response, the community was informed that since this is transmission line project it will not directly improve electricity condition in this area. However, in future, it will help to improve electricity supply, when the substation is connected with existing distribution substation. ● Villagers suggested to take adequate safety measures for the project, considering occurrence of flood in this area.



			<ul style="list-style-type: none"> ● At the time of consultation, villages also enquired about the actual position of the transmission line so that they can assess whose land is going to be affected by this project. Villagers with marginal land holding who practice agriculture in their small patch of land requested that transmission line should not pass from their land as their small land patch is the only source of income for them. ● At the time of consultation, villagers wanted to know whether compensation would be given to only those affected by project. They were informed that compensation amount would be given to only those whose land will fall in transmission line RoW. Also, compensation would be provided, incase, there are any damages to standing crop. ● Villagers were also informed that all the project affected land owners will be informed and consulted, before beginning of the project construction work. ● Villagers wanted to know whether they will be given employment opportunities in this project. They were informed that during construction work local people shall be given preference and would be engaged in the project construction as unskilled workers. ● During consultations, local people were also informed about the project site camp to be set up in the area with the possibility of workers (mainly skilled) coming to their area and staying for some time. At present, local community members have not shown any objection to this proposal. Some of the members were of the opinion that worker camp may improve economic transaction in the local market and boost village economy. ● Lack of unemployment is a major concern of the villagers. During consultations, local people have shown interest to be engaged in this project, as it will provide them livelihood opportunities. ● Safety is one major concern of the community members. Community members have suggested to maintain adequate ground clearance in this project, so as local people do not face any trouble while moving below transmission lines. Also, another suggestion recorded from villagers is regular maintenance of transmission lines. ● Community wanted to know whether trees will be felled along the transmission line, and in-case, trees are felled, are tree owners going to be paid? They were informed that, big trees will be felled along the transmission line. In some cases, branches of trees will be pruned. Wherever, tree felling will be required, compensation will be provided to owner of the tree.
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10.5 Continuous Consultation and Participation

The Project Management Consultant (PMC) will oversee a robust and continuous consultation process in alignment with the requirements of the Asian Infrastructure Investment Bank (AIIB). Monthly consultations, conducted by the Project Implementation Unit (PIU), PMC, and the EPC Contractor, will engage local communities near the substation. These consultations aim to identify and address concerns of affected persons, involve relevant stakeholders—including civil society—and ensure informed participation throughout the project lifecycle.

The consultation process is designed to:

- a. Commence at the subproject preparation stage and continue throughout the entire project cycle.
- b. Ensure timely, accessible, and inclusive disclosure of relevant information, with particular attention to women, vulnerable, and disadvantaged groups.
- c. Be conducted in a non-coercive, open environment that encourages free and honest feedback.
- d. Be gender-inclusive, responsive, and tailored to meet the specific needs of marginalized groups.
- e. Incorporate community input into decision-making processes, including project design, mitigation measures, benefit-sharing mechanisms, and implementation strategies.

The frequency and extent of consultations will correspond to the project's impact on local communities. All consultations and their outcomes will be thoroughly documented and reported in Environmental and Social Monitoring Reports.

Feedback from Project Affected Persons (PAPs) will be collected regularly during these consultations to ensure their concerns are addressed effectively. Additionally, a Grievance Redress Committee (GRC) will be available to resolve grievances raised by PAPs in a timely and transparent manner.

This comprehensive approach underscores the project's commitment to inclusivity, accountability, and sustainable development practices while fostering meaningful engagement with all stakeholders.

10.6 Public Consultation Information Disclosure

The Asian Infrastructure Investment Bank (AIIB) emphasizes information disclosure as a crucial aspect of stakeholder engagement for AIIB-financed projects. This approach ensures timely, transparent, and inclusive access to project-related information, adhering to the AIIB Environmental and Social Framework (ESF, 2024) and applicable national laws such as the Right to Information (RTI) Act, 2005. Early and continuous disclosure enables stakeholders to understand potential environmental and social risks and impacts, facilitating meaningful contributions to decision-making processes.

Key project documentation including Environmental and Social Impact Assessments (ESIAs), Environmental and Social Management Plans (ESMPs), semi-annual monitoring reports, and updates will be made accessible to promote transparency, accountability, and public trust. Disclosure will be conducted in culturally appropriate formats, using local languages such as Assamese, to ensure inclusivity for affected communities. This approach also supports compliance monitoring and stakeholder feedback mechanisms throughout the project lifecycle.

AEGCL officials, along with the Project Management Consultant (PMC), EPC contractor, and Project Implementation Unit (PIU), will ensure timely dissemination of environmental and social

information in accessible formats, including translations into Assamese.

For the Baghjap Substation in Morigaon, once the ESIA-ESMP is approved by AIIB, relevant documentation will be disclosed on the AIIB and Assam Electricity Grid Corporation Limited (AEGCL) websites. Hard copies of the ESIA-ESMP and an executive summary in Assamese and English will be made available at following locations:

1. Project Director cum CGM (PP&D)
Address: 1st Floor, AEGCL, Bijulee Bhawan
Contact No.: 0361-2739520
Website: www.aegcl.co.in
2. Project Authority cum DGM
Address: 132kV Baghjap Grid SS, AEGCL

Tools and Methods for Information Disclosure

AEGCL, with support from PMC and stakeholders, will utilize various methods to ensure transparency and accessibility:

- Brochures: Providing details on project scope, land requirements, compensation entitlements, and assistance packages. Available at local offices.
- Posters: Displayed at prominent public locations within the project area.
- Leaflets: Distributed within the project impact zone.
- Executive Summary of ESIA/ESMP: Translated into Assamese and made available at project offices and on AEGCL's website post-approval.

Regular community consultation meetings will be organized to update stakeholders on environmental and social aspects of the project.

Contribution to Monitoring and Accountability

Transparent disclosure will strengthen project governance, accountability, and public trust while enhancing monitoring indicators. This process will enable AIIB to assess compliance with environmental and social requirements and evaluate project outcomes effectively.

Chapter 11: Grievance Redress Mechanism

11.1 Introduction

The Assam Intra-State Transmission System Enhancement Project (Phase II), funded by the Asian Infrastructure Investment Bank (AIIB), seeks to enhance and modernize Assam's electricity transmission infrastructure. The project adheres to AIIB's Environmental and Social Framework (ESF) and its Policy on the Project-Affected People's Mechanism, ensuring environmentally and socially responsible implementation.

As part of this commitment, an Environmental and Social Management and Planning Framework (ESMPF) has been developed. The ESMPF, accessible via the Assam Electricity Grid Corporation Limited (AEGCL) website, prioritizes the concerns of affected communities and stakeholders. To further this, a multi-tiered Grievance Redress Mechanism (GRM) will be established to address grievances arising from project activities.

The GRM is a free and accessible system designed to register and resolve disputes or complaints from Project-Affected People (PAPs), workers, employees, or other stakeholders from the substation and transmission line project related construction activity. It aims to promptly address concerns, prevent litigation, and ensure smooth project implementation. The GRM guarantees that individuals raising grievances will not face reprisals or retribution. While the GRM provides an additional avenue for resolution, it does not restrict individuals from seeking recourse through the judicial system. Anonymous grievances are also accepted, though public disclosure of resolutions may be necessary in such cases.

Grievance Redress Committees at all levels of the project are tasked with upholding the objectives of the GRM and working diligently to achieve effective resolutions. This mechanism underscores the project's commitment to transparency, inclusivity, and accountability in addressing environmental and social concerns.

The primary objectives of the Grievance Redress Mechanism (GRM) are to establish a transparent, accessible, efficient, and predictable process for addressing and resolving grievances raised by stakeholders involved in the project. Key elements of the GRM include:

1. Accessibility and Awareness:

- Ensuring that the GRM is widely publicized and accessible to all stakeholders at no cost.
- Accepting grievances in various formats, including written, verbal, electronic submissions, email, social media, telephone, fax, and suggestion boxes.
- Assistance for illiterate or marginalized persons to submit grievances orally, in writing, or electronically.
- Translation and language support for local dialects of Indigenous Peoples.
- Female GRC members at all levels to facilitate women's participation.

2. Clear Procedures for Grievance Resolution:

- Registering all grievances, including minor and verbal complaints, in the GRM log.
- Acknowledging receipt of grievances and providing complainants with an expected resolution timeline.
- Investigating grievances thoroughly and proposing solutions to complainants. If the solution is accepted, the complaint is closed.
- If unresolved, escalating grievances from Tier I (field level) to Tier II (Project Management Unit level) and informing the complainant of the escalation.
- Providing feedback to complainants and ensuring closure of grievances in the GRM log.

3. Complainant Awareness and Protections:

- Emphasizing that there is no retribution or intimidation for filing complaints.
- Informing complainants that accessing the GRM is free of charge.
- Clarifying that the GRM does not replace judicial systems but provides an alternative resolution mechanism.
- Awareness campaigns targeting women and vulnerable groups to inform them about free access to the GRM.

4. Continuous Improvement:

- Monitoring repeated complaints to identify systemic issues and informing the PMU for corrective measures.
- Creating an environment that encourages free and honest exchange of information, views, and ideas.

The GRM aims to enhance stakeholder confidence by fostering a fair and responsive grievance resolution process while ensuring accountability and transparency throughout the project lifecycle.

11.2 Constitution of Grievance Redressal Committee

The construction activities under the Project, while necessary for development, may result in minor disturbances to the physical environment and local communities. These disturbances typically include dust generation, noise, air pollution, construction debris, an influx of workers, and, in some cases, the temporary or permanent acquisition of land. To address these issues effectively and ensure the concerns of all stakeholders are managed appropriately, a multi-tiered Grievance Redressal Mechanism (GRM) has been established, as outlined in the Environmental and Social Management and Planning Framework (ESMPF) guidelines.

The Assam Electrical Grid Corporation Limited (AEGCL) is committed to resolving grievances raised by Project Affected Persons (PAPs), local communities, and project workers. These grievances may pertain to resettlement benefits, compensation, relocation, replacement costs, additional assistance for vulnerable groups (including Indigenous Peoples), and environmental concerns. The GRM is designed to promote transparency, accountability, and smooth project implementation.

The Grievance Redress Mechanism will operate through a two-tiered structure:

1. Tier I: Functions at the field level to address grievances locally and promptly.
2. Tier II: Operates at the Project Management Unit (PMU) or Headquarters level to address

escalated or unresolved grievances.

For the Baghjap Substation construction site, dedicated Tier I and Tier II Grievance Redress Committees (GRCs) have been established in accordance with ESMPF guidelines. These committees are tasked with ensuring effective grievance resolution while maintaining transparency and accountability throughout the project's lifecycle. The composition of these committees is detailed in the respective tables (Table 36 for Tier I and Table 37 for Tier II).

This structured approach to grievance redressal reflects AEGCL's commitment to addressing stakeholder concerns efficiently while fostering sustainable development through responsible project execution.

Table 44: GRM Contact details for Morigaon Project

Sl. No.	Officials Nominated	Designation in the Committee
Tier-1 of the GRC		
1	Deputy General Manager, Narengi T&T Circle.	Chairman
2	Sub-District Magistrate/District Revenue Officer	Deputy Chairman
3	AGM, Guwahati T &T Division, AEGCL	Member
4	Representative from the autonomous council districts in case of tribal districts	Member
5	Representative of Local Panchayat / Council	Member
6	Woman Representative of village / Council	Member
7	Community based organization/ Non-Govt. Organization Representative	Member
8	Residential Engineer (RE), Baghjap SS	Focal Point contact
9	Representative of EPC contractor	Focal Point contact
10	Nominated Member from Tata Semi Conductor Plant	Member (as on required)
Tier-2 of the GRM		
1.	Chief General Manager/Project Director	Chairman
2.	General Manager (EAP) HQ	Deputy-Chairman
3.	Stakeholder (from State Govt.)	Member
4.	Deputy General Manager (PMU -AEGCL)	Member
5.	Assitant General Manager (EAP, PMU – AEGCL)	Member
6.	Environmental and Social Specialist–PMU	Member
7.	Team Leader, PMC	Member
8.	E&S Experts, PMC	Member

Roles and Responsibilities of Grievance Redressal Committee:

- The Grievance Redressal Committee (GRC) is tasked with efficiently managing and resolving grievances related to the project. Key responsibilities include receiving complaints from the complainants, recording them systematically in a logbook, and acknowledging receipt with a written record. The committee is responsible for convening meetings to address grievances and working collaboratively with GRC members to develop and implement solutions.

- The GRC ensures proper documentation by preparing minutes of meetings and recording resolutions. Regular feedback is provided to complainants regarding the status of their grievances within the assigned timeline. Proposed solutions are reviewed and submitted to the Contractor, Project Implementation Unit (PIU), or Project Management Unit (PMU) for approval or implementation. Additionally, the committee ensures timely communication of solutions to complainants.
- The GRC is committed to maintaining a robust grievance management process, including logging, escalating, tracking, reporting, and following up on all project-specific grievances. Any unresolved grievances at the project level or those posing significant reputational risks are swiftly escalated. This includes complaints related to health, safety, dignity, and well-being.
- In cases requiring urgent attention, such as those involving police or other authorities, the PMU is notified within 12 hours. The GRC also provides monthly updates to a designated PMU member responsible for tracking grievances. These updates are included in the monthly progress report, ensuring transparency and accountability in grievance management.
- Through these measures, the GRC aims to uphold high standards of grievance resolution while fostering trust and accountability among stakeholders.

11.3 Grievance Redressal Procedures

The Grievance Redress Mechanism (GRM) outlined in this document serves as a structured and transparent process for addressing environmental and social grievances arising during the lifecycle of the project. The mechanism is designed to ensure that complaints from project-affected persons (PAPs), workers, and other stakeholders are handled efficiently, fairly, and in a manner that minimizes the need for escalation to public legal systems.

The GRM is implemented and overseen by Environmental and Social (E&S) officers of both the Project Management Unit (PMU) and Project Management Consultant (PMC). These officers are responsible for ensuring effective communication about the GRM, recording complaints, resolving minor issues on-site, providing timely responses to stakeholders, and escalating unresolved concerns while considering the specific needs of vulnerable groups.

Key features of the GRM include:

1. Scope and Applicability:

- The GRM applies to all project phases, including pre-construction, construction, and post-construction.
- It covers grievances from project-affected persons, workers under contractors and subcontractors, and other stakeholders.
- Fatal incidents must be reported immediately to the PMU and AIIB (Asian Infrastructure Investment Bank).

Inclusive Access

- Dedicated representatives from IP and vulnerable communities on GRCs at PIU and PMU levels.
- Assistance for illiterate or marginalized persons to submit grievances orally, in writing, or electronically.
- Translation and language support for local dialects of Indigenous Peoples.



Gender-Sensitive Measures

- Female GRC members at all levels to facilitate women's participation.
- Private and safe channels for women to raise sensitive grievances, including SGBV-related issues.
- Awareness campaigns targeting women and vulnerable groups to inform them about free access to the GRM

2. Two-Tier Grievance Redress System:

- Tier-1 GRC: The first level of grievance redress involves members of the Grievance Redress Committee (GRC), who receive complaints in person or via phone/WhatsApp through a dedicated contact number. Complaints are logged, acknowledged with dated proof, and resolved within 10 working days. If a resolution is not achieved or accepted by the complainant, the issue may be escalated to Tier-2 GRC with the complainant's consent.

- Tier-2 GRC: The second level involves further investigation and resolution efforts within 20 working days. Similar to Tier-1, resolutions are communicated in writing, and outcomes are recorded. If unresolved, the complainant retains the right to seek legal recourse.

3. Special Provisions:

- In cases of severe incidents such as danger, sexual harassment, or life-threatening situations, victims are advised to contact Tier-1 or Tier-2 officials immediately. Such matters must also be reported to AIIB without delay for further action.

4. Commitment to Transparency and Stakeholder Engagement:

- Open communication with project-affected persons and workers is emphasized throughout the process.

- The GRM operates alongside public legal systems but aims to minimize reliance on formal litigation by providing an accessible and efficient resolution platform.

This GRM represents a proactive approach to grievance management, ensuring accountability, responsiveness, and stakeholder satisfaction throughout the project's implementation. It underscores the project's commitment to addressing concerns in a professional, equitable, and timely manner while maintaining compliance with legal and institutional frameworks.

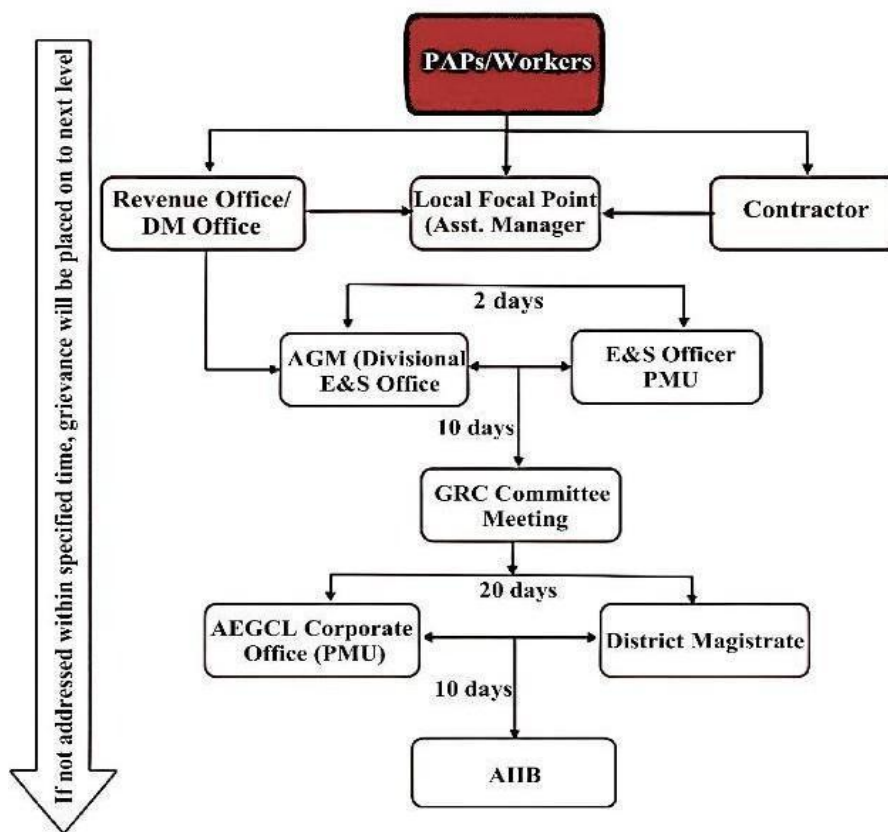


Figure 29: Grievance Redressal Procedures

Table 45: Most Common Grievances and possible Redressal

Common Grievance Categories	Issues and Likely Solutions
Technical/Engineering	<ul style="list-style-type: none"> - Design: Adapt designs to site-specific conditions, ensuring width and alignment conform to available land and GPS coordinates. For alignment issues, engage the Revenue Department for corrections. - Quality Assurance: Test materials and finished products at reputable laboratories and publicize results to maintain transparency.
Environmental	<ul style="list-style-type: none"> - Storm Water Management: Avoid obstructing or diverting natural drainage. Provide culverts or bridges where required. - Stone Blasting: Follow legal precautions and inform communities in advance. - Dust Control: Regularly water the site to prevent dust spread. - Noise Mitigation: Use barriers near sensitive areas and schedule work during appropriate hours. - Borrow Areas: Excavate borrow pits as per specifications to avoid environmental degradation. - Waste Disposal: Dispose of waste only at designated locations.



Common Grievance Categories	Issues and Likely Solutions
Social	<ul style="list-style-type: none"> - Public Services Disruption: Minimize interruptions to hospitals, schools, water, and electricity supplies by consulting with communities and providing alternatives where necessary. - Historical and Cultural Sites: Adhere to government guidelines to preserve these sites and prevent defacement - Health Awareness: Implement government Standard Operating Procedures (SoPs) for addressing HIV/AIDS and other pandemics. Conduct awareness campaigns for workers and communities. - Gender-Based Violence (GBV): Conduct awareness programs for workers and communities. Implement a code of conduct and establish Internal Complaints Committees to address gender-related grievances. <p>-Child Labour</p> <ul style="list-style-type: none"> ● Employment of children is allowed only from the age of 16 onwards. ● Work must ensure full protection of the child's health, safety, and morals. ● Children must have received adequate specific instruction or vocational training related to the work. ● Employment must comply strictly with applicable national laws and regulations. ● The guidelines align with the International Labour Organization's Minimum Age Convention, 1973, and AIB policy requirements.
Land, Compensation and Resettlement	<ul style="list-style-type: none"> - Compensation Payments: Ensure full compensation is paid before taking possession or commencement of construction work. - Ownership Disputes: Refer land ownership disputes to the Revenue Department for resolution. - Property Damage: Avoid causing damage to properties. Repair any damages promptly to restore them to their original condition. - Boundary Disputes: Do not intervene in disputes between Project Affected Persons (PAPs); allow them to resolve such issues independently. - RoW related cases if any.
Road Safety	<ul style="list-style-type: none"> - Accidents: Report incidents immediately to the Project Implementation Unit (PIU) or Project Management Unit (PMU). - Humps: Install speed humps only with PIU approval and as per design specifications. Unauthorized construction by private individuals is prohibited. - Signage: Ensure proper installation of road signage by the PIU or contractors. - Pavement Cutting: Utility companies must obtain permission before cutting pavements. - Overloaded Vehicles & Littering: Report such incidents to the PIU for appropriate action.
Occupational Health and Safety	<ul style="list-style-type: none"> - Protective Gear: Workers must wear protective gear at all times during work. Communities must also be educated on safety measures. - Health Awareness: Educate workers and communities about HIV/AIDS and other pandemics. Enforce adherence to government SoPs.
Governance	<ul style="list-style-type: none"> - Procurement Transparency: Ensure all procurement processes are transparent, with relevant details disclosed to stakeholders. - Contractor Conduct: Contractors must not directly engage with communities without PIU involvement. This ensures accountability and fairness in interactions. - Corruption Prevention: Any instances of corruption should be reported to the respective authorities for investigation.
Security Guard deployed at Substation	<ul style="list-style-type: none"> - Raising awareness among local residents and workers: Displaying of signboards and conducting awareness drive around the substation premises to highlight electrical hazards, restricted or prohibited areas, and to prevent unauthorized entry by nearby community members seeking shortcuts, grazing

Common Grievance Categories	Issues and Likely Solutions
	<p>animals, or other activities.</p> <ul style="list-style-type: none"> - Uncontrolled Movement Restriction and Identity Authorization: To regulate the movement of laborers and workers and verify the identities of laborers and community members within the substation campus, an ID pass system should be implemented for laborers and contractors working inside the substation. Additionally, entry and exit registers must be maintained by security guards under the supervision of the contractor. - Grievance Handling: Any grievances related to security guards shall be addressed through the existing GRM system. The first point of contact will be the RE of Baghjap SS, who will be responsible for addressing the grievance while ensuring confidentiality and protection from retaliation. A flowchart illustrating the security guard grievance handling process is provided in Appendix 13.

11.4 Recording, Monitoring, Reporting and Evaluation

The Grievance Redress Mechanism (GRM) system is designed to maintain a grievance register log for efficient tracking and resolution of complaints. The system will document each grievance with key details, including the type and description of the grievance, gender-disaggregated data of the complainant, date of receipt and acknowledgment, actions taken (investigations and corrective measures), and the resolution or escalation timeline. For grievances escalated to Tier II, the actions taken and resolution details will also be recorded. A sample grievance registered format is attached in **Appendix- 23**.

To ensure effective and timely grievance management, a set of monitoring indicators will be incorporated into the regular Environmental & Social (E&S) Monitoring report. These indicators include:

- Number of grievances received.
- Percentage of grievances acknowledged within the specified timeframe.
- Percentage of grievances resolved unilaterally.
- Percentage of grievances closed within the specified timeframe.
- Percentage of grievances related to recurring events or locations to identify areas most affected by potential project impacts.
- Percentage change in grievances compared to the previous reporting period.
- Percentage of complainants satisfied with the process (timeliness and fairness).
- Percentage of complainants satisfied with the outcome.

In cases where more than 30 grievances are recorded, the Project Manager may initiate an investigation to identify patterns or recurring issues requiring attention. If deemed necessary, an independent consultant may be engaged to review the grievances and provide expert recommendations for improvement.

This structured approach ensures transparency, accountability, and continuous improvement in

grievance management while fostering stakeholder satisfaction and mitigating potential project impacts.

Table 46: For GRC Members: Dos and Don'ts

DOs	DON'Ts
<ul style="list-style-type: none"> ➤ Respect complaints. ➤ Follow the established GRM procedures ➤ Popularize the GRM's existence, accessibility, and free access. ➤ Establish accessible compliant receipt locations and channels for vulnerable groups considering their constraints. ➤ Maintain logbooks. ➤ Establish clear timetables for resolving grievances. ➤ Assign each compliant a unique ID, track and report its resolution. ➤ Work with the complainant to find a resolution throughout the GRM. ➤ Keep complainant informed of resolution process. ➤ Seek feedback from the complainant to improve GRM functionality. 	<ul style="list-style-type: none"> ➤ Intimidate, threat, or harass complaints. ➤ Set unrealistic redress durations. ➤ Exclude vulnerable groups. ➤ Create constraints in filing grievances. ➤ Create barriers or compound the procedures for grievance filing receipt. ➤ Disclose aggrieved identity to others. ➤ Make false promises to the complainant. ➤ Be biased in redressal. ➤ Expect or seek any compensation or benefits from complainants.

11.5 The Project-affected People's Mechanism

The Project-affected People's Mechanism (PPM) has been established by the Asian Infrastructure Investment Bank (AIIB) to provide an independent and impartial platform for addressing concerns raised by individuals or communities adversely affected, or at risk of being adversely affected, by AIIB's failure to implement its Environmental and Social Policy (ESP). The PPM serves as a recourse mechanism when such concerns cannot be resolved satisfactorily through the Project-level Grievance Redress Mechanism (GRM) or AIIB's internal management processes. Further details about the PPM, including its scope and procedures, can be accessed at the following link: [AIIB PPM Information] (<https://www.aiib.org/en/policies-strategies/operational-policies/policy-on-the-project-affected-mechanism.html>).

Chapter 12: Gender Action Plan (GAP)

12.1 Purpose of the GAP

The Gender Action Plan (GAP) for the 220/132 kV (2x100 MVA) AIS at the Baghchap substation in Morigaon district is designed to ensure equitable benefits for both women and men through the project's interventions. Recognizing existing socio-economic disparities in the region, such as gender imbalances in sex ratio, literacy rates, and workforce participation, the GAP outlines targeted strategies to address these issues.

The GAP presents an opportunity to promote women's participation in local planning, employment in civil works, and capacity building for technical roles. It integrates gender-sensitive actions across all project components, including public consultations, labor engagement, and skills development. The plan prioritizes women's involvement in traditionally male-dominated sectors like infrastructure development, ensuring their voices are heard and their livelihoods are protected or improved.

Key objectives of the GAP include fostering inclusive participation of women in project planning, consultations, and implementation. The plan emphasizes creating employment and vocational training opportunities for women, contributing to their economic empowerment and social inclusion. It also seeks to enhance women's leadership and decision-making roles within local institutions and community platforms.

To mitigate potential adverse impacts on women, such as livelihood loss or disruption of services, the GAP includes measures to minimize these risks. It strengthens accountability through a gender-responsive Grievance Redress Mechanism (GRM) with safe and accessible feedback channels, encouraging women's representation and addressing their concerns effectively.

Overall, the GAP promotes a socially sustainable and gender-responsive approach to substation development. By addressing gender disparities and fostering inclusivity, the plan enhances the project's long-term social acceptability while contributing to broader goals of gender equality and community development.

12.2 Gender Analysis

The employment and earnings data for Assam highlight significant gender disparities in economic participation and income between men and women. According to the 2011 Census of India, the Worker Participation Rate (WPR) for males in Assam stood at 53.59%, while for females, it was significantly lower at 22.46%. Women constituted only 28.6% of the total workforce. Notably, 7.03 million men were engaged as main workers in full-time employment, compared to just 1.65 million women. A substantial 1.78 million women were recorded as marginal workers, reflecting their high dependence on seasonal, part-time, or informal jobs that often lack social security.

In Mayang Block, located in Morigaon district under the Tiwa Autonomous Council, literacy rates show considerable variation across villages based on 2011 Census data. The block has an overall literacy rate of approximately 59.2%. For instance, Burha Mayang recorded a literacy rate of 72.2% (male literacy: 78.85%, female literacy: 65.45%), while Raja Mayang had a higher literacy rate of 86.89% (male literacy: 91.47%). The district's overall literacy rate was noted at 56.4%.

The workforce participation of women in Mayang Block indicates a heavy reliance on marginal and non-regular employment. Of the total rural female population of 1,05,652 in Mayang Block, only 10,949 women were main workers employed for more than six months, while 19,672 were marginal workers employed for less than six months. A significant number—88,118 women—were classified as non-workers. The estimated female workforce participation rate, including both main and marginal workers, stood at approximately 25.8%.

While the 2011 Census provides a baseline, recent trends suggest a shift toward self-employment among rural women in Assam, driven by initiatives like Self-Help Groups (SHGs) under the Assam State Rural Livelihoods Mission (ASRLM). These programs are helping women transition to more sustainable economic activities and improve their participation in the workforce.

12.3 Measures to address Gender Issues and Action Plan

As discussed in *Section 4.4* of this report, there is imbalance in socio-economic profile of men and women in the study area related to sex ratio, literacy rate and workforce participation. The Gender Action Plan (GAP) will be implemented throughout all phases of the project to ensure that women in the project area benefit meaningfully and equitably. The GAP emphasizes the importance of engaging women in a free, prior, and informed manner across all activities, from planning and consultation to implementation and monitoring. Specific actions will be undertaken to facilitate women's active participation in the project and to ensure they receive fair access to employment, resources, and decision-making opportunities. Additionally, during community consultations, awareness will be provided to the local community regarding the engagement of female workers in construction activities. Interested groups of women will be encouraged to participate, and training and capacity-building programmes will be provided to interested women's groups to equip them with the necessary skills to safely and effectively engage in construction-related work. Equal pay for equal work will be ensured for both women and men workers. Basic amenities—such as separate toilets for male and female workers, clean water, iron- and arsenic-free drinking water facilities, and resting areas—will be provided for the workforce at construction sites and labor camps. The provisions of the Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act, 2013, will be strictly implemented. Gender-based violence risks will be addressed through (i) community engagement throughout the project lifecycle, (ii) a labor management plan, and (iii) a grievance redressal mechanism.

To monitor the effectiveness of gender inclusion, several key indicators will be tracked regularly. These include the percentage of women employed within the total workforce engaged in construction activities and the number of women receiving equal wages compared to their male counterparts for performing similar work. The project will also ensure the provision of essential amenities at construction sites, such as safe and separate toilet facilities and access to clean drinking water for women workers. Additionally, an Internal Complaints Committee will be established in accordance with legal provisions to address and document cases of sexual harassment, thereby ensuring a safe and supportive work environment for women. These combined measures will help ensure that gender equity into project processes and outcomes while fostering a more inclusive and accountable implementation framework.

Table 47: Gender Issues and Action Plan

Issues	Measures	Applicability	Responsible Agency	Monitoring Indicators
A. Women Working in Energy Sector and Construction Site				
Women workforce	Encourage contractors to prioritize the use of local resources and the employment of local workers and to maximize use of women (at least 30%) in labour-based work (wherever feasible) For transmission line works, which are typically executed by predominantly male labour gangs due to the nature of tower construction activities, a minimum of 5% women participation will be encouraged where practicable.	Construction phase	EPC/PMC/PIU/PMU	Minimum 30% of the workforce are women at the construction site A minimum of 5% women participation will be encouraged where practicable.
Equal wage	Ensure equal pay for equal work for women and men for all construction and maintenance work. Also, to be included in contractors' agreement	Construction phase	EPC Contractors/PMC/PIU/PMU	All workers (both women and men doing same work) receive same wage and reflected in payroll.
Employment announcement	Announce employment opportunities and recruitment notices widely, targeted at women as well as men.	Pre-construction phase	EPC contractor	Notice of employment opportunity published in local newspapers/cable channels/village panchayat office or Municipality ward offices/ outside the construction site, etc.
Employment Opportunities	As per the Government of Assam policy on reservation for women in public employment (Personnel Department Office Memorandum providing for 30% reservation for women in State Government jobs), a minimum of 30% women is engaged in AEGCL PIU/PMU. Further, technical training and capacity-building programmes may be provided to the local workforce—particularly women—to facilitate their	Operational phase	PIU/PMU	Can target minimum 25% women

Issues	Measures	Applicability	Responsible Agency	Monitoring Indicators
	inclusion in project activities, including during the operation and maintenance phase.			
Availability of basic facilities	Ensure basic facilities (separate toilets, clean water, iron and arsenic free drinking water facilities, resting place, crèche) are provided for male and female workers at the construction site.	Construction and Operational phase	To be implemented by the contractors and to be ensured by PMC, PIU and PMU	All facilities available at the construction site and used by the male and women workers
B. Women Residing in Adjacent Settlements of Project Area				
Livelihood	Preference may be given to women from project affected families to work as unskilled workers (wherever feasible) during the construction phase and they receive equal Wage for the work	Construction phase	Contractor and AEGCL	A minimum of 30% of the workforce at the substation construction site should be women. For transmission line tasks, which are typically performed predominantly by male teams due to the nature of tower construction, efforts will be made to ensure a minimum of 5% female participation wherever feasible.
Safety and Security concerns	Establish Internal Complaints Committee for men and women workers at site as per prevailing law, Code of conduct will be enforced and awareness on GBV. Address gender-based violence risk through (i) community engagement throughout project lifecycle, (ii) labour management plan, and (iii) grievance redressal mechanism.	Construction phase	Contractor and AEGCL	Constitution of "Internal Complaint Committee" in AEGCL as well as in EPC to register sexual harassment case. Number of safety and security related complaints registered with GRC.

12.4 Implementation Arrangements

The implementation of the Gender Action Plan (GAP) will be coordinated through a clearly defined institutional framework involving key stakeholders at multiple levels. The Project Management Unit (PMU) of AEGCL will have overall responsibility for GAP execution, supported by the Project Management Consultant (PMC) and the EPC contractor. Specific institutional roles include the

designation of Environmental and Social (E&S) officers within both the PMU and PMC to oversee gender-related activities and ensure compliance with GAP commitments. Additionally, the EPC contractor will appoint a dedicated Community Consultation Officer responsible for facilitating inclusive community engagement and ensuring that women's voices are adequately represented during implementation. To enhance the effectiveness of these arrangements, targeted capacity-building initiatives will be conducted for all implementing partners, including contractors, field staff, and community liaisons. Training programs will focus on gender-sensitive practices, inclusive communication, equitable benefit-sharing, and grievance handling to ensure that gender considerations are integrated at every stage of the project.

12.5 Monitoring and Reporting

The implementation of the Gender Action Plan (GAP) will be closely monitored and systematically reported through established Environmental and Social (E&S) reporting mechanisms. Gender-related progress and specific indicators will be integrated into the quarterly and semi-annual E&S monitoring reports prepared by the Project Management Consultant (PMC). These semi-annual reports will be submitted to the Asian Infrastructure Investment Bank (AIIB) for review and feedback, ensuring alignment with project objectives.

To maintain consistent tracking at the implementation level, the EPC contractor will include GAP-related indicators in their monthly E&S progress reports. Additionally, the PMC's monthly site visit reports will feature a dedicated section on GAP monitoring. This section will document field-level observations, track progress against established targets, and identify any emerging gender-related issues that require attention. This comprehensive reporting framework ensures accountability and timely action to address gender-related objectives throughout the project lifecycle.



Chapter 13: Summary, Recommendations and Conclusion

The ESIA has evaluated the overall acceptability of the environmental and social impacts likely to result from the construction and operation of the 220/132 kV AIS substation at Baghjap in Morigaon, under Phase II of the AISTSEP project. The proposed subproject is categorized as Category B, as the social and environmental impacts are assessed to be limited in scope, few in number, site-specific, largely reversible, and readily addressed through mitigation measures. Limited disturbance to the neighboring community is anticipated; however, this is expected to be short-term and confined to the construction phase. All these impacts are temporary and can be effectively mitigated with appropriate measures. Furthermore, the development of the 220/132 kV substation will enhance the availability of quality power in the region.

The ongoing construction activities will alter the baseline conditions to some extent; however, the economic opportunities, particularly in terms of local employment, are assessed as positive. Mitigation measures for potential impacts on Air, Water, Soil, Noise, Ecology, and Socio-economics have been specified through proper:

- Emphasis is placed on adhering to best practices for transparent communication and efficient resolution of grievances to ensure stakeholder satisfaction and compliance.
- Comprehensive planning and designing of AIS substation structures, including site preparation, access routes, and material transport logistics, are critical for project success.
- Strict application of health and safety protocols is essential during transformer erection and other equipment installation activities to minimize risks and ensure a safe working environment.
- Identification and acquisition of all necessary clearances and permits for each sub activity are integral to maintaining regulatory compliance and preventing project delays.

In the transmission line project activities related to construction of 220kV Baghjap LILO and 220kV D/C TATA Line may lead to potential impacts on:

- Diminution of land value along the transmission line corridor and damage to standing crops, both of which will be mitigated by way of payment of compensation (before beginning of civil work) to affected land owners.
- Deterioration of local level air quality due to vehicular movements, construction activities involving setting up of foundation structures, tower erection and stringing of conductors.
- Community health and safety aspects arising out of excavation of towers foundation near pathways and because of labour influx issues.
- Occupational health safety (risks of construction workers falling from height and electrocution) during the construction phase.

However, most of these impacts are temporary and can be mitigated with appropriate mitigation



measures. During the operation stage, there is expected to be no impacts on the physical environment. The adverse impacts on ecology would also be reduced to a significant extent with time as natural vegetation would be allowed to regenerate to a safe height beneath the conductors. The implementation of the mitigation measures suggested can help in managing the adverse impacts on air quality, ground water etc. whereas the economic opportunities in terms of local employment are assessed to be positive.

The ESMP provides a framework to address potential adverse impacts, guide contractors, and establish standards of good practice to be adopted for subproject activities during the construction and operation phases of the project. Regular inspection and monitoring of environmental and social aspects throughout these phases will enhance the effectiveness of the proposed mitigation measures.



APPENDICES



Appendix 1: Rapid Environment and Social Assessment Checklist

Name of the Project: Establishment of New 220/132 kV (2 X 160 MVA) AIS Substation and Associated Transmission Line (2 nos) at Morigaon

Name of Village, Panchayat, Block, District:

Date of Checklist Filled In:

Starting Coordinates: Longitude, Latitude

End Coordinates: Longitude, Latitude

A. Environmental Screening Checklist

Particulars	Yes	No	220/132kV AIS at Morigaon	220kV 4CKT Baghchap LILO and 220kV Dc TATA TLs
A. Project Siting: Is the Project area adjacent to or within any of the following environmentally sensitive areas?				
1. Cultural heritage site		✓		
2. Legally protected Area (core zone or buffer zone)	✓		The Substation does not fall within any legally protected areas. However, protected areas, namely Sunaikuchi RF, Khulahat RF, Tetelia Baghara RF, Baba Parbar RF, and Killing RF, are situated within the 10km buffer zone, with Sunaikuchi RF specifically located within the 2km buffer zone. Meanwhile, Pobotora WLS (KBA and IBA), Amchang WLS (KBA and IBA), Jengdia Beel, and Satgaon WLS (IBA) are all located beyond the 10km buffer zone.	The transmission lines are not located within any legally protected areas. The 220kV DC TATA Line runs in close proximity to the Sunai Kuchi RF, maintaining an average distance of 600m from its periphery. Other details provided for the AIS are also relevant to the transmission lines.
3. Wetland/ Mangrove/ Estuarine		✓		
4. Special area for protecting biodiversity		✓		
B. Potential Environmental Impacts. Will the Project cause?				
1. Impairment on historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		✓		
2. Disturbance to precious ecology (e.g. sensitive or protected areas)?	✓		Dust and fugitive emissions are expected during the construction phase. However, such impacts will not affect sensitive of protected areas. The air and noise effects will be confined to a localized area and	The TLs are not close to precious ecology. Dust and fugitive emissions may be expected during the construction phase in the peripheral areas of the Sunai Kuchi RF. Air and noise effects will



		will only last for a brief period.	be confined to a localized area and will only last for a brief period.
3. Alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?	✓	<p>The construction of a new substation within a compounded premises has the potential to alter surface water hydrology in nearby waterways.</p> <p>This alteration may lead to increased sedimentation in streams, primarily caused by heightened soil erosion at the construction site.</p> <p>It is crucial to implement appropriate erosion and sediment control measures to mitigate these impacts and protect the surrounding aquatic ecosystems.</p>	<p>The construction of new towers that are located within agricultural paddy fields, particularly in proximity to rural settlements, may lead to alterations in the surface water hydrology of nearby waterways.</p> <p>This disruption will result in increased sediment levels in streams, primarily caused by heightened soil erosion at the construction site.</p> <p>Addressing these environmental impacts requires careful planning and mitigation strategies to minimize further degradation of water quality and preserve the surrounding ecosystems.</p>
4. Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	✓	<p>The construction of the new AIS in a rural settlement can lead to deterioration of surface water quality. This can occur due to silt runoff caused by land disturbance during construction activities, improper management of sanitary wastes from worker-based camps, and the use of certain chemicals in construction processes.</p> <p>Mitigation measures, such as implementing effective erosion control systems, ensuring proper waste management practices, and using environmentally safe construction materials, are crucial to minimize these impacts and protect the surrounding ecosystem.</p>	<p>The construction of new towers will be on agricultural paddy fields, close to rural settlements, raises concerns about the degradation of surface water quality. This deterioration can be attributed to silt runoff, improper disposal of sanitary waste from worker camps, and the use of construction-related chemicals.</p> <p>Mitigating these impacts requires implementing effective erosion control measures, proper waste management systems, and careful handling of construction materials to minimize environmental harm.</p>
5. Increased air pollution due to subproject construction works/ civil works?	✓	<p>Construction activities often contribute significantly to air pollution due to the emissions produced by heavy machinery and vehicles. Equipment like excavators, bulldozers, and trucks typically operate on diesel or gasoline, releasing harmful pollutants into the atmosphere.</p> <p>These emissions include nitrogen oxides (NOx), particulate matter (PM), and volatile organic compounds (VOCs), which can</p>	<p>Erecting transmission towers in paddy fields can significantly contribute to air pollution due to the emissions generated by heavy machinery and vehicles used in the process. Equipment such as excavators, bulldozers, and transport trucks, which typically run on diesel or gasoline, release harmful pollutants into the atmosphere. These emissions include nitrogen oxides (NOx), particulate matter (PM), and volatile organic compounds (VOCs), all of which can degrade air quality and pose risks to</p>



		negatively impact air quality and human health.	nearby human health.
6. Noise and vibration due to subproject construction works/civil works?	✓	<p>Loud noise can often result from construction activities such as drilling, cutting, hammering, and mixing concrete.</p> <p>The AIS is located in a rural setting, with about 50-60 residential houses, which would be immediately impacted by noise and vibrations.</p> <p>Using sound barriers, acoustic enclosures, vibration isolation systems, scheduling activities, etc., will help to minimize disruption during sensitive periods,</p> <p>In addition, regular maintenance of machinery and equipment is also essential to ensure optimal performance and minimize unnecessary disturbances.</p>	<p>Along the transmission lines route, the tower location in the proximity to settlement areas, there will be concerns regarding noise and vibration caused by construction activities.</p> <p>Using sound barriers, acoustic enclosures, vibration isolation systems, scheduling activities, etc., will help to minimize disruption during sensitive periods,</p> <p>In addition, regular maintenance of machinery and equipment is also essential to ensure optimal performance and minimize unnecessary disturbances.</p>
7. Improper 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?	✓	<p>Inadequate sanitation facilities at construction camps and work sites can pose significant health risks. The absence of proper toilets or sanitation systems often forces workers to rely on open defecation or temporary makeshift setups. This practice heightens the danger of faecal contamination, which can affect water sources, soil, and food supplies. Consequently, it increases the likelihood of disease outbreaks, including diarrhoea, typhoid, and hepatitis A, emphasizing the critical need for improved sanitation infrastructure in such environments.</p>	<p>Improper sanitation practices and inadequate solid waste management in construction camps and work sites pose significant environmental and public health concerns.</p> <p>These issues are further compounded by the potential transmission of communicable diseases, including sexually transmitted infections (STIs) and HIV/AIDS, from construction workers to local communities.</p> <p>Proximity to residential zones highlights the critical need for implementing robust hygiene measures, effective waste disposal systems, and comprehensive health awareness programs to mitigate these risks and safeguard both the environment and public health.</p>
8. Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and other	✓	<p>To effectively prevent the spread of diseases carried by mosquitoes and rodents, it is crucial to implement measures that target their control. This includes</p>	<p>The construction and installation of towers in paddy fields located near settlement areas or villages have the potential to inadvertently create temporary</p>



vectors of diseases?		<p>eliminating potential breeding sites, maintaining cleanliness, and using appropriate pest control methods. By reducing their presence and opportunities to thrive, the risk of disease transmission can be significantly minimized.</p>	<p>breeding habitats for disease-carrying organisms, such as mosquitoes and other vectors. These environments, often characterized by stagnant water or disturbed soil, can serve as ideal conditions for the proliferation of such vectors, thereby increasing the risk of vector-borne diseases in nearby communities.</p> <p>It is essential to implement effective mitigation measures, such as proper site management, drainage systems, and regular monitoring, to minimize these risks and ensure the health and safety of the local population.</p>
9. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and Electromagnetic hazards during project construction and operation?	✓	<p>The construction and operation of a compounded substation in settlement areas present several occupational health and safety risks and vulnerabilities due to exposure to physical, chemical, biological, and electromagnetic hazards.</p> <p>Physical risks may include injuries from heavy machinery, falls, or accidents during construction activities.</p> <p>Chemical hazards could arise from the handling of substances such as oils, solvents, or other potentially hazardous materials used in the construction or maintenance processes.</p> <p>Biological risks might stem from exposure to pests, rodents, or unsanitary conditions on-site.</p> <p>Additionally, electromagnetic hazards are a significant concern during the operation phase, as prolonged exposure to electromagnetic fields (EMFs) generated by the substation equipment could pose health risks to workers and nearby residents. Implementing comprehensive risk assessments, strict safety protocols, and regular training programs is essential to mitigate these risks and ensure the well-being of workers and the surrounding community.</p>	<p>The process of tower erection in paddy fields adjacent to settlement areas or villages presents several occupational health and safety risks and vulnerabilities.</p> <p>These include exposure to physical hazards such as falls, equipment-related injuries, and ergonomic strain during construction activities.</p> <p>Chemical risks may arise from the handling of hazardous materials like fuels, lubricants, or solvents.</p> <p>Additionally, biological hazards, including the presence of harmful organisms or diseases associated with wetland environments, can pose significant health concerns.</p> <p>Electromagnetic hazards during the operation phase, particularly due to high-voltage transmission lines, may also impact workers and nearby residents if not adequately mitigated.</p> <p>Implementing strict safety protocols, regular training, and thorough risk assessments is essential to minimize these risks and ensure the well-being of all individuals involved.</p>



<p>10. 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?</p>	<p>✓</p>	<p>The construction and operation of a new AIS in an area surrounded by settlements present potential risks to community health and safety, particularly due to the transport, storage, use, and disposal of materials such as explosives, fuel, and other chemicals.</p> <p>These activities require stringent safety protocols to mitigate hazards, including accidental spills, leaks, or explosions, which could adversely impact both the local environment and the well-being of nearby residents.</p> <p>Proper planning, adherence to regulatory standards, and the implementation of robust risk management strategies are essential to ensure that such materials are handled responsibly throughout the project's lifecycle. Proactive communication with the community and emergency preparedness measures are also critical to fostering trust and minimizing potential risks.</p> <p>Construction and operational activities can present numerous risks to the health and safety of the community, including:</p> <ul style="list-style-type: none"> ☞ Accidents and explosions ☞ Chemical spills and leaks ☞ Air pollution ☞ Water contamination ☞ Occupational hazards ☞ Noise pollution ☞ Waste generation 	<p>The construction and operation of transmission line towers in areas such as paddy fields and nearby settlements pose potential risks to community health and safety due to the transport, storage, usage, and disposal of hazardous materials, including explosives, fuel, and chemicals.</p> <p>These activities, if not managed properly, can lead to environmental contamination, accidents, or health hazards for the local population.</p> <p>It is essential to implement stringent safety protocols, proper handling measures, and robust monitoring systems to mitigate these risks and ensure the well-being of the surrounding communities.</p>
<p>11. 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,</p>	<p>✓</p>	<p>The construction of a new AIS substation within a compounded premises situated near settlements presents potential community safety risks arising from both accidental and natural causes.</p> <p>These risks are particularly significant when structural elements or components of the project are accessible to members of the surrounding community or in cases where their failure could</p>	<p>Community safety risks, arising from both accidental and natural causes, must be carefully assessed and mitigated, particularly in cases where structural elements or components of a project are accessible to members of the surrounding community. This is especially critical during the construction, operation, and decommissioning phases, as any failure in these structures could result in significant harm to the community. For instance, the erection of transmission line</p>



<p>operation and decommissioning?</p>		<p>result in injury.</p> <p>It is imperative to implement comprehensive safety measures throughout the phases of construction, operation, and decommissioning to mitigate such risks.</p> <p>This includes ensuring robust structural integrity, establishing secure boundaries to restrict unauthorized access, conducting regular safety inspections, and engaging with the local community to raise awareness about potential hazards and precautionary measures.</p> <p>Proactive risk management and adherence to safety standards are essential to safeguard the well-being of the affected community.</p>	<p>towers in areas such as paddy fields, with settlements in close proximity, presents potential hazards. These may include risks of structural instability, electrical accidents, or impacts from natural events.</p> <p>It is essential to implement robust safety measures, conduct thorough risk assessments, and engage with the affected communities to ensure their safety and well-being throughout the lifecycle of the project.</p>
<p>12. Generation of solid wasteland/or hazardous waste?</p>	<p>✓</p>	<p>The construction of a new Air-Insulated Substation (AIS) within a compounded premises, particularly in proximity to residential settlements, may result in the generation of both solid and potentially hazardous waste.</p> <p>Proper waste management practices must be implemented to minimize environmental impact and ensure compliance with regulatory standards.</p> <p>This includes the segregation, collection, treatment, and disposal of waste materials in accordance with applicable guidelines.</p> <p>Additionally, measures should be taken to mitigate any potential risks to the health and safety of nearby communities, ensuring that all construction activities are conducted responsibly and sustainably.</p> <ul style="list-style-type: none"> ☞ Waste from Construction and Demolition ☞ Waste from Equipment ☞ Waste from Maintenance 	<p>The erection of transmission line towers in paddy fields, particularly in areas with nearby settlements, raises concerns regarding the potential generation of solid and/or hazardous waste.</p> <p>Proper waste management strategies must be implemented to mitigate any adverse environmental and social impacts.</p> <p>It is essential to ensure that construction activities are carried out in compliance with environmental regulations, with measures in place to minimize waste generation and ensure safe disposal.</p> <p>Additionally, close monitoring and engagement with local communities can help address any concerns related to waste management and maintain a sustainable balance between development and environmental preservation.</p>



<p>13. Use of chemicals?</p>	<p>✓</p>	<p>Chemicals are anticipated to be used for the following</p> <ul style="list-style-type: none"> ☞ Concrete Admixtures ☞ Anti-Corrosion Coatings ☞ Insulating Oils ☞ Sulphur Hexafluoride (SF6) ☞ Fire Suppression Agents ☞ Lubricants ☞ Cleaning Agents <p>The use of chemicals in the construction of a new Air-Insulated Substation (AIS) within a compounded premises, particularly in proximity to residential settlements, necessitates careful consideration and adherence to safety protocols. It is essential to conduct a thorough assessment of the potential environmental and health impacts associated with the use of such chemicals.</p> <p>Appropriate measures, including proper storage, handling, and disposal procedures, should be implemented to mitigate any risks to the surrounding community and environment.</p> <p>Additionally, compliance with regulatory standards and guidelines is crucial to ensure that the construction process prioritizes safety and sustainability while minimizing any adverse effects on nearby settlements.</p>	<p>The use of chemicals in the erection of transmission line towers situated in paddy fields, particularly in areas with nearby settlements, requires careful consideration and adherence to environmental and safety standards.</p> <p>It is essential to evaluate the potential impact on agricultural land, local ecosystems, and the health of residents in the vicinity. Implementing proper measures to minimize chemical usage and ensuring compliance with regulatory guidelines can help mitigate risks while maintaining the structural integrity of the towers.</p>
<p>14. Generation of wastewater during construction or operation?</p>	<p>✓</p>	<p>The generation of wastewater during the construction or operation of a new AIS substation within a compounded premises, especially in proximity to settlements, is an important consideration.</p> <p>During the construction phase, wastewater may result from activities such as equipment cleaning, worker sanitation facilities, and potential runoff from construction materials.</p> <p>Proper management strategies, including the installation of temporary wastewater treatment systems and adherence to environmental regulations, should be implemented to mitigate any adverse impacts.</p>	<p>The generation of wastewater during the construction or operation phases of erecting transmission line towers, particularly in areas where the alignment passes through paddy fields and is in proximity to settlements, warrants careful consideration. Proper measures should be implemented to manage wastewater effectively, ensuring minimal environmental impact and safeguarding the health and well-being of nearby communities.</p> <p>Strategies such as the use of sedimentation tanks, wastewater treatment systems, and adherence to environmental regulations are essential to mitigate potential risks.</p>



		<p>During the operational phase, wastewater generation is typically minimal but may arise from maintenance activities or drainage systems.</p> <p>It is crucial to ensure that any wastewater produced is treated appropriately to prevent contamination of the surrounding environment and to safeguard the health and well-being of nearby communities.</p>	<p>Additionally, continuous monitoring and proactive engagement with local stakeholders can help address concerns and promote sustainable practices throughout the project lifecycle.</p>
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B. Social Screening Checklist

Particulars	Observation	
	Substation	Transmission Line
A. Proposed Site Location		
1. Does Land procurement require for the project (for Baghjap Substation in Morigaon)	No	Yes, the TL primarily passes through agricultural fields, and there is a possibility of partial land acquisition for tower footings and RoW.
2. Landownership of the project area: Govt. / Private lands	Currently AEGCL's own existing land since 1984.	Confirmation will be provided after verification of land acquisition by the Circle Office.
3. Does the project require acquisition of land or transfer of Govt. land/structures?	No land acquisition is required, as the proposed substation will be constructed on AEGCL's own existing land. A total of 3.34 Ha is available for construction of 220 kV substation along with the quarters, which is free from all encumbrances, with no Encroachers or squatters present on the site.	Yes, a NOC must be obtained from the concern District Collector's office after the final check survey inspection. No structures will be demolished, as the transmission line passes through agricultural fields.
4. If yes please mention the area of land, number of affected structures, Households.	NA	57 Meter (average) for Tower Footing and 35 Meter for RoW. No structures/ households are directly affected.
5. Number of villages/settlements through which SS/TL is passing through and their names	Baghjap, Junbil	Baghjap, Junbil, Kharbeel, Banthai gaon, Bangfor, Tegheria, Deosal
6. Present usage of the land parcels is for: Agricultural purposes, Residential purposes, Commercial purposes and other purposes (Indicate)	The proposed land is currently unused and includes quarters and structures owned by AEGCL, some of which are used for residential purposes.	The proposed transmission line primarily passes through agricultural fields for both routes.
7. Will the project lead to loss of housing?	No, the staff quarters inside the substation campus will be demolished, and the families will be relocated to rented accommodations under the HRA Policy of AEGCL.	No, the TL is not passing through any structures. It is traversing agricultural and barren land.
8. Will the project lead to loss of agricultural land?	No	Yes, mostly paddy and mustard crops will be affected.



9. Are the crops to be affected and if yes, names of the crops	None	Yes, mostly paddy, mustard crops and green vegetables will be affected.
10. Are the trees to be affected and if yes, Approx number and names of trees to be cut along the corridor (Fruit and Non-fruit trees)	No but there are 50 to 60 trees inside the boundary.	Will be assessed after finalization of check survey and before the construction work.
11. Will the project cause damage to private property/assets?	No, but the existing staff quarters will be demolished	No, the TL is not passing through any structures other than houses. It is passing through agricultural and barren land.
12. Will the project lead to loss of common property resources?	No	No
13. Will the project lead to loss of livelihood – directly or indirectly?	No loss of livelihood anticipated.	Yes, (Crop damage area will be calculated after verifying the land schedule for each PAP).
14. Does the project require relocation of encroachers / squatters? If yes, please elaborate number and nature, if possible.	No encroachers or squatters were found.	Relocations are not anticipated in TL. However, there may be squatters engaged in cultivation, which will be confirmed after verification of the land schedule.
15. Does the project require relocation of community facilities/Govt. establishment or any object that are of religious, cultural and historical significance?	No. (Existing staff quarter shall be demolished and relocated)	None
B. Potential Social Impacts- Will the Project cause		
16. Involuntary resettlement of people? (physical displacement and/ or economic displacement)	No displacement required	None
17. Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?	No negative impact on the vulnerable group	None
18. Is the project located within or near any Indigenous Peoples' communities or lands that could be adversely affected by the project?	None, the populations comprises in the district are SC, ST and mix tribe of Assam, which does not come under Indigenous Tribe community.	None. The populations comprising the district are SC, ST, and mixed tribes of Assam, which do not fall under the Indigenous Tribe community under the project.
19. Is a specific environmental and social impact study and approval required concerning Indigenous Peoples according to the country's regulations?	Not Required. No IP are getting affected. However, Tiwa community peoples are getting affected which falls under schedule tribe but not under schedule VI.	Not required. No IPs are being affected. However, the Tiwa community, which is classified as a Scheduled Tribe but not under Schedule VI, is being impacted.
20. Has the specific environmental and social impact study, along with the necessary approval concerning Indigenous Peoples, been obtained?	Not Required.	Not Required.



21. Will community facilities require relocation?	No	No
22. Social conflicts if workers from other regions or countries are hired?	<p>EPC contractors will be encouraged to prioritize the engagement of local labor. However, if workers from other regions or countries are employed, there is a potential for social conflicts during construction activities. A Labour Management Plan shall be developed in accordance with the specific conditions. These issues largely depend on the local context, cultural dynamics, and the management of the workforce. Potential social conflicts may include:</p> <ul style="list-style-type: none"> ● Job competition between local and non-local workers. ● Disparities in wages and labor conditions. ● Tensions arising from cultural or language differences. ● Strain on local resources and services. <p>Consultations will be conducted regularly under the supervision of the Residential Engineer at Baghjap Substation. Additionally, space will be allocated for a labour camp within the substation boundary to minimize contact between the laborers and the local community.</p>	<p>EPC contractors will be encouraged to prioritize the engagement of local labor. However, if workers from other regions or countries are employed, there is a potential for social conflicts during construction activities. A Labour Management Plan shall be developed in accordance with the specific conditions. These issues largely depend on the local context, cultural dynamics, and the management of the workforce. Potential social conflicts may include:</p> <ul style="list-style-type: none"> ● Job competition between local and non-local workers. ● Disparities in wages and labor conditions. ● Tensions arising from cultural or language differences. ● Strain on local resources and services. <p>Consultations will be conducted regularly under the supervision of the Residential Engineer at Baghjap Substation. Additionally, space will be allocated for a labour camp within the substation boundary to minimize contact between the laborers and the local community.</p>
23. Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	<p>Greater emphasis should be placed on hiring local labor. Implementation of Labour Management Plan will be required. The existing water tank will be demolished, and a new one will be constructed before the commencement of construction activities to ensure an uninterrupted water supply to the substation. This water supply will also be available for use by the laborers during the construction period.</p>	<p>Greater emphasis should be placed on hiring local labor. The Implementation of a Labour Management Plan will be required.</p>
24. Social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing facilities and structures?	None	None
25. Will a resettlement Action Plan be required?	No	Yes, RAP will be developed after the approval of ESIA-ESMP
26. Impact on local economy – Fisheries, local tourism related businesses, market places, etc.?	None	None



27. Livelihood- Direct impact due to loss of land and structures?	Nil	Partially, crops will be damaged under the RoW and compensation will be provided in accordance with the applicable laws and regulations.
28. Indirect impact due to loss of commercial grounds, market places, places for hawker stalls, etc.?	No loss of commercial land.	None
29. Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	Low risk; however, any further risk will be minimized through standard safety norms.	Low risk anticipated
30. Other social concerns relating to inconveniences in living conditions in the project areas?	Not anticipated any such inconvenience	No
31. Social concerns relating to local inconveniences associated with project operation, if any? (e.g. increased volume of traffic, greater risk of accidents, communicable disease transmission)	Not anticipated any such inconvenience	Not anticipated any such inconvenience
32. Does the project related work affect any objects that are of religious and cultural significance to the IPs?	No	No
33. Which are the economic activities of IP will be affected by the proposed project development and how?	No IP will be affected as the nearby community is the Assam mix tribe population resided near the substation.	None
34. Is there a requirement for an in-depth Indigenous people's plan? (IPP)	No land acquisition is required, as the proposed substation will be constructed on AEGCL's own existing land. Hence, no IPP is required for sub-station site.	Not Required
35. Describe alternatives, if any, to avoid or minimize land acquisition/ displacement of people from private or public lands	AEGCL existing land will be used for the proposed Baghjap S/S with no encroacher / squatters.	TL is mostly passing through agriculture and barren land and the final landowner details will be confirmed after verification of land schedule.



Appendix 2: Socio Economic Questionnaire- AISTSEP Project, Phase II-

Sub Project Locations/Details:

QUESTIONNAIRE NO.: _____
HOUSEHOLD NO.: _____

1.0 Identification

- 1.1 Name of the Village: _____
- 1.2 Name of the Village Council/ Village Head/ Gaon Pradhan:

- 1.3 Name of the Development Block:

- 1.4 Name of the Revenue Circle: _____
- 1.5 Name of the District: _____

2.0 General

- 2.1 Name of the Respondent:

- 2.2 Name of the Head of the Household:

- 2.3 Relationship of the Respondent
With the Head of the Household:

- 2.4 Religion of the Household (Tick Relevant option)
- | | |
|--------------|-----|
| 1. Christian | () |
| 2. Hindu | () |
| 3. Muslim | () |
| 4. Buddhist | () |
| 5. Others | () |
- 2.5 Caste of the Household (Tick Relevant option)
- | | |
|-------------------------------|-----|
| 1. General | () |
| 2. Other Backward Class (OBC) | () |
| 3. Schedule Caste (SC) | () |
| 4. Schedule Tribe (ST) | () |
- 2.6 Name of the Sub-Caste/ Tribe: _____
- 2.7 Name of the Clan (Sub-Tribe): _____

(NOTE: FOR 2.6 WRITE THE NAME OF THE SUB-CASTE/TRIBE and CLAN AFFILIATION OF THE HOUSEHOLD)



3.0 Family Details

1	2	3	4	5	6	7	8	9	10
S.NO.	NAME OF FAMILY MEMBER	AGE (Complete Years)	GENDER M/ F	MARITAL STATUS	RELATIONSHIP WITH HEAD OF HH	UPTO WHICH CLASS EDUCATED	MAIN OCCUPATION	Total Income Earning (Yearly)	WHETHER LIVING IN VILLAGE (Y/N)
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

NOTE: HOW TO FILL-IN THIS TABLE

COLUMN 3: AGE OF EACH FAMILY MEMBER SHOULD BE IN COMPLETE YEARS.

COLUMN 4: SEX OF THE INDIVIDUAL SHOULD BE EITHER (1) FOR MALE, OR (2) FOR FEMALE

COLUMN 5: MARITAL STATUS—1.= SINGLE/ 2=MARRIED/ 3.=WIDOW/ 4=WIDOWER/ 5=DIVORCEE/

COLUMN 7: WRITE DOWN THE LAST COMPLETED CLASS/ STANDARD AT SCHOOL/ COLLEGE/ INSTITUTION

COLUMN 8: MAIN OCCUPATION OF EACH MEMBER, i.e. FARMER/ SHEPHARD/ OFFICE EMPLOYEE/ TAILOR/ HOUSE-WIFE/ STUDENT/ UNEMPLOYED ETC.



4.0 Total Agricultural Land Owned by the Family _____

4.1 Does the Household cultivate for livelihood () 1. YES/ 2. NO

4.2 What is the method of cultivation () 1. SEDENTARY 2. JHUMMING

4.3 IF SEDENTARY, Give details of land owned in the resident village

NAME OF TILLER(s)	RELATIONSHIP WITH HOHH	TOTAL AREA	TOTAL IRRIGATED AREA	TOTAL UNIRRIGATED AREA
1				
2				
3				
4				
5				

4.4 Does the household cultivate on share cropping basis () 1. YES/ 2. NO

IF YES,

NAME OF MEMBER, PRACTICING SHARE CROPPING	RELATIONSHIP WITH HOHH	TOTAL AREA	TOTAL IRRIGATED AREA	TOTAL UNIRRIGATED AREA

4.4.1 The Share Cropping is done on () 1. OWN LAND 2. OTHERS LAND

4.4.2 What are the terms and conditions of this arrangement?

5.0 What are the means of irrigation facilities [Tick relevant option(s)]

- 1. Natural Sources ()
- 2. Rivers/ Streams ()
- 3. Rain ()
- 4. Others ()
- 5. None ()

6.0 Do you use any fertilizers? If yes, what fertilizers/ manure is used



7.0 Housing Details

7.1 Sources of water for various purposes

USES	RIVER/ STREAM	SPRINGS	PIPE & TAP	OTHERS
FOR DRINKING	()	()	()	()
WASHING & CLEANING	()	()	()	()
FOR CATTLE	()	()	()	()

TICK () THE RELEVANT OPTION. IN CASE, FOR ANY USE, THE SOURCE OF WATER IS "OTHERS", THEN KINDLY MENTION THE SOURCE

8.0 Livestock owned by the Household

LIVESTOCK	NUMBERS
1. Mithuns	
2. Cows	
3. Bulls	
4. Calves	
5. Goats	
6. Poultry	
7. Pigs	
8. Others	

9.0 About the Project (Data collected for RAP preparation, where applicable)

9.1 Are you aware (have you heard) of the AISTSEP Project

1. YES ()
2. NO ()

9.2 Do you aware that land are temporary will be acquire for TL Tower work

3. YES ()
4. NO ()

9.3 Do you aware that crops/trees are likely to be damaged for TL Stinging work

1. YES ()
2. NO ()

10.0 Other Observation: (Investigators Note)

Investigators Signature:

Supervisor's Signature:



Appendix 3: Indigenous People Screening Checklist

Name of the Project:	Establishment of New 220/132 kV (2 X 160 MVA) AIS Substation and Associated Transmission Line (2 nos) at Morigaon
Name of Village, Panchayat, Block, District:	Baghjap, Mayong Block, Morigaon District
Date of Checklist Filled In:	3 & 8 January and 6 & 10 February 2026
Screening Conducted for	Associated Transmission Line (2 nos): 220 kV 4 CKT Baghjap Lilo Line and 220 kV DC Tata Line

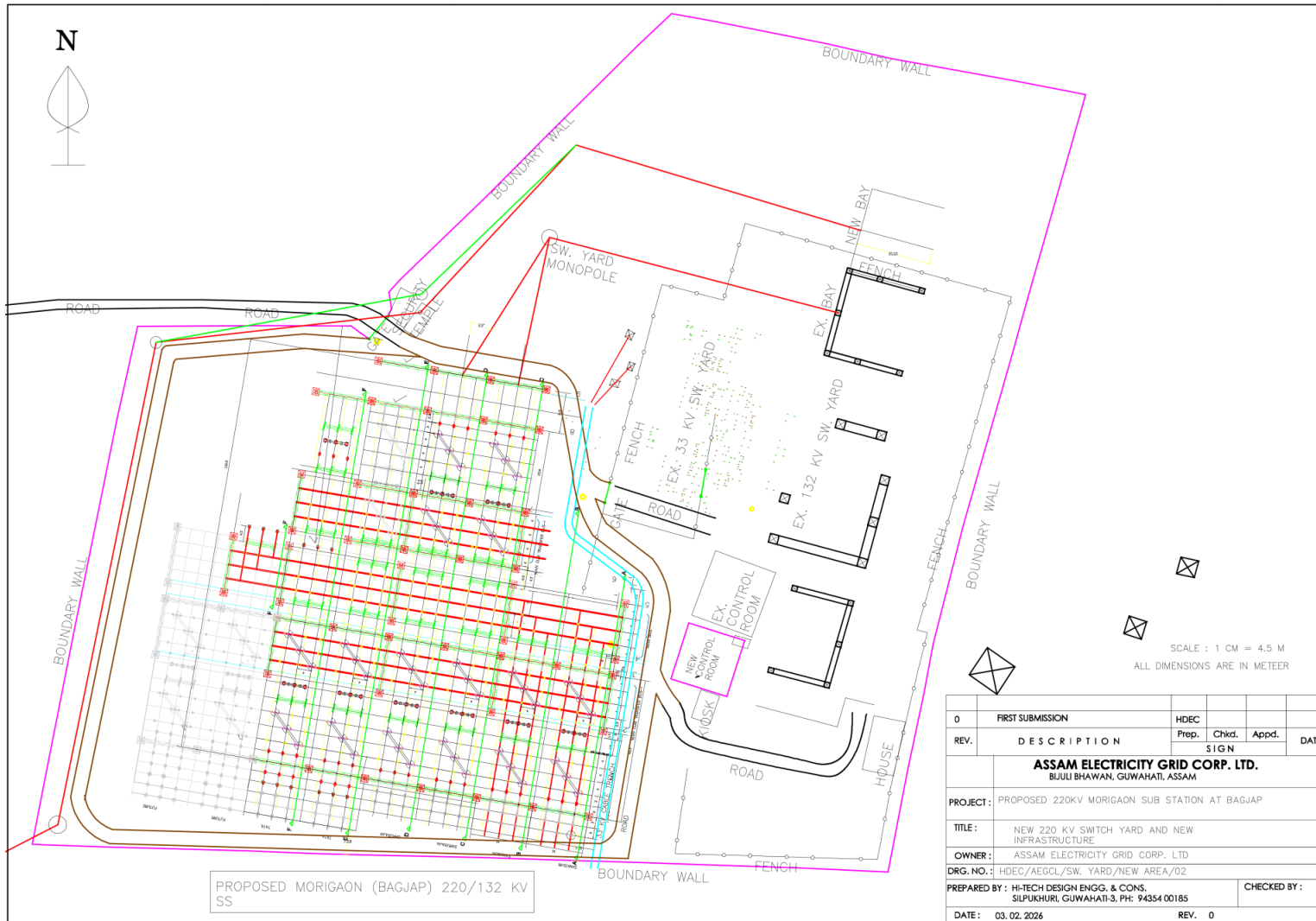
Key Concern	Yes	No	Remarks
A. Indigenous Peoples Identification			
1. Are there Scheduled Tribe or tribal communities in the project influence area?	Yes		Mixed Assamese population including Tiwa (ST Plains).
2. Are these groups recognized as Scheduled Tribes under Indian law?	Yes		Tiwa notified as ST (Plains) in Assam.
3. Distinct language separate from dominant society		No	Assamese primarily used
4. Distinct socio-economic system		No	Mainstream agrarian system.
5. Customary institutions governing project land		No	No customary tenure affected.
6. Presence in Sixth Schedule area		No	Outside Sixth Schedule.
7. Are there any national or local laws or policies, as well as anthropological studies or research that recognizes the groups residing in or utilizing the project area as ethnic minorities, scheduled tribes, tribal peoples, national minorities, or cultural communities?	Yes		The Lalung (Tiwa) Autonomous Council Act of 1995, enacted by the Assam Legislative Assembly, classified the Tiwa as a Scheduled Tribe but did not include them under the provisions for Indigenous Communities.
8. Are these groups formally recognized and represented as "Indigenous Peoples," "ethnic minorities," "scheduled tribes," or "tribal populations" within official decision-making institutions at the national or local levels?		No	None. The populations comprising near the project areas are SC, ST, and mixed tribes of Assam, which do not fall under the provisions of Indigenous Tribe community.
B. Identification of Potential Impacts			
9. Does the project have direct or indirect benefits for, or is it intended to target, Indigenous Peoples?		None	As the IP community does not reside near the project area, it does not directly benefit from the project. However, it indirectly benefits IP communities in other districts, as this project is improving electricity connectivity throughout the entire state.
10. Will the project have an impact on the livelihood systems of Indigenous Peoples, including aspects such as food production, natural resource management, artisanal crafts and trade, and employment conditions?		No	No IP community found in the project area. But the other community may be impacted during tower erection and stringing work.



11. Is the project located within land or territory that is occupied, owned, or utilized by Indigenous Peoples, or that is asserted as ancestral domain?		No	None of the land belongs to IP communities.
C. Nature of Project Impact			
12. Is the IP are Physical displacement or relocation from ancestral or customary territories?		No	No IPs is being affected. However, the other communities like SC and ST (but not under Schedule VI), is being impacted during the tower erection and stringing work.
13. Impact on customary land, cultural sites, temporary crop damaged, RoW Land use restriction and impact on traditional livelihood		None Identified	No Indigenous Peoples (IP) community has been identified; however, there may be impacts on other communities. There is a possibility of crop damage during tower footing and stringing, which may cause temporary disturbances to agriculture. Agricultural activities can continue under the RoW.
D. Screening Conclusion			
Items		Result	
14. Scheduled Tribe Present		Yes	
15. Meets the IP criteria as per Environment and Social Standards- 3: Indigenous People		No	
16. ESS- 3 Triggered		No	



Appendix 4: Layout Plan for 220/132kV Air-Insulated Substation at Morigaon, Assam





Appendix - 5: Audit of existing 132/33kV Baghjap Grid Substation with Photographs

Audit Checklist for Environmental, Social, Health & Safety aspects for Existing 132/33 AIS at Baghjap, Morigaon, Assam

Name of Substation	132/33 kV Baghjap AIS, Morigaon, Assam
Audit Date	16/02/2026
GPS Coordinates	26°16'09"N, 92°13'28"E
Address	Baghjap, Assam

Sl. No.	Criteria	Description	Observations	Remarks
A. General Considerations				
1	Transformer Condition	Physical integrity, Oil leakage, Sign of rust/corrosion	All the transformers are in good condition. No incident of oil leakage; No corrosion observed.	
2	Switchgear and Panels	Panels are properly labelled, functional and free from dust/moisture	All the switchgear panels are properly labelled and functional.	
3	Control Room Structure	Condition of walls, roof, flooring, ventilation, and damp-proofing. Any water seepage or structural cracks.	Control room structure observed to be in good condition. There is no any incident of water seepage.	
4	Protection Systems	Presence and operability of relays, isolators, circuit breakers, lightning arrestors	The existing substation has sophisticated protection system as per grid rules.	
5	Earthing System	Functional earthing pits and electrodes.	The earthing system are in good condition. All the earthing pit electrodes are fully functional.	
6	Lighting and Security	Adequacy of internal and external lighting, presence of security personnel, boundary wall, CCTV etc.	The switchgear has adequate lighting facility. The substation is guarded by armed homeguards 24/7. No CCTV facility.	

Sl. No.	Criteria	Description	Observations	Remarks
B. Environmental Considerations				
7	Transformer Oil Handling	Containment for oil spills	Both the transformers are equipped with oil back pits for any oil spillage issues.	
8	Hazardous Waste Management	Proper storage and disposal of used oil	Used oils are properly stored in oil drums. Used oils are replaced with new oils through HA level.	
9	E-Waste and Battery Disposal	Authorized disposal	E-waste and discarded batteries are disposed off through auction as scrap materials.	
10	Storm Water and Drainage	Site run-off drains are clean, free from oil/chemical contamination	The substation has proper drainage system which are free from oil/chemical contamination.	

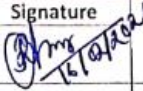

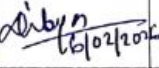


1	Solid Waste Management	Segregation (biodegradable and non-biodegradable waste) and disposal	Biodegradable wastes are buried in the ground. Non-biodegradable wastes are collected by local authorities for disposal.	
---	------------------------	--	--	--

Sl. No.	Criteria	Description	Observations	Remarks
C. Social Considerations				
7	Land Ownership and Encumbrance	Legally owned by AEGCL	AEGCL'S OWN Land, (Total 35 Bigha)	
8	Public access and Fencing	Site secured from public intrusion	Site is secured with proper boundary walls / switchyard is enclosed with fencing.	
9	Community Grievances	Records of issues and resolutions	No community grievances has been received so far.	
10	Local Employment	Local staff employed	Yes, Local employees have been employed. 9-10 employees are local employees out of 14 employees.	
11	CSR Activities	Community development support	Monetary contribution are made by the staffs towards local cultural and social events.	

Sl. No.	Criteria	Description	Observations	Remarks
D. Health and Safety Considerations				
1	Electrical Safety Signage	Danger, High Voltage and other relevant signs in place	Electrical safety signage and are placed in suitable locations at the substation.	
2	PPE Availability and Use	Staffs wear PPEs and records maintained	PPEs are available for the staffs and use PPEs while on duty.	
3	Fire Safety	Availability of fire extinguishers (dry powder/CO ₂ , Placement as per norms, expiry dates, and fire safety training records	Adequate fire extinguishers are available at the substation and refilled when required. Sand buckets are also present.	
4	First Aid and Emergency Kit	Availability and Accessibility	First-aid kits and emergency kits are available.	
5	Incident Records	Maintained Accidents and Near-miss records	Log book / records are maintained for any types of incident.	
6	Emergency Preparedness	Evacuation Plans and Awareness	Evacuation and safety mock drills are regularly conducted for staffs / workers.	

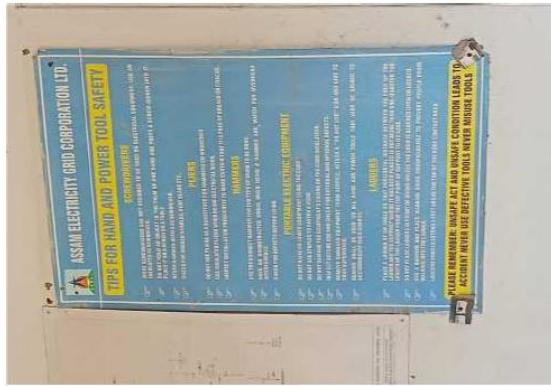


Auditor		Resident Engineer/ Substation In-charge	
Name and Designation	Signature	Name	Signature
Rahul Choudhary, ESS, AEGCL, HQ.		Bidyant Bikash Deka	
Dibyajyoti Bora, SSS, AEGCL, HQ		R E Baghijap GSS AEGCL	Resident Engineer 132 KV Baghijap G.SS. AEGCL, Morigaon

Protologue of Audit carried-out in the existing 132/33kV Baghjap Grid Substation







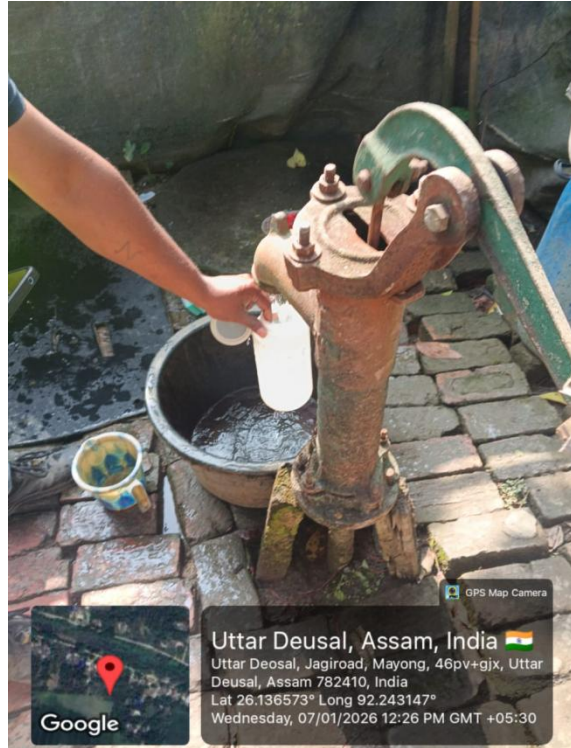


Protologue of EQMT in the proposed 220/132kV (2x160 MVA) AIS at Morigaon and along the 220kV 4 CKT Baghjap LILO and 220kV DC TATA Transmission Lines

EQMT sample collection at 220/132kV (2x160MVA) AIS at Morigaon



EQMT sample collection at Deusal village, near 220kV 4 CKT Baghjap LILO TL near LILO Point



EQMT sample collection at Deusal village, near 220kV DC TATA TL near TATA Semi-conductor facility



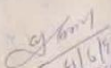


Appendix 6: Land related ownership documents for the Baghjan SS

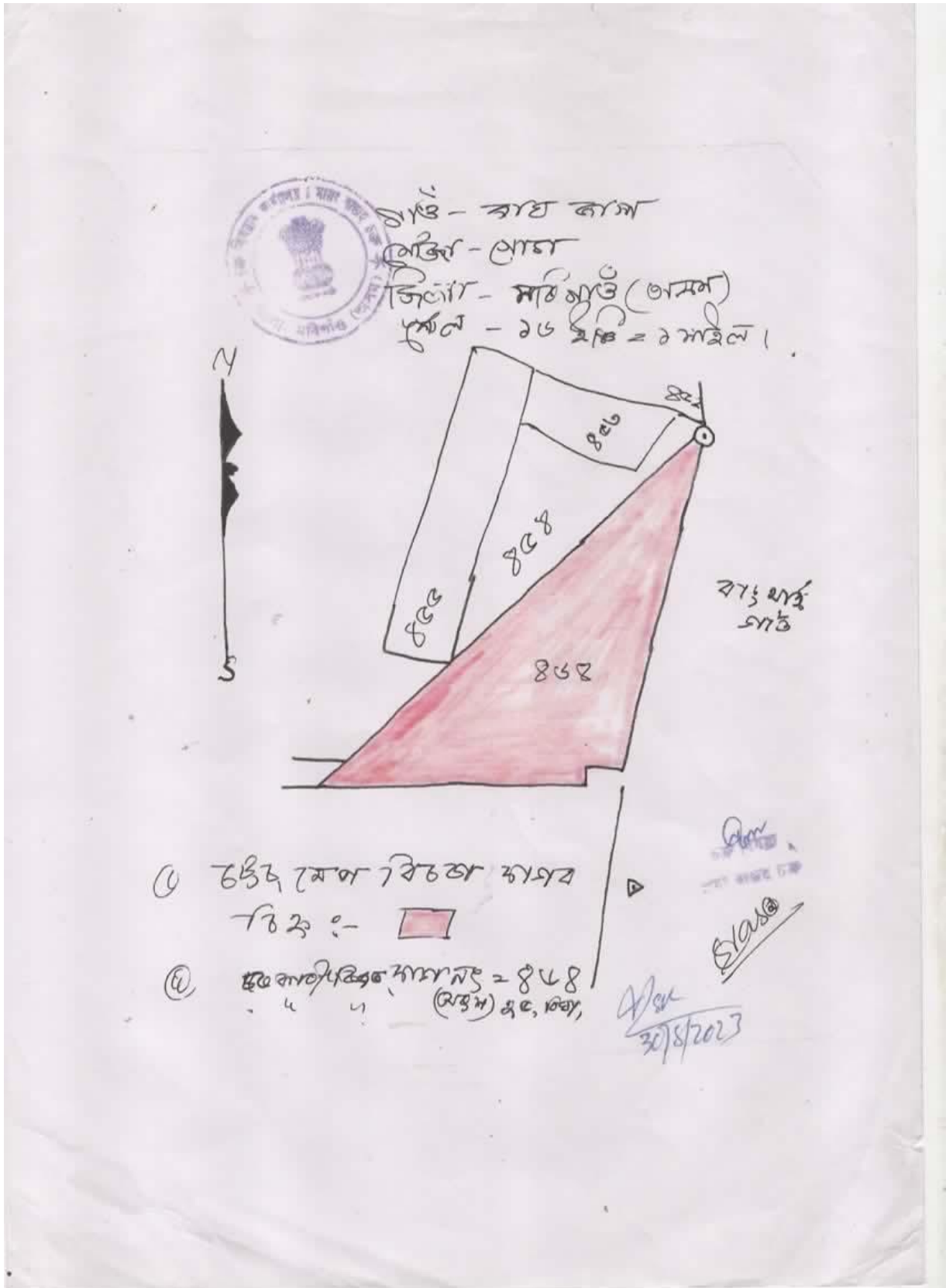
PARTICULARS OF PATTI LAND DIRECTLY PURCHASED BY THE ASEP TO 1-5-93.

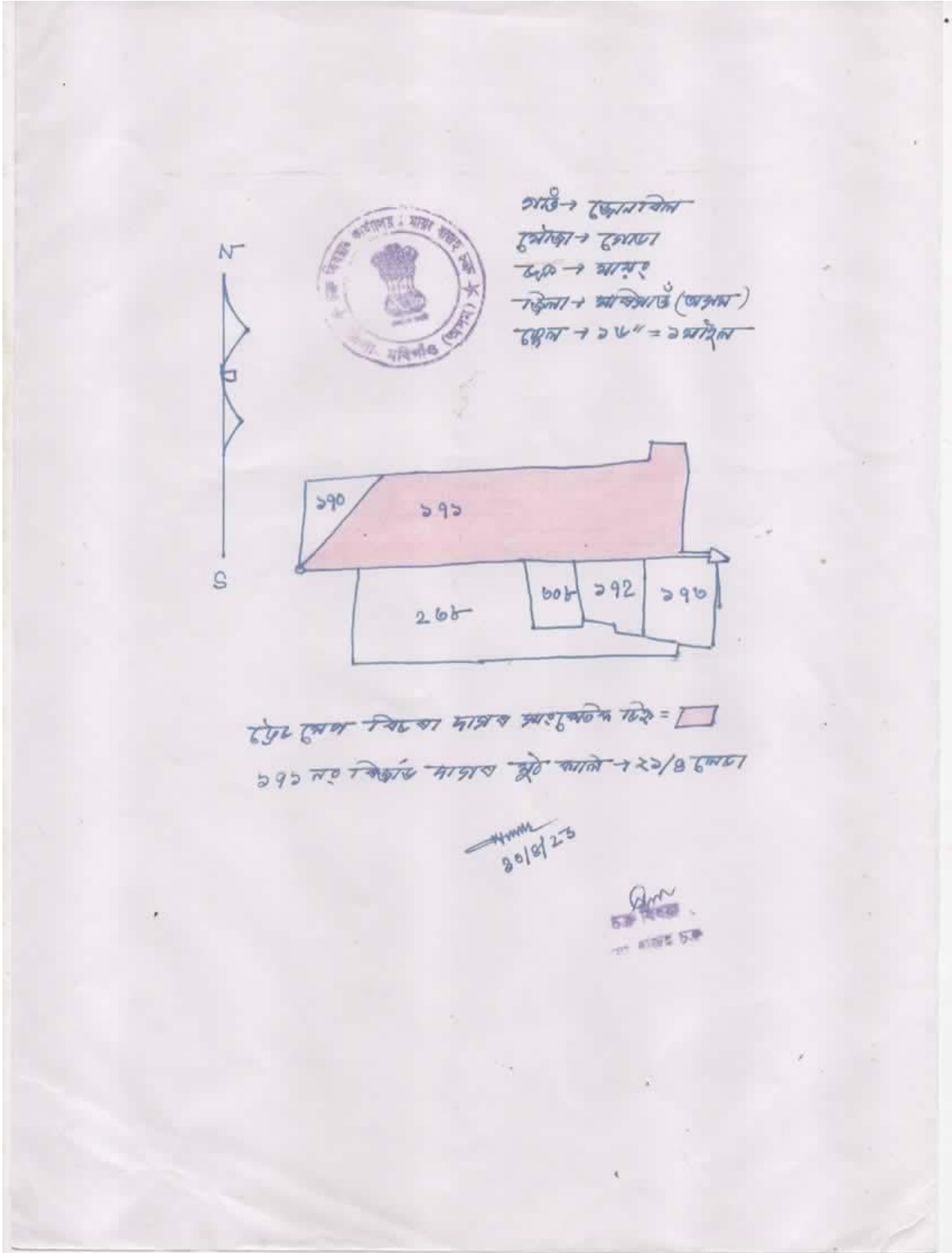
Name of the Division:- Merigean
 Name of the civil sub-division and district:- Merigean, Dist:- Merigean.

No.	Total area of private patta lands purchased directly by Board so far	Name of revenue Village where the lands are situated.	No. & dt. of the purchase Deeds.	Name of the Circle Officer Concerned.
1	2	3	4	5
	Sarkari Land	Vill:- Baghjan. Gova Mauza Vill:- Junheal. Gova Mauza.	alloted by D.C. Nazeem in January '84.	Mayang Circle Dist:- Merigean Assam.
Da No	Da No	Area Purchased	Remarks	
	7	8		1E
	1. Da No -464	25 Bighas.		
	Vill:- Baghjan			
	2. Da No:- 171	10 Bighas.		
	Vill:- Junheal.			
Total = 35 Bighas Area.				


 4/6/93
 সহকারী কমিশনার (ভূমি) অসম
 উলুবাৰানী জিলা
 ক. হা. বি. নং. ১১০০০০
 মোবাইল: ৯৮০০

18/5/93





Appendix 7: Environmental and Social Exclusion List as per AIIB ESF, 2024

Environmental and Social Framework

Environmental and Social Exclusion List

Environmental and Social Exclusion List

The Bank will not knowingly finance Projects involving the following:

1. Forced laborⁱ or harmful or exploitative forms of child labor.ⁱⁱ
2. The production of, or trade in, any product or activity deemed illegal under national laws or regulations of the Member in whose territory the Project is located, or international conventions and agreements, or subject to international phase out or bans, such as:
 - 2.1. Production of, or trade in, products containing polychlorinated biphenyl (PCBs).ⁱⁱⁱ
 - 2.2. Production of, or trade in, pharmaceuticals, pesticides/herbicides and other hazardous substances subject to international phase outs or bans (Rotterdam Convention, Stockholm Convention).^{iv}
 - 2.3. Production of, or trade in, ozone depleting substances subject to international phase out (Montreal Protocol).^v
3. Trade in wildlife or production of, or trade in, wildlife products regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).^{vi}
4. Transboundary movements of waste prohibited under international law (Basel Convention).^{vii}

ⁱ Forced labor means any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty (including any kind of forced or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements, or labor by trafficked persons).

ⁱⁱ For purposes of this List, harmful or exploitative forms of child labor means the employment of children under the age of 18 for work which by its nature or the circumstances in which it is carried out is likely to jeopardize their health, safety or morals. However, if the laws or regulations of the country in which the Project is located provide, in conformity with the International Labour Organization's Minimum Age Convention, 1973, that children at least 16 years of age may be employed for such work on condition that their health, safety and morals are fully protected and that they have received adequate specific instruction or vocational training in the relevant branch of activity, then child labor means employment of children for work that does not comply with these laws and regulations.

ⁱⁱⁱ PCBs: Polychlorinated biphenyls are a group of highly toxic chemicals. PCBs are likely to be found in oil-filled electrical transformers, capacitors and switchgear dating from 1950 to 1985.

^{iv} United Nations Consolidated List of Products whose Consumption and/or Sale have been Banned, Withdrawn, Severely Restricted or not Approved by Governments; Convention on the Prior Informed Consent Procedures for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention); Stockholm Convention on Persistent Organic Pollutants; World Health Organization Recommended Classification of Pesticides by Hazard. A list of pharmaceutical products subject to phase outs or bans is available at https://www.who.int/medicines/areas/quality_safety/safety_efficacy/pharm_restrictions/en/. A list of pesticides, herbicides and other hazardous substances subject to phase outs or bans is available at <http://www.pic.int/TheConvention/Chemicals/AnnexIIIChemicals/tabid/1132/language/en-US/Default.aspx>

^v Ozone Depleting Substances (ODS): Chemical compounds which react with and deplete stratospheric ozone, resulting in the widely publicized "ozone holes." The Montreal Protocol on Substances that Deplete the Ozone Layer lists ODSs and their target reduction and phase out dates. A list of the chemical compounds regulated by the Montreal Protocol, which includes aerosols, refrigerants, foam blowing agents, solvents and fire protection agents, together with details of signatory countries and phase out target dates, is available from the United Nations Environment Programme, <https://ozone.unep.org/treaties/montreal-protocol>.

^{vi} The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). A list of CITES listed species is available from the CITES secretariat, <https://www.cites.org/eng/disc/species.php>

^{vii} Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, see <http://www.basel.int>



Environmental and Social Framework

Environmental and Social Exclusion List

5. Production of, or trade in, weapons and munitions, including paramilitary materials.
6. Production of, or trade in, alcoholic beverages, excluding beer and wine.^{viii}
7. Production of, or trade in, tobacco.^{ix}
8. Gambling, casinos and equivalent enterprises.^x
9. Production of, trade in, or use of asbestos fibers, whether or not bonded.^{xi}
10. Activities prohibited by legislation of the Member in whose territory the Project is located or by international conventions relating to the protection of biodiversity resources or cultural resources, such as, Bonn Convention, Ramsar Convention, World Heritage Convention and Convention on Biological Diversity.^{xii}
11. Commercial logging operations or the purchase of logging equipment for use in primary tropical moist forests or old-growth forests.
12. Production or trade in wood or other forestry products other than from sustainably managed forests.
13. Marine and coastal fishing practices, such as large-scale pelagic drift net fishing and fine mesh net fishing, harmful to vulnerable and protected species in large numbers and damaging to marine biodiversity and habitats.
14. Shipment of oil or other hazardous substances in tankers that do not comply with IMO requirements (IMO, MARPOL, SOLAS and Paris MOU).^{xiii}
15. Thermal coal mining, coal-fired power and heating plants or Projects that are functionally related to coal.^{xiv}

^{viii} This does not apply to Clients who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to the entity's primary operations.

^{ix} This does not apply to Clients who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to the entity's primary operations.

^x This does not apply to Clients who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to the entity's primary operations.

^{xi} In special circumstances, if necessary to enable a Client to transition from the use of bonded asbestos to alternative materials, the Bank may agree with the Client on a reasonable transition period, provided that the asbestos content of the materials being used is less than 20 percent. Projects involving disposal of asbestos are not prohibited, provided a suitable asbestos management plan is adopted for such disposal.

^{xii} Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) - <https://www.cms.int/>; Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention) - <https://www.ramsar.org/>; Convention Concerning the Protection of the World Cultural and Natural Heritage - <https://whc.unesco.org/en/convention/>; Convention on Biological Diversity - <https://www.cbd.int/>

^{xiii} Noncompliance with International Maritime Organisation (IMO) requirements: tankers that do not have all required International Convention for the Prevention of Pollution from Ships (MARPOL) or International Convention for the Safety of Life at Sea (SOLAS) certificates (including, without limitation, International Safety Management Code compliance), tankers banned by the Paris Memorandum of Understanding on Port State Control (Paris MOU), and tankers due for phase out under MARPOL regulation 13G. No single hull tanker over 25 years old should be used. [http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx)

^{xiv} Projects functionally related to coal means associated facilities that are dedicated to enable the mining and use of coal or projects that would not be carried out without dedicated coal-based power supply. In order to assist Clients to reduce their coal use, the Bank may support Projects that aim at early retirement of coal plants, replacement of coal with lower-carbon fuel sources, or Projects for decommissioning, remediation, and redevelopment of affected coal facility sites and communities.

Appendix 8: Soil Test Reports

Sub-Station:



DMCU ENVIROCHEM LLP

ডিএমচিইউ এনভাইৰ'কেম এলএলপি,

ADDRESS: House No: 68, Kailash Nagar, Panjabari, Guwahati-781037, Assam
E-mail: dmcenvirochemllp@gmail.com Ph No:9864615794, 7002812082

TEST REPORT

Test Report No:	DMCU/20260112/R05	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Description	Soil
		Sample Id:	DMCU/S/260108/01
		Sampling Protocol	IS 4332 (Part I) 1967; Reaffm. 2010
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	12/01/2026
Sampling Location	220/132 kV Grid Substation (GSS) at Morigaon, (Baghiap) (Latitude:26.1696164°, Longitude: 92.2239004°)		
Environmental Condition	Temperature:	23.5 °C	Humidity: 73%

ANALYSIS RESULT

Sl. No.	Test Parameters	Unit	Result	Method
1.	pH value (1:2.5) at 25 Deg. C	None	6.34	IS 2720 (Part 26) 1987; Rffm:2011
2.	Conductance	(mS/cm)	0.453	IS 14767 (2000)
3.	Organic Matter	%	0.79	IS 2720 (Part 22) 1972; Rffm:2010
4.	Water Holding Capacity	%	41.6	IS 14765:2000; Rffm:2021
5.	Salinity	dS/m	3.5	IS 11624: 1996
6.	Particle Size Distribution	-		
	Sand		87.4	IS 1498:1970
	Clay	%	0.6	
	Silt		10.2	
7.	Total Kjeldhal Nitrogen	g/kg	0.83	IS 14684:1999
8.	Available Phosphorus	%	0.07	Soil testing manual, Department of Agriculture & Cooperation Ministry of Agriculture, Government of India, 2011
9.	Available Potassium	%	0.92	
10.	Available Sodium	mg/kg	107.4	
11.	Chloride	mg/kg	75.0	
12.	Phosphate	mg/kg	419	

Note:

- The results relate to the sample tested only.
- The test report shall not be reproduced, except in full, without written approval of the company
- The laboratory is responsible for all the above information in the report

-----End of Report-----

Prepared by:
(Champak Barman)



Reviewed by:
(Debashish Das)

Authorised by:
(Dr. Mayur Jyoti Mahanta)

N2 (220/132 Baghjap LILO Line



DMCU ENVIROCHEM LLP

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ADDRESS: House No: 68, Kailash Nagar, Panjabari, Guwahati-781037, Assam
E-mail: dmcenvirochemllp@gmail.com Ph No:9864615794, 7002812082

TEST REPORT

Test Report No:	DMCU/260109/R10	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Description	Soil
		Sample Id:	DMCU/S/260108/02
		Sampling Protocol	IS 4332 (Part I) 1967; Reaffm. 2010
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	12/01/2026
Sampling Location	Baghiap Langpi Transmission Line T-2 (Latitude: 26.13670672N°, Longitude: 92.24330991E°)		
Environmental Condition	Temperature: 23.5 °C	Humidity:	73%

ANALYSIS RESULT

Sl. No.	Test Parameters	Unit	Result	Method
1.	pH value (1:2.5) at 25 Deg. C	None	6.76	IS 2720 (Part 26) 1987; Rffm:2011
2.	Conductance	(mS/cm)	0.434	IS 14767 (2000)
3.	Organic Matter	%	0.81	IS 2720 (Part 22) 1972; Rffm:2010
4.	Water Holding Capacity	%	53.0	IS 14765:2000; Rffm:2021
5.	Salinity	dS/m	2.9	IS 11624: 1996
6.	Particle Size Distribution	-		IS 1498:1970
	Sand		79.0	
	Clay	%	0.8	
	Silt		10.6	
7.	Total Kjeldhal Nitrogen	g/kg	0.91	IS 14684:1999
8.	Available Phosphorus	%	0.08	Soil testing manual, Department of Agriculture & Cooperation Ministry of Agriculture, Government of India, 2011
9.	Available Potassium	%	0.54	
10.	Available Sodium	mg/kg	185.0	
11.	Chloride	mg/kg	61.0	
12.	Phosphate	mg/kg	329	

Note:

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-----End of Report-----

Prepared by:
(Champak Barman)



Reviewed by:
(Debashish Das)

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N3 220/132 DC TATA Line:

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TEST REPORT

Test Report No:	DMCU/200112/R14	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Description	Soil
		Sample Id:	DMCU/S/260108/03
		Sampling Protocol	IS 4332 (Part I) 1967; Reaffm. 2010
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	12/01/2026
Sampling Location	Transmission Line T-30, T-31, A.T. Road, Near Tata Semiconductor Jagiroad.	Latitude: 26.12664953°, Longitude: 92.2216461°	
Environmental Condition	Temperature: 23.5 °C	Humidity:	73%

ANALYSIS RESULT

Sl. No.	Test Parameters	Unit	Result	Method
1.	pH value (1:2.5) at 25 Deg. C	None	6.29	IS 2720 (Part 26) 1987; Rffm:2011
2.	Conductance	(mS/cm)	0.477	IS 14767 (2000)
3.	Organic Matter	%	0.62	IS 2720 (Part 22) 1972; Rffm:2010
4.	Water Holding Capacity	%	39.5	IS 14765:2000; Rffm:2021
5.	Salinity	dS/m	2.7	IS 11624: 1996
6.	Particle Size Distribution	-		
	Sand		84.4	IS 1498:1970
	Clay	%	0.6	
	Silt		12.2	
7.	Total Kjeldhal Nitrogen	g/kg	0.74	IS 14684:1999
8.	Available Phosphorus	%	0.05	Soil testing manual, Department of Agriculture & Cooperation Ministry of Agriculture, Government of India, 2011
9.	Available Potassium	%	0.76	
10.	Available Sodium	mg/kg	213.8	
11.	Chloride	mg/kg	98.0	
12.	Phosphate	mg/kg	382.0	

Note:

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-----End of Report-----

Prepared by:
(Champak Barman)



Reviewed by:
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Appendix 9: Water Quality Test Reports

Sub-Station:



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TEST REPORT

Test Report No:	DMCU/260112/R04		Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001		WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
			Sample Description	Ground Water
			Sample Source	Bore Well
			Sample Id:	DMCU/GW/260108/01
			Sampling Protocol	IS 17614 (Part1):2025
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.			
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026	
Received Date:	08/01/2026	Analysis End Date:	12/01/2026	
Sampling Location	220/132 kV Grid Substation (GSS) at Morigaon, (Baghiap) (Latitude: 26.1688168N°, Longitude: 92.22332317E°)			
Environmental Condition	Temperature:	22.9 °C	Humidity:	73%

ANALYSIS RESULT


Sl No	Parameters	Unit	RESULT	LIMIT (As per IS 10500:2012)	TEST METHOD
1.	pH	-	7.09	6.5-8.5	IS 3025: Part 11:2022
2.	Temperature	°C	21.5	Shall not exceed 5°C above the receiving water temperature	IS 3025 Part 9: 2023
3.	Colour	Hazen	2	5	IS 3025 : Part 4:2021
4.	Odour	-	Agreeable	Agreeable	IS 3025 : Part 5:2018
5.	Turbidity	NTU	1	1 Max.	IS 3025: Part 10:2023
6.	Specific Conductance	mS/cm	0.265	-	IS 3025 : Part 14 :2023
7.	Total Suspended Solids (TSS)	mg/L	4.0	-	IS 3025: Part 17:2022
8.	Total Dissolved Solids (TDS) at 180°C	mg/L	110.0	500 Max.	IS 3025 : Part 16:2023
9.	Total Alkalinity (as CaCO3)	mg/L	96.0	200 Max.	IS 3025 : Part 23:2023
10.	Fluoride (as F)	mg/L	0.72	1.0 Max.	APHA 24 th Eddtn.:2023
11.	Nitrate (as NO3)	mg/L	5.9	45 Max.	IS 3025 Part 34: Sec.1: 2023
12.	Sulphate (as SO4)	mg/L	42.5	200 Max.	IS 3025 Part 24: Sec.1: 2022
13.	Chloride (as Cl)	mg/L	53.0	250 Max.	IS 3025 : Part 32 :2019

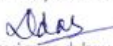
Note: BDL: Below Detection Limit.

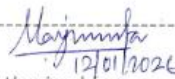
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Prepared by: 
(Champak Barman)



Reviewed by: 
(Debashish Das)

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14.	Total Hardness (as CaCO ₃)	mg/L	92.18	200 Max.	IS 3025 : Part 21 :2023
15.	Calcium (as Ca)	mg/L	34.2	75 Max.	IS 3025 : Part 40 :2024
16.	Magnesium (as Mg)	mg/L	8.13	30 Max.	IS 3025 : Part 46 :2023
17.	Mercury (as Hg)	mg/L	BDL	0.001 Max.	IS 3025 : Part 48
18.	Cadmium (as Cd)	mg/L	BDL	0.003 Max.	IS 3025 : Part 41
19.	Copper (as Cu)	mg/L	BDL	0.05 Max.	IS 3025 : Part 42
20.	Iron (as Fe)	mg/L	0.29	0.3 Max.	IS 3025 : Part 53
21.	Lead (as Pb)	mg/L	BDL	0.01 Max.	IS 3025 : Part 47
22.	Zinc (as Zn)	mg/L	1.25	5.0 Max.	IS 3025 : Part 49
23.	E. Coli	per 100ml	Absent	Shall not be detectable in any 100ml sample	IS 15185:2016
24.	Faecal Coliform	CFU/100	Absent	-	IS 1622:1981 (Reaff. 2003)

Note: BDL: Below Detection Limit.

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12/01/2026

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TEST REPORT

Test Report No:	DMCU/260112/R03	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/A ISTSEP, Phase-II/2024/12, Dated: 08/01/2026
	OFFICE OF THE MANAGING DIRECTOR	Sample Description	Drinking Water
	Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001	Sample Source	Treated (Filter)
		Sample Id:	DMCU/DW/260108/01
		Sampling Protocol	IS 17614 (Part1):2025
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	12/01/2026
Sampling Location	220/132 kV Grid Substation (GSS) at Morigaon, (Baghjap) (Latitude: 26.1688168N°, Longitude: 92.22332317E°)		
Environmental Condition	Temperature:	22.9 °C	Humidity: 73%


ANALYSIS RESULT

Sl No	Parameters	Unit	RESULT	LIMIT (As per IS 10500:2012)	TEST METHOD
1.	pH	-	6.95	6.5-8.5	IS 3025: Part 11:2022
2.	Temperature	°C	21.7	Shall not exceed 5°C above the receiving water temperature	IS 3025 Part 9: 2023
3.	Colour	Hazen	1	5	IS 3025 : Part 4:2021
4.	Odour	-	Agreeable	Agreeable	IS 3025 : Part 5:2018
5.	Turbidity	NTU	BDL	1 Max.	IS 3025: Part 10:2023
6.	Specific Conductance	mS/cm	0.175	-	IS 3025 : Part 14 :2023
7.	Total Suspended Solids (TSS)	mg/L	2.0	-	IS 3025: Part 17:2022
8.	Total Dissolved Solids (TDS) at 180°C	mg/L	48.2	500 Max.	IS 3025 : Part 16:2023
9.	Total Alkalinity (as CaCO3)	mg/L	62.0	200 Max.	IS 3025 : Part 23:2023
10.	Fluoride (as F)	mg/L	0.54	1.0 Max.	APHA 24 th Eddtn.:2023
11.	Nitrate (as NO3)	mg/L	4.1	45 Max.	IS 3025 Part 34: Sec.1: 2023
12.	Sulphate (as SO4)	mg/L	37.0	200 Max.	IS 3025 Part 24: Sec.1: 2022
13.	Chloride (as Cl)	mg/L	45.0	250 Max.	IS 3025 : Part 32 :2019

Note: BDL: Below Detection Limit.

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Prepared by:
(Champak Barman)



End of Report

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14.	Total Hardness (as CaCO ₃)	mg/L	42.10	200 Max.	IS 3025 : Part 21 :2023
15.	Calcium (as Ca)	mg/L	19.6	75 Max.	IS 3025 : Part 40 :2024
16.	Magnesium (as Mg)	mg/L	2.03	30 Max.	IS 3025 : Part 46 :2023
17.	Mercury (as Hg)	mg/L	BDL	0.001 Max.	IS 3025 : Part 48
18.	Cadmium (as Cd)	mg/L	BDL	0.003 Max.	IS 3025 : Part 41
19.	Copper (as Cu)	mg/L	BDL	0.05 Max.	IS 3025 : Part 42
20.	Iron (as Fe)	mg/L	0.15	0.3 Max.	IS 3025 : Part 53
21.	Lead (as Pb)	mg/L	BDL	0.01 Max.	IS 3025 : Part 47
22.	Zinc (as Zn)	mg/L	BDL	5.0 Max.	IS 3025 : Part 49
23.	E. Coli	per 100ml	Absent	Shall not be detectable in any 100ml sample	IS 15185:2016
24.	Faecal Coliform	CFU/100	Absent	-	IS 1622:1981 (Reaff. 2003)

Note: BDL: Below Detection Limit.

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220/132 Baghja LILo Line



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TEST REPORT

Test Report No:	DMCU/260112/R13	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/A ISTSEP, Phase-II/2024/12, Dated: 08/01/2026
	OFFICE OF THE MANAGING DIRECTOR	Sample Description	Ground Water
	Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001	Sample Source	Tube Well
		Sample Id:	DMCU/GW/260108/03
		Sampling Protocol	IS 17614 (Part1):2025
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghja) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	12/01/2026
Sampling Location	Baghja Langpi Transmission Line T-2 (Latitude: 26.13658868N°, Longitude: 92.24312037E°)		
Environmental Condition	Temperature: 22.9 °C	Humidity:	73%

ANALYSIS RESULT


Sl No	Parameters	Unit	RESULT	LIMIT (As per IS 10500:2012)	TEST METHOD
1.	pH	-	7.11	6.5-8.5	IS 3025: Part 11:2022
2.	Temperature	°C	21.4	Shall not exceed 5°C above the receiving water temperature	IS 3025 Part 9: 2023
3.	Colour	Hazen	2	5	IS 3025 : Part 4:2021
4.	Odour	-	Agreeable	Agreeable	IS 3025 : Part 5:2018
5.	Turbidity	NTU	1	1 Max.	IS 3025: Part 10:2023
6.	Specific Conductance	mS/cm	0.283	-	IS 3025 : Part 14 :2023
7.	Total Suspended Solids (TSS)	mg/L	7.0	-	IS 3025: Part 17:2022
8.	Total Dissolved Solids (TDS) at 180°C	mg/L	128.0	500 Max.	IS 3025 : Part 16:2023
9.	Total Alkalinity (as CaCO3)	mg/L	110.25	200 Max.	IS 3025 : Part 23:2023
10.	Fluoride (as F)	mg/L	0.84	1.0 Max.	APHA 24 th Eddtn.:2023
11.	Nitrate (as NO3)	mg/L	6.3	45 Max.	IS 3025 Part 34: Sec.1: 2023
12.	Sulphate (as SO4)	mg/L	38.5	200 Max.	IS 3025 Part 24: Sec.1: 2022
13.	Chloride (as Cl)	mg/L	61.0	250 Max.	IS 3025 : Part 32 :2019

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14.	Total Hardness (as CaCO ₃)	mg/L	84.79	200 Max.	IS 3025 : Part 21 :2023
15.	Calcium (as Ca)	mg/L	28.65	75 Max.	IS 3025 : Part 40 :2024
16.	Magnesium (as Mg)	mg/L	7.14	30 Max.	IS 3025 : Part 46 :2023
17.	Mercury (as Hg)	mg/L	BDL	0.001 Max.	IS 3025 : Part 48
18.	Cadmium (as Cd)	mg/L	BDL	0.003 Max.	IS 3025 : Part 41
19.	Copper (as Cu)	mg/L	BDL	0.05 Max.	IS 3025 : Part 42
20.	Iron (as Fe)	mg/L	0.27	0.3 Max.	IS 3025 : Part 53
21.	Lead (as Pb)	mg/L	BDL	0.01 Max.	IS 3025 : Part 47
22.	Zinc (as Zn)	mg/L	0.95	5.0 Max.	IS 3025 : Part 49
23.	E. Coli	per 100ml	Absent	Shall not be detectable in any 100ml sample	IS 15185:2016
24.	Faecal Coliform	CFU/100	Absent	-	IS 1622:1981 (Reaff. 2003)

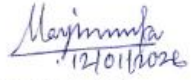
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TEST REPORT

Test Report No:	DMCU/260112/R09	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PM U)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Description	Surface Water
		Sample Source	Stream
		Sample Id:	DMCU/SW/260108/01
		Sampling Protocol	IS 17614 (Part1):2025
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	12/01/2026
Sampling Location	Baghiap Langpi Transmission Line T-2 (Latitude: 26.13693619N°, Longitude: 92.24334089E°)		
Environmental Condition	Temperature: 23.5 °C	Humidity:	70%

ANALYSIS RESULT

SI No	Parameters	Unit	RESULT	TEST METHOD
1.	pH	-	7.24	IS 3025: Part 11:2022
2.	Temperature	°C	21.7	IS 3025 Part 9: 2023
3.	Colour	Hazen	5	IS 3025 : Part 4:2021
4.	Odour	-	Agreeable	IS 3025 : Part 5:2018
5.	Turbidity	NTU	3	IS 3025: Part 10:2023
6.	Specific Conductance	mS/cm	0.278	IS 3025 : Part 14 :2023
7.	Total Suspended Solids (TSS)	mg/L	13.0	IS 3025: Part 17:2022
8.	Total Dissolved Solids (TDS) at 180°C	mg/L	76.0	IS 3025 : Part 16:2023
9.	Total Alkalinity (as CaCO3)	mg/L	92.0	IS 3025 : Part 23:2023
10.	Fluoride (as F)	mg/L	0.54	APHA 24 th Eddtn.:2023
11.	Nitrate (as NO3)	mg/L	21.3	IS 3025 Part 34; Sec.1: 2023
12.	Sulphate (as SO4)	mg/L	37.5	IS 3025 Part 24; Sec.1: 2022
13.	Chloride (as Cl)	mg/L	29.4	IS 3025 : Part 32 :2019

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-----End of Report-----

Prepared by:
(Champak Barman)



Reviewed by:
(Debashish Das)

Authorised by:
(Dr. Mayur Jyoti Mahanta)



DMCU ENVIROCHEM LLP

ডিএমচিইউ এনভাইৰ'কেম এলএলপি,

ADDRESS: House No: 68, Kailash Nagar, Panjabari, Guwahati-781037, Assam

E-mail: dmcenvirochemllp@gmail.com Ph No:9864615794, 7002812082

14.	Total Hardness (as CaCO ₃)	mg/L	78.26	IS 3025 : Part 21 :2023
15.	Calcium (as Ca)	mg/L	22.58	IS 3025 : Part 40 :2024
16.	Magnesium (as Mg)	mg/L	7.02	IS 3025 : Part 46 :2023
17.	Mercury (as Hg)	mg/L	BDL	IS 3025 : Part 48
18.	Cadmium (as Cd)	mg/L	BDL	IS 3025 : Part 41
19.	Copper (as Cu)	mg/L	BDL	IS 3025 : Part 42
20.	Iron (as Fe)	mg/L	0.41	IS 3025 : Part 53
21.	Lead (as Pb)	mg/L	BDL	IS 3025 : Part 47
22.	Zinc (as Zn)	mg/L	2.15	IS 3025 : Part 49
24.	Dissolve Oxygen (DO)	mg/L	6.8	IS 3025 Part 38: Clause 4
25.	Bio Chemical Oxygen Demand (BOD 3 days at 27 °C)	mg/L	9.0	IS 3025 Part 44: 2023
26.	Chemical Oxygen Demand (COD)	mg/L	28.0	IS 3025 Part 58: 2023
27.	E. Coli	MPN/per 100ml	6	IS 1622:1981 (Reaff. 2003)
28.	Faecal Coliform	MPN/per 100ml	19	IS 1622:1981 (Reaff. 2003)

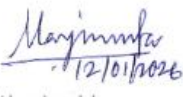
Note: BDL: Below Detection Limit.

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-----End of Report-----


 Prepared by:
 (Champak Barman)


 Reviewed by:
 (Debashish Das)


 Authorised by:
 (Dr. Mayur Jyoti Mahanta)



220/132 DC TATA Line



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E-mail: dmcenvirochemllp@gmail.com Ph No:9864615794, 7002812082

TEST REPORT

Test Report No:	DMCU/260112/R13	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/A ISTSEP, Phase-II/2024/12, Dated: 08/01/2026
	OFFICE OF THE MANAGING DIRECTOR	Sample Description	Ground Water
	Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001	Sample Source	Dug Well
		Sample Id:	DMCU/GW/260108/03
		Sampling Protocol	IS 17614 (Part1):2025
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	12/01/2026
Sampling Location	Transmission Line T-30, T-31, A.T Road, Near Tata Semiconductor, Jagiroad. Latitude: 26.1230206N°, Longitude: 91.2153601E°		
Environmental Condition	Temperature:	22.9 °C	Humidity: 73%

ANALYSIS RESULT


Sl No	Parameters	Unit	RESULT	LIMIT (As per IS 10500:2012)	TEST METHOD
1.	pH	-	7.17	6.5-8.5	IS 3025: Part 11:2022
2.	Temperature	°C	21.8	Shall not exceed 5°C above the receiving water temperature	IS 3025 Part 9: 2023
3.	Colour	Hazen	1	5	IS 3025 : Part 4:2021
4.	Odour	-	Agreeable	Agreeable	IS 3025 : Part 5:2018
5.	Turbidity	NTU	1	1 Max.	IS 3025: Part 10:2023
6.	Specific Conductance	mS/cm	0.289	-	IS 3025 : Part 14 :2023
7.	Total Suspended Solids (TSS)	mg/L	5.3	-	IS 3025: Part 17:2022
8.	Total Dissolved Solids (TDS) at 180°C	mg/L	85.0	500 Max.	IS 3025 : Part 16:2023
9.	Total Alkalinity (as CaCO3)	mg/L	112.0	200 Max.	IS 3025 : Part 23:2023
10.	Fluoride (as F)	mg/L	0.44	1.0 Max.	APHA 24 th Eddtn.:2023
11.	Nitrate (as NO3)	mg/L	7.6	45 Max.	IS 3025 Part 34: Sec.1: 2023
12.	Sulphate (as SO4)	mg/L	33.0	200 Max.	IS 3025 Part 24: Sec.1: 2022
13.	Chloride (as Cl)	mg/L	35.6	250 Max.	IS 3025 : Part 32 :2019

Note: BDL: Below Detection Limit.

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Reviewed by:
(Debashish Das)

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14.	Total Hardness (as CaCO ₃)	mg/L	120.7	200 Max.	IS 3025 : Part 21 :2023
15.	Calcium (as Ca)	mg/L	41.2	75 Max.	IS 3025 : Part 40 :2024
16.	Magnesium (as Mg)	mg/L	7.5	30 Max.	IS 3025 : Part 46 :2023
17.	Mercury (as Hg)	mg/L	BDL	0.001 Max.	IS 3025 : Part 48
18.	Cadmium (as Cd)	mg/L	BDL	0.003 Max.	IS 3025 : Part 41
19.	Copper (as Cu)	mg/L	BDL	0.05 Max.	IS 3025 : Part 42
20.	Iron (as Fe)	mg/L	0.23	0.3 Max.	IS 3025 : Part 53
21.	Lead (as Pb)	mg/L	BDL	0.01 Max.	IS 3025 : Part 47
22.	Zinc (as Zn)	mg/L	0.84	5.0 Max.	IS 3025 : Part 49
23.	E. Coli	per 100ml	Absent	Shall not be detectable in any 100ml sample	IS 15185:2016
24.	Faecal Coliform	CFU/100	Absent	-	IS 1622:1981 (Reaff. 2003)

Note: BDL: Below Detection Limit.

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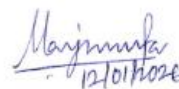
-----End of Report-----



Prepared by:
(Champak Barman)



Reviewed by:
(Debashish Das)



Authorised by:
(Dr. Mayur Jyoti Mahanta)





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TEST REPORT

Test Report No:	DMCU/260112/R15		Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED		WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
	OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001		Sample Description	Surface Water
			Sample Source	Pond
			Sample Id:	DMCU/SW/260108/02
			Sampling Protocol	IS 17614 (Part1):2025
Name of the Project	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.			
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026	
Received Date:	08/01/2026	Analysis End Date:	12/01/2026	
Sampling Location	Trasmission Line T-30, T-31, Jagiroad to Morigaon Road,		Latitude: 26.133378N°, Longitude: 92.205318E°	
Environmental Condition	Temperature:	23.5 °C	Humidity:	70%

ANALYSIS RESULT

SI No	Parameters	Unit	RESULT	TEST METHOD
1.	pH	-	7.22	IS 3025: Part 11:2022
2.	Temperature	°C	23.5	IS 3025 Part 9: 2023
3.	Colour	Hazen	2	IS 3025 : Part 4:2021
4.	Odour	-	Agreeable	IS 3025 : Part 5:2018
5.	Turbidity	NTU	7	IS 3025: Part 10:2023
6.	Specific Conductance	mS/cm	0.273	IS 3025 : Part 14 :2023
7.	Total Suspended Solids (TSS)	mg/L	14.2	IS 3025: Part 17:2022
8.	Total Dissolved Solids (TDS) at 180°C	mg/L	143.0	IS 3025 : Part 16:2023
9.	Total Alkalinity (as CaCO3)	mg/L	130.4	IS 3025 : Part 23:2023
10.	Fluoride (as F)	mg/L	0.53	APHA 24 th Eddtn.:2023
11.	Nitrate (as NO3)	mg/L	9.6	IS 3025 Part 34: Sec.1: 2023
12.	Sulphate (as SO4)	mg/L	32.8	IS 3025 Part 24: Sec.1: 2022
13.	Chloride (as Cl)	mg/L	60.6	IS 3025 : Part 32 :2019

Note: BDL: Below Detection Limit.

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-----End of Report-----

Prepared by:

(Champak Barman)



Reviewed by:

(Debashish Das)

Authorised by:

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14.	Total Hardness (as CaCO ₃)	mg/L	79.4	IS 3025 : Part 21 :2023
15.	Calcium (as Ca)	mg/L	30.2	IS 3025 : Part 40 :2024
16.	Magnesium (as Mg)	mg/L	7.7	IS 3025 : Part 46 :2023
17.	Mercury (as Hg)	mg/L	BDL	IS 3025 : Part 48
18.	Cadmium (as Cd)	mg/L	BDL	IS 3025 : Part 41
19.	Copper (as Cu)	mg/L	BDL	IS 3025 : Part 42
20.	Iron (as Fe)	mg/L	0.24	IS 3025 : Part 53
21.	Lead (as Pb)	mg/L	BDL	IS 3025 : Part 47
22.	Zinc (as Zn)	mg/L	1.77	IS 3025 : Part 49
24.	Dissolve Oxygen (DO)	mg/L	6.8	IS 3025 Part 38: Clause 4
25.	Bio Chemical Oxygen Demand (BOD 3 days at 27°C)	mg/L	10.0	IS 3025 Part 44: 2023
26.	Chemical Oxygen Demand (COD)	mg/L	92.5	IS 3025 Part 58: 2023
27.	E. Coli	MPN/per 100ml	04	IS 1622:1981 (Reaff. 2003)
28.	Faecal Coliform	MPN/per 100ml	16	IS 1622:1981 (Reaff. 2003)

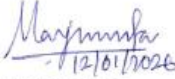
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 Prepared by:
 (Champak Barman)



 Reviewed by:
 (Debashish Das)


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Appendix 10: Ambient Air Quality Test Reports

Sub-Station:



DMCU
Environmental Services

DMCU ENVIROCHEM LLP

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TEST REPORT

Test Report No:	DMCU/260112/R01	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S (PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Id:	DMCU/AAQ/260108/01
Project Name	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Sample Description	Air	Type of Sample	Ambient Air
Sampling Protocol	IS 5182 (Part 5): 2020	Sample Collected by:	DMCU Envirochem LLP
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	10/01/2026
Sampling Location	220/132 kV Grid Substation (GSS) at Morigaon, (Baghjap)	Latitude:26.1696164°, Longitude: 92.2239004°	
Environmental Condition	Humidity: 73%	Temperature:	23.7 °C


ANALYSIS RESULT

Sl No	Parameters	Unit	RESULT	LIMIT (CPCB)	TEST METHOD
1.	Respirable Suspended Particulate Matter (PM 10)	µg/m ³	79.2	100	IS 5182: Part 23:2006 (Reaff. 2022)
2.	Fine Particulate Matter (PM 2.5)	µg/m ³	43.0	60	IS 5182: Part 24:2019 (Reaff. 2024)
3.	Sulphur Dioxide (as SO ₂)	µg/m ³	6.3	80	IS 5182: Part 2 :2001 (Reaff.2022)
4.	Oxides of Nitrogen (as NO _x)	µg/m ³	18.5	80	IS 5182: Part 6 :2006 (Reaff.2017)


Remarks:


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-----End of Report-----

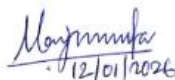


Prepared by:
(Champak Barman)





Reviewed by:
(Debashish Das)



Authorised by:
(Dr. Mayur Jyoti Mahanta)

220/132 Baghjap LILO Line



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TEST REPORT

Test Report No:	DMCU/260112/R06	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S (PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Id:	DMCU/AAQ/260108/02
Project Name	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Sample Description	Air	Type of Sample	Ambient Air
Sampling Protocol	IS 5182 (Part 5): 2020	Sample Collected by:	DMCU Envirochem LLP
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	10/01/2026
Sampling Location	Baghiap Langpi Transmission Line T-2	Latitude:26.136803°, Longitude: 92.2433652°	
Environmental Condition	Humidity: 73%	Temperature:	23.7 °C

ANALYSIS RESULT

SI No	Parameters	Unit	RESULT	LIMIT (CPCB)	TEST METHOD
1.	Respirable Suspended Particulate Matter (PM 10)	µg/m ³	68.5	100	IS 5182: Part 23:2006 (Reaff. 2022)
2.	Fine Particulate Matter (PM 2.5)	µg/m ³	37.2	60	IS 5182: Part 24:2019 (Reaff. 2024)
3.	Sulphur Dioxide (as SO ₂)	µg/m ³	5.2	80	IS 5182: Part 2 :2001 (Reaff.2022)
4.	Oxides of Nitrogen (as NO _x)	µg/m ³	16.7	80	IS 5182: Part 6 :2006 (Reaff.2017)

Remarks:

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-----End of Report-----

Prepared by:
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(Dr. Mayur Jyoti Mahanta)

220/132 DC TATA Line



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TEST REPORT

Test Report No:	DMCU/260112/R11	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S (PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Id:	DMCU/AAQ/260108/03
Project Name	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Sample Description	Air	Type of Sample	Ambient Air
Sampling Protocol	IS 5182 (Part 5): 2020	Sample Collected by:	DMCU Envirochem LLP
Date of sampling	07/01/2026	Analysis Start Date:	08/01/2026
Received Date:	08/01/2026	Analysis End Date:	10/01/2026
Sampling Location	Transmission line T-30, T-31, A. T. Road, Near Tata Semiconductor, Jaglroad.	Latitude:26.12662793°, Longitude: 92.2216434°	
Environmental Condition	Humidity: 73%	Temperature:	23.7 °C

ANALYSIS RESULT

Sl No	Parameters	Unit	RESULT	LIMIT (CPCB)	TEST METHOD
1.	Respirable Suspended Particulate Matter (PM 10)	µg/m ³	70.5	100	IS 5182: Part 23:2006 (Reaff. 2022)
2.	Fine Particulate Matter (PM 2.5)	µg/m ³	32.6	60	IS 5182: Part 24:2019 (Reaff. 2024)
3.	Sulphur Dioxide (as SO ₂)	µg/m ³	6.7	80	IS 5182: Part 2 :2001 (Reaff.2022)
4.	Oxides of Nitrogen (as NO _x)	µg/m ³	16.2	80	IS 5182: Part 6 :2006 (Reaff.2017)

Remarks:

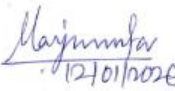
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-----End of Report-----


 Prepared by:
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 Reviewed by:
 (Debashish Das)


 Authorised by:
 (Dr. Mayur Jyoti Mahanta)

Appendix 11: Noise Level Test Reports

Sub-Station



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TEST REPORT

Test Report No:	DMCU/260106/R02	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001.	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Id:	DMCU/NL/260108/01
Project Name	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Sample Description	Noise	Type of Sample	Ambient Noise
Sampling Protocol	IS 9989:1981 (Reaff.2022)	Date of sampling	07/01/2026
Sampling Location	220/132 kV Grid Substation (GSS) at Morigaon, (Baghjap)	Latitude: 26.169591°, Longitude: 92.2239258°	
Environmental Condition	Temperature: 23.9 °C	Humidity:	67%

ANALYSIS RESULT

Sl No	Parameters	Unit	RESULT	TEST METHOD
1.	Ambient Noise Level (Day)	dB(A)	59.3	IS 9989:1981 (Reaff.2022)
2.	Ambient Noise Level (Night)	dB(A)	36.2	IS 9989:1981 (Reaff.2022)

Ambient Noise Standards:

Area Code	Category of Area	Limit in dB(A) Leq	
		Day time	Night time
A.	Industrial area	75	70
B.	Commercial area	65	55
C.	Residential area	55	45
D.	Silence Zone	50	40

Remarks:

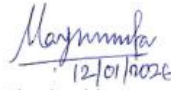
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 (Champak Barman)




 Reviewed by:
 (Debashish Das)


 12/01/2026
 Authorised by:
 (Dr. Mayur Jyoti Mahanta)

220/132 Baghjap LILO Line



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TEST REPORT

Test Report No:	DMCU/260112/R07	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI – 781001.	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Id:	DMCU/NL/260108/02
Project Name	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Sample Description	Noise	Type of Sample	Ambient Noise
Sampling Protocol	IS 9989:1981 (Reaff.2022)	Date of sampling	07/01/2026
Sampling Location	Baghiap Langpi Transmission Line T-2	Latitude:26.1368264°, Longitude: 92.243409°	
Environmental Condition	Temperature: 23.9 °C	Humidity:	67%

ANALYSIS RESULT

Sl No	Parameters	Unit	RESULT	TEST METHOD
1.	Ambient Noise Level (Day)	dB(A)	55.9	IS 9989:1981 (Reaff.2022)
2.	Ambient Noise Level (Night)	dB(A)	34.1	IS 9989:1981 (Reaff.2022)

Ambient Noise Standards:

Area Code	Category of Area	Limit in dB(A) Leq	
		Day time	Night time
A.	Industrial area	75	70
B.	Commercial area	65	55
C.	Residential area	55	45
D.	Silence Zone	50	40

Remarks:

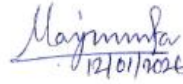
- The results relate to the sample tested only.
- The test report shall not be reproduced, except in full, without written approval of the company
- The laboratory is responsible for all the above information in the report.

-----End of Report-----


 Prepared by:
 (Champak Barman)




 Reviewed by:
 (Debashish Das)


 Authorised by:
 (Dr. Mayur Jyoti Mahanta)



220/132 DC TATA Line

DMCU ENVIROCHEM LLP

ডিএমচিইউ এনভাইৰ'কেম এলএলপি,

ADDRESS: House No: 68, Kailash Nagar, Panjabari, Guwahati-781037, Assam
E-mail: dmcenvirochemllp@gmail.com Ph No:9864615794, 7002812082

TEST REPORT

Test Report No:	DMCU/260112/R12	Date of Reporting	12/01/2026
Customer Name & Address	M/S ASSAM ELECTRICITY GRID CORPORATION LIMITED OFFICE OF THE MANAGING DIRECTOR Regd. Office: (FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001.	WO No. & Date	File No.: AEGCL/MD/AIIB/E&S(PMU)/AISTSEP, Phase-II/2024/12, Dated: 08/01/2026
		Sample Id:	DMCU/NL/260108/03
Project Name	proposed 220/132 kV Grid Substation (GSS) at Morigaon (Baghjap) and its associated Transmission Lines (Package E) under AIIB funded AISTSEP, Phase II.		
Sample Description	Noise	Type of Sample	Ambient Noise
Sampling Protocol	IS 9989:1981 (Reaff.2022)	Date of sampling	08/01/2026
Sampling Location	Transmission Line T-30, T-31, A.T Road, Near Tata Semiconductor, Jagiroad.		
Environmental Condition	Temperature: 23.9 °C	Humidity:	67%

ANALYSIS RESULT

Sl No	Parameters	Unit	RESULT	TEST METHOD
1.	Ambient Noise Level (Day)	dB(A)	61.7	IS 9989:1981 (Reaff.2022)
2.	Ambient Noise Level (Night)	dB(A)	42.2	IS 9989:1981 (Reaff.2022)

Ambient Noise Standards:			
Area Code	Category of Area	Limit in dB(A) Leg	
		Day time	Night time
A.	Industrial area	75	70
B.	Commercial area	65	55
C.	Residential area	55	45
D.	Silence Zone	50	40

Remarks:

- The results relate to the sample tested only.
- The test report shall not be reproduced, except in full, without written approval of the company
- The laboratory is responsible for all the above information in the report.

-----End of Report-----

Prepared by:
 (Champak Barman)



Reviewed by:
 (Debashish Das)

Authorised by:
 (Dr. Mayur Jyoti Mahanta)

Annexure 12: Photographic evidence of Trees within the Proposed Site



Aam
Mango Tree
Mangifera indica



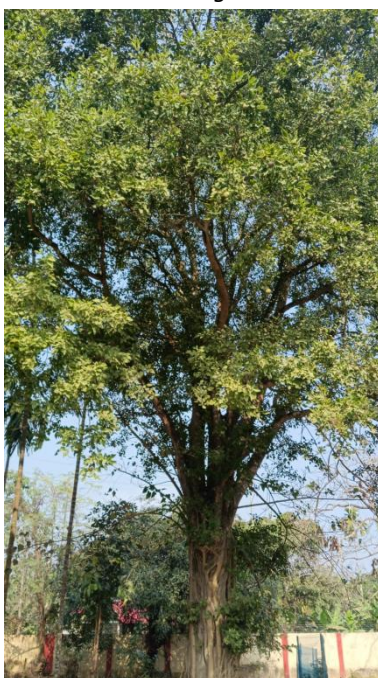
Ahaot
Sacred Fig
Ficus religiosa



Amlokhi
Indian Gooseberry Tree
Phyllanthus emblica



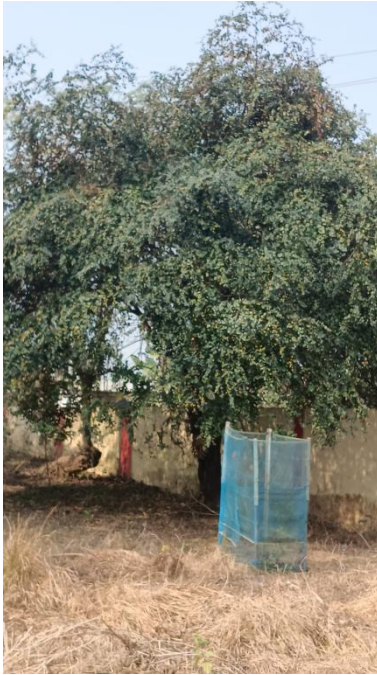
Bakul
Spanish Cherry
Mimusops elengi



Bel
Wood Apple Tree
Aegle marmelos



Bhelo
Indian Cork Tree
Millingtonia hortensis



Bogori
Indian Jujube
Ziziphus mauritiana



Dholunga
White Teak / Gamhar Tree
Gmelina arborea



Dimoru
Cluster Fig
Ficus racemosa



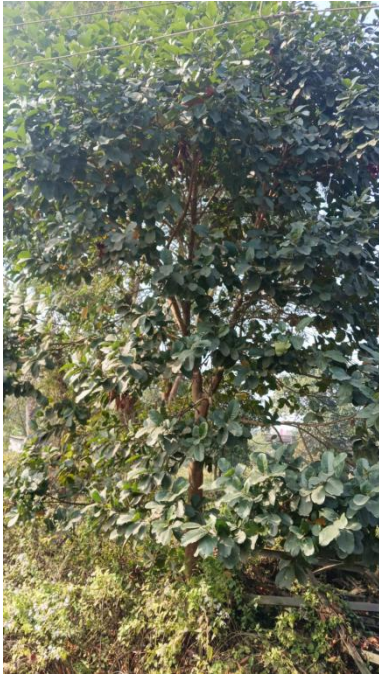
Jamun
Black Plum / Java Plum
Syzygium cumini



Jarnomi
Indian Lilac
Azadirachta indica



Sojana
Drumstick Tree / Moringa Tree
Moringa oleifera

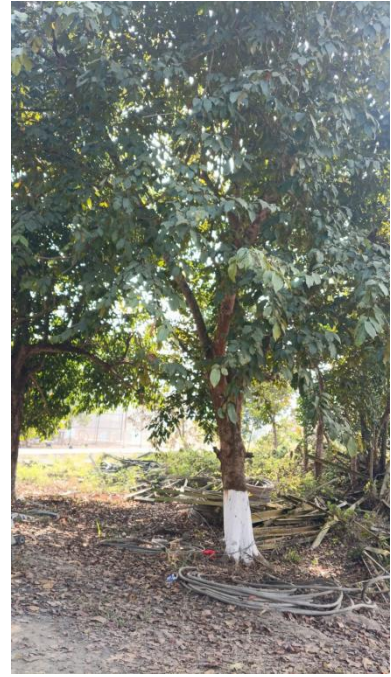


Khangalu
Thorny Bamboo

-



Khejur
Date Palm
Phoenix dactylifera



Hilikha
Indian Elm

-



Krishnasura
Flame of the Forest/ Gulmohar
Delonix regia



Koro
Karanj Tree
Pongamia pinnata



Madhuri Aam
Guava Tree
Psidium guajava



Nahor
Mesua Tree / Ironwood Tree
Mesua ferrea



Simolu
Silk Cotton Tree
Bombax ceiba



Sotiona
A Medicinal Plant
-



Tamul
Areca Palm / Betel Nut Tree
Areca catechu



Appendix 13: Armed Security Guards' Management Plan for Substation

Introduction

This sub-plan outlines the management plan for the deployment and operation of 5–6-armed security personnel assigned to safeguard the electric substation. Given the critical importance of the substation to the region's infrastructure, ensuring its security is paramount. The following sections detail the roles, responsibilities, and operational guidelines for the security team.

1. Objectives

The primary objectives of deploying armed security personnel at the substation are as follows:

- To prevent unauthorized access to the facility.
- To deter and respond to potential threats, including theft, sabotage, or vandalism.
- To ensure the safety of personnel, equipment, and infrastructure.
- To maintain a secure environment for uninterrupted operations.

2. Security Personnel Deployment

The substation will be secured by 5–6-armed security guards stationed strategically to maximize coverage and response efficiency. Their deployment will be structured as follows:

- Entry/Exit Points: At least two guards will be positioned at the main entry and exit points to monitor and control access.
- Perimeter Patrols: Two guards will conduct routine patrols along the perimeter to ensure no breaches or suspicious activities occur.
- Control Room Monitoring: One guard will be stationed in the control room to oversee surveillance systems and communicate with patrolling guards.
- Reserve Guard(s): Any additional personnel will serve as a reserve to respond to incidents or provide relief during breaks.

3. Roles and Responsibilities

Each security guard will be assigned specific duties to ensure efficient operation:

- Access Control: Verify identification and credentials of all personnel entering the substation. Maintain a log of all visitors and vehicles.
- Surveillance Monitoring: Continuously monitor CCTV footage and alarm systems to detect unusual activity.
- Incident Response: Respond promptly to emergencies, including intrusions, equipment tampering, or other security threats.
- Reporting: Document and report all incidents, suspicious activities, and daily operations to the security supervisor.
- Emergency Coordination: Assist in implementing emergency protocols and coordinate with local law enforcement or emergency services when necessary.

4. Training and Preparedness

To ensure the effectiveness of the security team, all personnel will undergo mandatory training in the following areas:

- Facility Familiarization: Understanding the layout of the substation, including critical areas and escape routes.
- Emergency Procedures: Training in fire safety, first aid, and evacuation protocols.



- Conflict Resolution: Techniques for de-escalating confrontations and handling potential intruders professionally.
- Weapon Handling: Regular drills to ensure proficiency in the use of firearms in compliance with local regulations.

Periodic refresher courses will be conducted to maintain high levels of readiness.

5. Community Health and Safety – Security Management

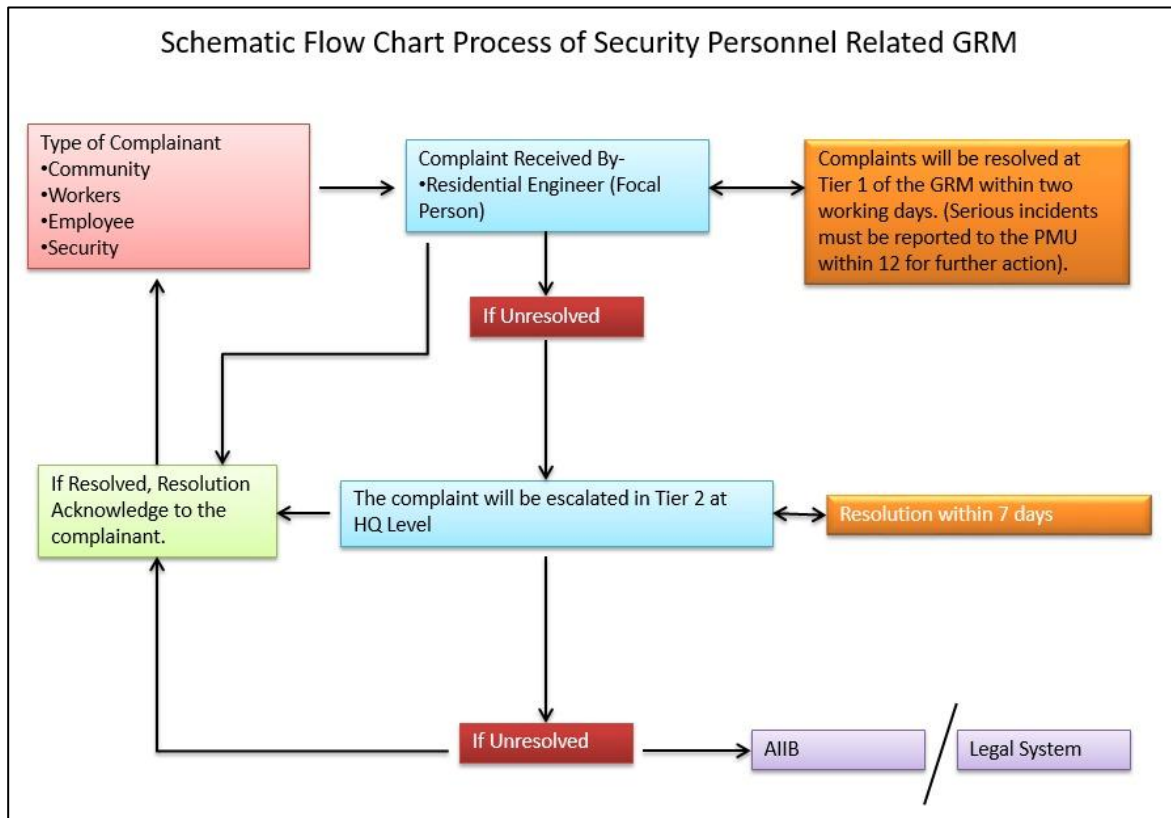
The Security Management Plan establishes clear operational and behavioral standards for armed security personnel to ensure that their presence supports, rather than undermines, community health, safety, and trust. The framework is guided by the principles of proportional and law full use-of-force, respectful community engagement, and transparency, while ensuring that all security related complaints are integrated into the Grievance Redress Mechanism (GRM).

It is aligned with the requirements of AIIB’s ESS1 on Environmental and Social Assessment and Management, which requires projects to identify and manage risks to communities arising from security arrangements.

In addition, the Plan complies with relevant national regulatory frameworks governing security personnel and public safety in India, including the Private Security Agencies (Regulation) Act, 2005 governing licensing and training of private security agencies, the ASEB Security Service Regulation, 1975 applicable to utility security personnel, and safety provisions under the CEA (Measures relating to Safety and Electric Supply) Regulations, 2023 to ensure protection of workers, project assets, and surrounding communities.

- Proportional Use-of-Force Principles
 - A graduated response protocol shall be applied, prioritizing verbal warnings, de-escalation, and non-violent intervention before any use of physical force. Firearms shall only be used when strictly unavoidable to protect life or prevent serious injury.
 - Security personnel shall apply force strictly as a last resort and only when necessary to prevent imminent harm or unlawful acts.
 - Any use of force must be legal, necessary, proportionate, and time-bound, consistent with applicable national law and good international practice.
 - Firearms shall only be drawn or discharged under exceptional circumstances involving credible threats to life or serious injury.
 - Every instance of weapon display, discharge, or physical force shall trigger:
 - Immediate internal review and incident documentation;
 - Notification to project management; and
 - Preparation of a public safety report, where appropriate.
 - Disciplinary measures shall apply in cases of misuse or excessive force.
- Respectful and Non-Threatening Community Engagement
 - Security guards are required to interact with all community members in a fair, dignified, and non-discriminatory manner.
 - Intimidation, harassment, coercion, or culturally insensitive behavior is strictly prohibited.
 - Guards shall communicate clearly and courteously, avoiding aggressive postures, unnecessary weapon display, or conduct that may create fear or anxiety within the community.
 - Mandatory induction and periodic refresher training shall include:
 - Cultural sensitivity and awareness of local customs;

- Conflict de-escalation techniques;
 - Human rights obligations; and
 - Appropriate conduct in community-facing roles.
- Dedicated sensitization sessions will be conducted with armed security guards to reinforce a non-threatening posture and professional demeanor. These sessions will emphasize that community members must feel safe and confident in raising concerns regarding any project-related activity without fear of retaliation or intimidation.
- Integration of Security-Related Grievances into the Project GRM
- The contact information and GRM reporting channels will be display at the substation entrance, including telephone numbers and complaint submission procedures.
 - All complaints concerning security personnel shall be formally recorded by RE, Baghjap SS (focal point) and processed through the Project Grievance Redress Mechanism (GRM). A flow chart is provided below to describe the GRM system related to security personnel.



- Communities shall be proactively informed—through public meetings, signage, and stakeholder engagement—about safe and confidential channels for reporting security-related concerns will be initiated by EPC with support assistance from PMC/PMU. It will be undertaken simultaneously during consultations and GRM awareness initiated by EPC & PMC.
- The GRM shall ensure:
 - Confidential handling of complaints;
 - Protection against retaliation;
 - Timely investigation and resolution; and
 - Feedback to complainants on actions taken.



Security-related grievances shall be periodically analyzed to identify systemic issues and implement corrective and preventive measures. This structured approach ensures that security arrangements contribute to community safety, uphold human rights standards, and maintain public trust throughout project implementation.

6. Communication Protocols

Effective communication is vital for coordinated security operations. The following protocols will be implemented:

- All guards will be equipped with two-way radios for real-time communication.
- A designated shift supervisor will oversee operations and act as the primary point of contact for external agencies.
- Incident reporting will follow a standardized format, with immediate escalation for critical events.

7. Security Incident Reporting and Escalation

Any security-related incident involving use of force, community complaints, or security breaches shall be reported immediately to the Security Supervisor and Project Management Unit (PMU).

Incident reports shall include:

- date, time, and location of incident
- personnel involved
- nature of force used
- actions taken
- follow-up measures.

Serious incidents involving injury, weapon discharge, or community complaints shall be reported to the PMU within 12 hours and investigated promptly.

8. Shift Management

To ensure continuous security coverage, guards will work in rotating shifts. Each shift will include a handover period to brief incoming personnel on ongoing situations or concerns. Adequate rest periods will be scheduled to maintain alertness and effectiveness.

9. Evaluation and Improvement

Regular evaluations will be conducted to assess the performance of the security team and identify areas for improvement. The monitoring will be supported by measurable indicators, including:

- Number and type of security-related grievances received and resolved through the Project Grievance Redress Mechanism (GRM);
- Percentage of grievances resolved within the prescribed timeframe;
- Number of incidents involving use of force or conflict with community members;
- Compliance with security training requirements on code of conduct, human rights, and community interaction; and
- Periodic site inspections to verify adherence to approved security protocols.

These indicators will be monitored and recorded by the Environmental and Social (E&S) Officer of PMC/PMU, with findings reviewed during periodic environmental and social monitoring to ensure that security arrangements remain consistent with project commitments and community safety



requirements.

Conclusion

The management plan for armed security guards at the electric substation is designed to provide comprehensive protection for this critical infrastructure. By implementing strategic deployment, specialized training, and clear communication protocols, this plan ensures a robust security framework capable of addressing potential threats effectively.

Appendix 14: Construction and Demolition Waste Management Plan

1. Introduction

This Construction and Demolition (C&D) Waste Management Plan is prepared as part of the Environmental and Social Impact Assessment (ESIA)-Environmental and Social Management Plan (ESMP) for the construction of the 220/132 kV AIS at Morigaon and associated transmission lines under the Assam Intra-State Transmission System Enhancement Project (AISTSEP), Phase II, funded by the Asian Infrastructure Investment Bank (AIIB). The primary objective of this C&D Waste Management Plan is to define systematic procedures for the segregation, safe handling, reuse, recycling, and environmentally sound disposal of construction and demolition waste generated during the project implementation phase. The plan has been developed in accordance with the requirements and guidelines prescribed by the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, under the Construction and Demolition Waste Management Rules, 2016.

This plan is based on a detailed estimation and categorization of waste types to be generated during demolition of 6 nos. of dilapidated staff quarters comprising 25 flats, including residence of the Residential Engineer and an existing overhead water tank. The methodology and quantification are aligned with the 'Guidelines on Environmental Management of C&D Waste in India (Draft 2017)' published by the Central Pollution Control Board (CPCB). These guidelines provide normative waste generation rates for different types of structures and recommend practices for segregation, reuse, recycling, and safe disposal of construction and demolition waste.

2. Regulatory Compliance and Pre-Demolition Activities

This Construction and Demolition (C&D) Waste Management Plan has been prepared in compliance with the applicable legal and regulatory framework of the Government of India. The plan is aligned with the following statutes and rules to ensure environmentally sound and legally compliant management of construction and demolition waste during project implementation:

- Construction and Demolition Waste Management Rules, 2016
- Solid Waste Management Rules, 2016
- The Forest (Conservation) Act, 1980, where applicable for tree cutting and clearance
- The Environment (Protection) Act, 1986, and associated rules and notifications

Compliance with the above regulations shall be ensured throughout the pre-construction, construction, and demolition phases of the sub-project through systematic planning, implementation, monitoring, and reporting mechanisms.

Table: Pre-Demolition Activities, Responsibilities, and Timelines

Sl. No.	Activity	Responsibility	Timeline
1	Conduct structural integrity and environmental audit of existing structures	PMC / EPC Contractor	Pre-demolition
2	Disconnection of utilities (electricity, water supply, telecom, etc.)	EPC Contractor	At least 1 week prior to demolition
3	Inform, consult, and relocate occupants, if any.	PIU / Social Expert	Prior to commencement of works
4	Identification and assessment of hazardous materials (e.g., asbestos, lead-based paint, contaminated materials)	PMC / EPC Contractor	Pre-demolition
5	Obtain necessary approvals and permissions from	EPC Contractor	Prior to

	concerned local authorities		commencement of works
6	Conduct stakeholder consultations and discloser.	PIU / PMC	Pre-demolition

3. Waste Quantification and Categorization

Waste quantification and categorization shall be undertaken prior to and during the construction and demolition activities to estimate the type and volume of waste likely to be generated from the proposed sub-project. The assessment will be carried out based on the demolition methodology, construction material inventory, and site-specific conditions.

Table: Categorization and Estimation by Waste Type

Sl. No.	Material Type	Visual/Inventory Observations	Estimated Quantity (tons)	Estimated Composition (%)	Remarks
1	Concrete, RCC, Bricks, Masonry Debris	RCC building structure, plinths, partitions	To be determined	To be determined	Could be reused as aggregate if uncontaminated
2	Wood (doors, windows, etc.)	Doors, frames in tin sheds/quarters	To be determined	To be determined	Check for termite damage, reuse possible
3	Metals (steel, iron rods)	Roof trusses, rebars, frames in tin sheds	To be determined	To be determined	Corrosion levels to be assessed
4	Plaster, Mortar	Found on floors and walls of all structures	To be determined	To be determined	
5	Glass (window panes)	Few broken windows in RCC and tin sheds	To be determined	To be determined	Fragile, mostly broken
6	Others / Residual debris	Misc. debris like tiles, dust, degraded wood, unidentified waste	To be determined	To be determined	Includes unusable or contaminated waste
Total			-	-	

4. Demolition Strategy

The demolition of existing structures at the proposed 220/132 kV Morigaon substation site shall follow a methodical and environmentally conscious approach to minimize risks to workers, nearby receptors, and the surrounding environment. The strategy comprises the following key components:

(i) Type of Demolition: Manual + Light Machinery

The demolition will be carried out using a combination of manual labour and light machinery such as jackhammers, electric breakers, and small excavators. This approach is preferred over heavy machinery to:

- Minimize ground vibrations that could affect nearby structures or utilities.
- Reduce noise levels, protecting the well-being of workers and sensitive receptors in the vicinity.
- Allow better control over the demolition sequence, ensuring safer dismantling in congested or sensitive areas.

(ii) Safety Measures

To ensure a safe working environment during demolition, the following measures shall be strictly implemented:

- Barricading and Signage: The entire demolition zone will be barricaded using metal sheets or safety mesh to restrict unauthorized access. Multilingual warning signage (e.g., “Danger – Demolition in Progress”) shall be posted prominently.
- Dust Suppression: Continuous water spraying using hosepipes or mist cannons will be undertaken during demolition to suppress airborne dust. Water shall be applied particularly during the breaking of concrete, bricks, and plaster materials.
- Personal Protective Equipment (PPE): All demolition workers and supervisors will be provided with mandatory PPE, including:
 - ✓ Safety helmets
 - ✓ Gloves
 - ✓ Dust masks or respirators
 - ✓ Protective goggles
 - ✓ Safety boots
 - ✓ Reflective jackets (for visibility)
- Emergency Preparedness and First Aid: An emergency response plan shall be in place. This includes:
 - ✓ On-site first aid kits and trained first responders
 - ✓ Designated assembly points for evacuation
 - ✓ Emergency contact numbers displayed clearly
 - ✓ Quick access to nearby healthcare facilities

(iii) Methodology: Sequential Top-Down Demolition

Systematic Dismantling Sequence: The structure will be dismantled in a top-down manner to avoid structural instability and collapse:

- ✓ Roof and overhead structures such as trusses, tiles, asbestos sheets, or concrete slabs will be removed first.
- ✓ Walls and vertical structures will be dismantled next, starting from the top to the bottom floor. Structural supports will be retained temporarily as needed to ensure safety.
- ✓ Floor slabs and base columns will be removed afterward using light equipment.
- ✓ Foundation and substructure elements will be excavated last, following clearance of above-ground components.

(iv) Material Handling, Waste Segregation and Disposal:

As the structures will be dismantled, debris will be sorted and segregated at source (e.g., RCC, bricks, plaster, steel). Reusable materials (e.g., wood, steel) will be salvaged, and demolition debris will be transported using covered trucks to prevent dust dispersion and spillage. Additionally, debris-carrying vehicles will strictly adhere to designated haulage routes to minimize disruption to the local community and prevent damage to roads.

5. Monitoring and Documentation

- Maintenance of a waste inventory register, tracking the quantity and type of C&D waste generated, stored, reused, and disposed.
- Photographic evidence and transportation records shall be maintained for each major demolition activity.
- Monthly reports shall be submitted to the PMC and PMU indicating compliance with waste management practices.
- Worker health and safety conditions shall be monitored regularly, ensuring compliance with safety measures and use of PPE.

6. Roles & Responsibilities

Sl. No.	Stakeholder	Role
1	EPC Contractor	Execute demolition & manage waste
2	PMC	Supervision & compliance verification & reporting
3	PIU (AEGCL)	Coordination with local bodies
4	Concerned local authorities	Final disposal site approval & compliance

Note:

A detailed Construction and Demolition Waste Management Plan (C&DWMP) shall be prepared by the Contractor as part of the Contractor's Environmental and Social Management Plan (CESMP) prior to the commencement of any demolition activities. The C&DWMP shall provide comprehensive details on, inter alia, the sequencing and methodology of demolition works, measures for minimizing noise and dust including the use of less noisy equipment and covered trucks for transportation of debris, identification and approval status of proposed disposal sites for demolition waste, estimation of the quantities and types of demolition debris, procedures for segregation, storage, transportation and disposal of waste, maintenance of waste generation and disposal records/logs.



Appendix 15: Socio-Economic Details of Persons Staying in the Staff Quarter

AIIB FUNDED ASSAM INTRA STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT (PHASE-II)									
Socio-Economic Details of the Person Staying in the Staff Quarter inside the Baghjap Substation in Morigaon									
	Sl. No	Name of the Employee Residing in the Quarter	Age	Gender	Caste	Post/ Designation	Regular/ Contractual	Staying in the Quarter Since (Year)	No of Family Members Staying (Provide details in Below Section)
A.	1	Bidyut Bikas Deka	34	M	OBC	DM	REGULAR	2025	NA
	2	Jyotishman Gogoi	31	M	OBC	JM	REGULAR	2025	NA
	3	Deepraj Kakoty	29	M	OBC	JM	REGULAR	2025	NA
	4	Sontosh Phukan	24	M	OBC	JM	REGULAR	2025	NA
	5	Dhansingh Rangpi	41	M	ST	SAHAYAK	REGULAR	2011	6 (Details in Section B)
	6	Rana Borah	37	M	OBC	SBO II	REGULAR	2014	4 (Details in Section B)
	7	Shiba Das	40	M	OBC	CHAWKIDAR	FIX PAY	2012	4 (Details in Section B)
	8	Nabajit Tumung	24	M	ST	SAHAYAK	CONTRACTUAL	2023	3 (Details in Section B)
	9	Aniruddha Das	48	M	OBC	SAHAYAK	CONTRACTUAL	2011	NA
	10	Tapash Amchi	22	M	ST	SAHAYAK	CONTRACTUAL	2023	NA
B.	S.No	Name of Family Members Staying in the Quarter	Age	Gender	Occupation (Working, House wife, Student etc)	Post/ Designation	Qualification	Duration of Stay in the Quarter Since (Year)	Studying in Which Class (In case of Child)
	1	Rana Borah	37	M		SBO II	ITI	12	--
		June Doloi Borah	36	F	WORKING	--	DEGREE	12	--
		Runu Borah	59	F	WORKING	--	--	12	--



AIIB FUNDED ASSAM INTRA STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT (PHASE-II)									
Socio-Economic Details of the Person Staying in the Staff Quarter inside the Baghjap Substation in Morigaon									
	2	Abhinav Borah	8	M	STUDENT	--	--	8	CLASS 1
		Dhansingh Rangpi	41	M		SAHAYAK	10TH PASS	15	--
		Mekri Teronpi	36	F	HOUSE WIFE	--	--	15	--
		Sanjoy Rongpi	18	M	STUDENT	--	--	18	CLASS 10
		Cherli Rongpi	17	F	STUDENT	--	--	17	CLASS 10
		Reema Rongpi	14	F	STUDENT	--	--	14	CLASS 8
		Changmi Rongpi	11	F	STUDENT	--	--	11	CLASS 5
	3	Siva Das	40	M	--	CHOWKIDAR	--	14	--
		Anita Das	32	F	HOUSE WIFE	--	--	14	--
		Huoni das	58	F	MOTHER	--	--	14	--
		Uday Das	10	M	STUDENT	--	--	10	CLASS 3
	4	Nabajit Tumung	24	M		SAHAYAK	--	2	--
		Mina Tumung	28	F	HOUSE WIFE	--	--	2	--
Shruti Tumung		6	F	STUDENT	--	--	2	--	
C.	1	Approx.- Access to Amenities and Facilities with Distance in (KM)	Electricity	Drinking Water	Water for Washing and Cleaning	Vegetable and Fruit Market	General Store	Hospital/ Sub Center/ Private Doctor	Banks/ ATM
			o km	o km	o km	2 km	2 km	10km/2 km/ none	7km/2 km
	2		Temple	Panchayat Office	School/ Collage	-	-	-	-
			2 km	2 km	2 km/10km				

Appendix 16: IFC's Benchmark Standards for Workers Accommodation

August 2009

11

PART II: STANDARDS FOR AND MANAGEMENT OF WORKERS' ACCOMMODATION

I. Standards for workers' accommodation

This section looks at the principles and standards applicable to the location and construction of workers' accommodation, including the transport systems provided, the general living facilities, rooms/dormitories facilities, sanitary facilities, canteen and cooking facilities, food safety, medical facilities and leisure/social facilities.

A. National/local standards

The key standards that need to be taken into consideration, as a baseline, are those contained in national/local regulations. Although it is quite unusual to find regulations specifically covering workers' accommodation, there may well be general construction standards which will be relevant. These may include the following standards:

- **Building construction:** for example, quality of material, construction methods, resistance to earthquakes.
- **Housing and public housing:** in some countries regulations for housing and public housing contain requirements on issues such as the basic amenities, and standards of repair.
- **General health, safety and security:** requirements on health and safety are often an important part of building standards and might include provisions on occupation density, minimal air volumes, ventilation, the quality of the flooring (slip-resistant) or security against intrusion.
- **Fire safety:** requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and emergency exits, restrictions on the use of certain building materials.
- **Electricity, plumbing, water and sanitation:** national design and construction standards often include very detailed provisions on electricity or plumbing fixtures/fittings, water and sanitation connection/equipment.

Benchmark

1. The relevant national and local regulations have been identified and implemented.

B. General living facilities

Ensuring good standards in living facilities is important in order to avoid safety hazards and to protect workers from diseases and/or illness resulting from humidity, bad/stagnant water (or lack of water), cold, spread of fungus, proliferation of insects or rodents, as well as to maintain a good level of morale. The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards. It is also important that workers' accommodation is unaffected by the environmental or operational impacts of the worksite (for example noise, emissions or dust) but is sufficiently close that workers do not have to spend undue amounts of time travelling from their accommodation to the worksite. Living facilities should be built using adequate materials and should always be kept in good repair, clean and free from rubbish and other refuse.

Benchmarks

1. Living facilities are located to avoid flooding and other natural hazards.
2. Where possible, living facilities are located within a reasonable distance from the worksite.
3. Transport from the living facilities to worksite is safe and free.
4. The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.

Drainage

The presence of stagnant water is a factor of proliferation of potential disease vectors such as mosquitoes, flies and others, and must be avoided.

Benchmarks

1. The building site is adequately drained to avoid the accumulation of stagnant water.

Heating, air conditioning, ventilation and light

Heating, air-conditioning and ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.

Benchmarks

1. For facilities located in cold weather zones, the temperature is kept at a level of around 20 degrees Celsius notwithstanding the need for adequate ventilation.
2. For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems are provided.
3. Both natural and artificial lighting are provided and maintained in living facilities. It is best practice that the window area represents not less than 5% to 10% of the floor area. Emergency lighting is provided.

Water

Special attention to water quality and quantity is absolutely essential. To prevent dehydration, water poisoning and diseases resulting from lack of hygiene, workers should always have easy access to a source of clean water. An adequate supply of potable water must be available in the same buildings where bedrooms or dormitories are provided. Drinking water must meet local or WHO drinking water standards⁷ and water quality must be monitored regularly. Depending on the local context, it could either be produced by dedicated catchment and treatment facilities or tapped from existing municipal facilities if their capacity and quality are adequate.

Benchmarks

1. Access to an adequate and convenient supply of free potable water is always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 litres per person per day are available.
2. Drinking water meets national/local or WHO drinking water standards.⁸
3. All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.

7. www.who.int/water_sanitation_health/dwa/en/
8. Ibid

4. Drinking water quality is regularly monitored.

Wastewater and solid waste

Wastewater treatment and effluent discharge as well as solid waste treatment and disposal must comply with local or World Bank effluent discharge standards⁹ and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. Depending on the local context, treatment and disposal services can be either provided by dedicated or existing municipal facilities.

Benchmarks

1. Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.
2. Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition it is best practice to locate rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odours associated with decaying organic materials.
3. Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.

9. As per the "Pollution Prevention and Abatement Handbook", World Bank Group, July 1998, available from www.worldbank.org

C. Room/dormitory facilities

The standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Overcrowding should be avoided particularly. This also has an impact on workers' productivity and reduces work-related accidents. It is generally acknowledged that rooms/dormitories should be kept clean and in a good condition. Exposure to noise and odour should be minimised. In addition, room/dormitory design and equipment should strive to offer workers a maximum of privacy. Resorting to dormitories should be minimised and single or double rooms are preferred. Dormitories and rooms must be single-sex.

Benchmarks

1. Rooms/dormitories are kept in good condition.
2. Rooms/dormitories are aired and cleaned at regular intervals.
3. Rooms/dormitories are built with easily cleanable flooring material.
4. Sanitary facilities are located within the same buildings and provided separately for men and women.
5. Density standards are expressed either in terms of minimal volume per resident or of minimal floor space. Usual standards range from 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface).
6. A minimum ceiling height of 2.10 metres is provided.
7. In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers.
8. All doors and windows should be lockable, and provided with mosquito screens where conditions warrant.
9. There should be mobile partitions or curtains to ensure privacy.
10. Every resident is provided with adequate furniture such as a table, a chair, a mirror and a bedside light.
11. Separate sleeping areas are provided for men and women, except in family accommodation.

Additional issue

Irrespective of whether workers are supposed to keep their facilities clean, it is the responsibility of the accommodation manager to ensure that rooms/dormitories and sanitary facilities are in good condition.

Bed arrangements and storage facilities

The provision of an adequate numbers of beds of an appropriate size is essential to provide workers with decent, safe and hygienic conditions to rest and sleep. Here again, particular attention should be paid to privacy. Consideration should be given to local customs so beds could be replaced by hammocks or sleeping mats for instance.

Benchmarks

1. A separate bed for each worker is provided. The practice of "hot-bedding" should be avoided.
2. There is a minimum space between beds of 1 metre.
3. Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimised. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from 0.7 to 1.10 metres.
4. Triple deck bunks are prohibited.
5. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding.
6. Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria).
7. Facilities for the storage of personal belongings for workers are provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 metre of shelf unit.
8. Separate storage for work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.

D. Sanitary and toilet facilities

It is essential to allow workers to maintain a good standard of personal hygiene but also to prevent contamination and the spread of diseases which result from inadequate sanitary facilities. Sanitary and toilet facilities will always include all of the following: toilets, urinals, washbasins and showers. Sanitary and toilet facilities should be kept in a clean and fully working condition. Facilities should also be constructed of materials that are easily cleanable and ensure privacy. Sanitary and toilet facilities are never shared between male and female residents, except in family accommodation. Where necessary, specific additional sanitary facilities are provided for women.

Benchmarks

1. Sanitary and toilet facilities are constructed of materials that are easily cleanable.
2. Sanitary and toilet facilities are cleaned frequently and kept in working condition.
3. Sanitary and toilet facilities are designed to provide workers with adequate privacy, including ceiling to floor partitions and lockable doors.
4. Sanitary and toilet facilities are not shared between men and women, except in family accommodation.

Toilet facilities

Toilet arrangements are essential to avoid any contamination and prevent the spread of infectious disease.

Benchmarks

1. An adequate number of toilets is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons.
2. Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 metres from rooms/dormitories. Toilet rooms shall be located so as to be accessible without any individual passing through any sleeping room. In addition, all toilet rooms should be well-lit, have good ventilation or external windows, have sufficient hand wash basins and be conveniently located. Toilets and other sanitary facilities should be ("must be" in cold climates) in the same building as rooms and dormitories.

Showers/bathrooms and other sanitary facilities

Hand wash basins and showers should be provided in conjunction with rooms/dormitories. These facilities must be kept in good working condition and cleaned frequently. The flooring for shower facilities should be of hard washable materials, damp-proof and properly drained. Adequate space must be provided for hanging, drying and airing clothes. Suitable light, ventilation and soap should be provided. Lastly, hand washing, shower and other sanitary facilities should be located within a reasonable distance from other facilities and from sleeping facilities in particular.

Benchmarks

1. Shower/bathroom flooring is made of anti-slip hard washable materials.
2. An adequate number of handwash facilities is provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Handwash facilities should consist of a tap and a basin, soap and hygienic means of drying hands.
3. An adequate number of shower/bathroom facilities is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons.
4. Showers/bathrooms are conveniently located.
5. Shower/bathroom facilities are provided with an adequate supply of cold and hot running water.

E. Canteen, cooking and laundry facilities

Good standards of hygiene in canteen/dining halls and cooking facilities are crucial. Adequate canteen, cooking and laundry facilities and equipments should also be provided. When caterers are contracted to manage kitchens and canteens, special attention should be paid to ensure that contractors take into account and implement the benchmarks below, and that adequate reporting and monitoring mechanisms are in place. When workers can individually cook their meals, they should be provided with a space separate from the sleeping areas. Facilities must be kept in a clean and sanitary condition. In addition, canteen, kitchen, cooking and laundry floors, ceilings and walls should be made of easily cleanable materials.



Benchmarks

- 1. Canteen, cooking and laundry facilities are built in adequate and easy to clean materials.
- 2. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition.
- 3. If workers can cook their own meals, kitchen space is provided separate from sleeping areas.

Laundry facilities

Providing facilities for workers to wash both work and non-work related clothes is essential for personal hygiene. The alternative is for the employer to provide a free laundry service.

Benchmarks

- 1. Adequate facilities for washing and drying clothes are provided. Standards range from providing sinks or tubs with hot and cold water, cleaning soap and drying lines to providing washing machines and dryers.
- 2. When work clothes are used in contact with dangerous substance (for example, application of pesticide), special laundry facilities (washing machines) should be provided.

Additional issue
When workers are provided with facilities allowing them to individually do their laundry or cooking, it should be the responsibility of each worker to keep the facilities in a clean and sanitary condition. Nonetheless, it is the responsibility of the accommodation manager to make sure the standards are respected and to provide an adequate cleaning, disinfection and pest/vector control service when necessary.

Additional issue
When the employer provides family accommodation, it is best practice to provide each family with a private kitchen or the necessary cooking equipment to allow the family to cook on their own.

Canteen and cooking facilities

Canteen and cooking facilities should provide sufficient space for preparing food and eating, as well as conform to hygiene and safety requirements.

Benchmarks

- 1. Canteens have a reasonable amount of space per worker. Standards range from 1 square metre to 1.5 square metres.
- 2. Canteens are adequately furnished. Standards range from providing tables, benches, individual drinking cups and plates to providing special drinking fountains.
- 3. Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation.
- 4. Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying.
- 5. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are also equipped with a smooth durable washable surface. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures and all walls and ceilings have a smooth durable washable surface.
- 6. All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials.
- 7. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made of non-toxic materials. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures have a smooth, durable and washable surface.
- 8. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided.
- 9. Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.

F. Standards for nutrition and food safety

When cooking for a number of workers, hygiene and food safety are absolutely critical. In addition to providing safe food, providing nutritious food is important as it has a very direct impact on workers' productivity and well-being. An ILO study demonstrates that good nutrition at work leads to gains in productivity and worker morale, prevention of accidents and premature deaths and reductions in health care costs.¹⁰

Benchmarks

1. The WHO 5 keys to safer food or an equivalent process is implemented (see Box 6 below).
2. Food provided to workers contains an appropriate level of nutritional value and takes into account religious/cultural backgrounds; different choices of food are served if workers have different cultural/religious backgrounds.
3. Food is prepared by cooks. It is also best practice that meals are planned by a trained nutritionist.

Box 6 - Five keys to safer food

Keep clean

Wash your hands before handling food and often during food preparation.
Wash your hands after going to the toilet.
Wash and sanitise all surfaces and equipment used for food preparation.
Protect kitchen areas and food from insects, pests and other animals.

While most micro organisms do not cause disease, dangerous micro organisms are widely found in soil, water, animals and people. These micro organisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause food borne diseases.

Separate raw and cooked

Separate raw meat, poultry and seafood from other foods.
Use separate equipment and utensils such as knives and cutting boards for handling raw foods.
Store food in containers to avoid contact between raw and prepared foods.

Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous micro organisms which may be transferred onto other foods during food preparation and storage.

Cook thoroughly

Cook food thoroughly, especially meat, poultry, eggs and seafood.
Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer.
Reheat cooked food thoroughly.

Proper cooking kills almost all dangerous micro organisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.

Keep food at safe temperatures

Do not leave cooked food at room temperature for more than 2 hours.
Refrigerate promptly all cooked and perishable food (preferably below 5°C).
Keep cooked food piping hot (more than 60°C) prior to serving.
Do not store food too long even in the refrigerator.
Do not thaw frozen food at room temperature.

Micro organisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of micro organisms is slowed down or stopped. Some dangerous micro organisms still grow below 5°C.

Use safe water and raw materials

Use safe water or treat it to make it safe.
Select fresh and wholesome foods.
Choose foods processed for safety, such as pasteurised milk.
Wash fruits and vegetables, especially if eaten raw.
Do not use food beyond its expiry date.

Raw materials, including water and ice, may be contaminated with dangerous micro organisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Take care in selection of raw materials and implement simple measures such as washing.

Source: World Health Organization, Food Safety
www.who.int/foodsafety/publications/consumer/en/5keys_en.pdf

¹⁰ C. Wanjek (2005), "Food at Work - Workplace solutions for malnutrition, obesity and chronic disease", International Labour Organization, Geneva.

G. Medical facilities

Access to adequate medical facilities is important to maintain workers' health and to provide adequate responses in case of health emergency situations. The availability or level of medical facilities provided in workers' accommodation is likely to depend on the number of workers living on site, the medical facilities already existing in the neighbouring communities and the availability of transport. However, first aid must always be available on site.

First aid facilities

Providing adequate first aid training and facilities can save lives and prevent minor injuries becoming major ones.

Other medical facilities

Depending on the number of workers living on site and the medical services offered in the surrounding communities, it is important to provide workers with additional medical facilities. Special facilities for sick workers and medical services such as dental care, surgery, a dedicated emergency room can, for instance, be provided.

Benchmarks

1. A number of first aid kits adequate to the number of residents are available.
2. First aid kits are adequately stocked. Where possible a 24/7 first aid service/facility is available.
3. An adequate number of staff/workers is trained to provide first aid.
4. Where possible and depending on the medical infrastructures existing in the community, other medical facilities are provided (nurse rooms, dental care, minor surgery).

Box 7 - UK/HSE First Aid facilities

What should be in a first aid kit?

There is no standard list and it very much depends on the assessment of the needs in a particular workplace:

- a leaflet giving general guidance on first aid, for example HSE leaflet *Basic advice on first aid at work*
- individually wrapped sterile adhesive dressings (assorted sizes)
- two sterile eye pads
- four individually wrapped triangular bandages (preferably sterile)
- six safety pins
- six medium-sized (approximately 12 cm x 12 cm) individually wrapped sterile unmedicated wound dressings
- two large (approximately 18 cm x 18 cm) sterile individually wrapped unmedicated wound dressings
- one pair of disposable gloves.

What should be kept in the first aid room?

The room should contain essential first aid facilities and equipment. Typical examples of these are:

- a sink with hot and cold running water
- drinking water and disposable cups
- soap and paper towels
- a store for first aid materials
- foot-operated refuse containers, lined with disposable yellow clinical waste bags or a container for the safe disposal of clinical waste
- a couch with waterproof protection, clean pillows and blankets
- a chair
- a telephone or other communication equipment
- a record book for recording incidents where first aid has been given.

Source: UK Health and Safety Executive

H. Leisure, social and telecommunication facilities

Basic leisure and social facilities are important for workers to rest and also to socialise during their free time. This is particularly true where workers' accommodation is located in remote areas far from any communities. Where workers' accommodation is located in the vicinity of a village or a town, existing leisure or social facilities can be used so long as this does not cause disruption to the access and enjoyment of local community members. But in any case, social spaces should also be provided on site. Exercise and recreational facilities will increase workers' welfare and reduce the impact of the presence of workers in the surrounding communities. In addition it is also important to provide workers with adequate means to communicate with the outside world, especially when workers' accommodation is located in a remote location or where workers live on site without their family or are migrants. Consideration of cultural attitudes is important. Provision of space for religious observance needs to be considered, taking account of the local context and potential conflicts in certain situations.

Benchmarks

1. Basic collective social/rest spaces are provided to workers. Standards range from providing workers multi-purpose halls to providing designated areas for radio, TV, cinema.
2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, educational facilities.
3. Workers are provided with dedicated places for religious observance if the context warrants.
4. Workers have access to public phones at affordable/public prices (that is, not inflated).
5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated.

Box 8 - Examples of social/leisure facilities

In Qatar there is a newly built 170-hectare complex which accommodates contractors and more than 35,000 workers for a project run by a major oil company. At the heart of this complex, the recreation area includes extensive sport facilities, a safety-training centre, an outdoor cinema and a park. The purpose of those facilities goes beyond providing adequate accommodation to the large numbers of contractors and workers on this project but is designed to provide the same level of services as a small town. The accommodation complex has a mayor, as well as a dedicated welfare team which is responsible for the workers' welfare, cultural festivals and also acts as the community's advocates.

II. Managing workers' accommodation

Once the living facilities have been constructed and are operational, effective ongoing management of living facilities is essential. This encompasses issues such as the physical maintenance of buildings, security and consultation with residents and neighbouring communities in order to ensure the implementation of the housing standards in the long term.

A. Management and staff

Worker camps and housing facilities should have a written management plan, including management policies or plans on health and safety, security, living conditions, workers' rights and representation, relationships with the communities and grievance processes. Part of those policies and plans can take the form of codes of conduct. The quality of the staff managing and maintaining the accommodation facilities will have a decisive impact on the level of standards which are implemented and the well-being of workers (for instance on the food safety or overall hygiene standards). It is therefore important to ensure that managers are competent and other workers are adequately skilled. The manager will be responsible for overseeing staff, for ensuring the implementation of the accommodation standards and for the implementation of the management plans. It is important the accommodation manager has the corresponding authority to do so.

If the facility is being managed by a contractor, as is often the case, the expected housing and management standards should be specified in the relevant contract, and mechanisms to ensure that those standards are implemented should be set up. As part of this process, the accommodation manager (or contractor) should have a duty to monitor the application of the accommodation standards and to report frequently on their implementation to the client.

Benchmarks

1. There are management plans and policies especially in the field of health and safety (with emergency responses), security, workers' rights, relationships with the communities.
2. An appointed person with the adequate background and experience is in charge of managing the workers' accommodation.
3. If contractors are being used, there are clear contractual management responsibilities and monitoring and reporting requirements.
4. Depending on the size of the accommodation, there is a sufficient number of staff in charge of cleaning, cooking and of general maintenance.
5. Such staff are recruited from the local communities.
6. Staff have received basic health and safety training.
7. Persons in charge of the kitchen are trained in nutrition and food-handling and adequately supervised.

B. Charging fees for accommodation and services

Charging fees for the accommodation or the services provided to workers such as food or transport should be avoided where workers do not have the choice to live or eat anywhere else, or if deemed unavoidable, should take into account the specific nature of workers' accommodation. Any charges should be transparent, discussed during recruitment and specified in workers' contracts. Any such charges should still leave workers with sufficient income and should never lead to a worker becoming indebted to an employer.

Benchmarks

1. When fees are charged, workers are provided with clear information and a detailed description of all payments made such as rent, deposit and other fees.
2. When company housing is considered to be part of workers' wages, it is best practice that workers are provided with an employment contract clearly specifying housing arrangements and regulations, in particular rules concerning payments and fees, facilities and services offered and rules of notice.
3. When fees are charged, the renting arrangements are fair and do not cost the worker more than a small proportion of income and never include a speculative profit.
4. Food and other services are free or are reasonably priced, never above the local market price.
5. The provision of accommodation or other services by employers as a payment for work is prohibited.

Additional issue

To avoid that fair renting arrangements turn into unfair ones, any deposit of advance should be set at a reasonable level and it is best practice that renting prices include a fixed fee covering the water needed and the use of the energy required to the functioning of the heating/cooling/ventilation/cooking systems. However, in such cases it might be necessary to raise workers' awareness to ensure that workers will use the facilities responsibly, particularly in areas where water is scarce.

C. Health and safety on site

The company or body in charge of managing the workers' accommodation should have the prime responsibility for ensuring workers' physical well-being and integrity. This involves making sure that the facilities are kept in good condition (ensuring that sanitary standards or fire regulations are respected for instance) and that adequate health and safety plans and standards are designed and implemented.

Benchmarks

1. Health and safety management plans including electrical, mechanical, structural and food safety have been carefully designed and are implemented.
2. The person in charge of managing the accommodation has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and other important casualties.
3. An adequate number of staff/workers is trained to provide first aid.
4. A specific fire safety plan is prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills.
5. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk and concerns relating to HIV/AIDS and of other health risk-related activities is provided to workers. It is best practice to develop a clear policy on this issue.
6. Workers have access to adequate preventive measures such as contraception (condoms in particular) and mosquito nets.
7. Workers have easy access to medical facilities and medical staff. Where possible, female doctors/nurses should be available for female workers.
8. Emergency plans on health and fire safety are prepared. Depending on the local context, additional emergency plans are prepared as needed to handle specific occurrences (earthquakes, floods, tornadoes).

D. Security of workers' accommodation

Ensuring the security of workers and their property on the accommodation site is of key importance. To this end, a security plan must be carefully designed including appropriate measures to protect workers against theft and attacks. Policies regarding the use of force (force can only be used for preventive and defensive purposes in proportion to the nature and the extent of the threat) should also be

carefully designed. To implement those plans, it may be necessary to contract security services or to recruit one or several staff whose main responsibility is to provide security to safeguard workers and property. Before making any security arrangements, it is necessary to assess the risks of such arrangements to those within and outside the workers' accommodation and to respect best international practices, including IFC PS4 and EBRD PR4 and applicable law.¹¹ Particular attention should be paid to the safety and security of women workers.

Benchmarks

1. A security plan including clear measures to protect workers against theft and attack is implemented.
2. A security plan including clear policies on the use of force has been carefully designed and is implemented.
3. Security staff have been checked to ensure that they have not been implicated in any previous crimes or abuses. Where appropriate, security staff from both genders are recruited.
4. Security staff have a clear mandate and have received clear instruction about their duties and responsibilities, in particular their duties not to harass, intimidate, discipline or discriminate against workers.
5. Security staff have received adequate training in dealing with domestic violence and the use of force.
6. Security staff have a good understanding about the importance of respecting workers' rights and the rights of the communities.
7. Body searches are only allowed in specific circumstances and are performed by specially trained security staff using the least-intrusive means possible. Pat down searches on female workers can only be performed by female security staff.
8. Security staff adopt an appropriate conduct towards workers and communities.
9. Workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff.

¹¹ See for instance the Voluntary Principles on Security and Human Rights, www.voluntaryprinciples.org/principles

E. Workers' rights, rules and regulations on workers' accommodation

Freedoms and human rights of workers should be recognised and respected within their living quarters just as within the working environment. House rules and regulations should be reasonable and non discriminatory. It is best practice that workers' representatives are consulted about those rules. House rules and regulations should not prevent workers from exercising their basic rights. In particular, workers' freedom of movement needs to be preserved if they are not to become effectively "trapped". To this end it is good practice to provide workers with 24/7 access to the accommodation and free transport services to and from the surrounding communities. Any restriction to this freedom of movement should be limited and duly justified. Penalties for breaking the rules should be proportional and implemented through a proper procedure allowing workers to defend themselves and to challenge the decision taken. The relationship between continuing employment and compliance with the rules of the workers' accommodation should be clear and particular attention should be paid to ensure that housing rules do not create indirect limitation of the right to freedom of association. Best practice might include a code of conduct relating to the accommodation to be signed together with the contract of employment.

Box 9 - Dole housing plantation regulation in Costa Rica

In every plantation there is an internal accommodation regulation that every worker is required to sign together with his/her employment contract. That document describes the behaviour which is expected from workers at all times and basic rules such as the prohibition of alcohol and the interdiction to make noise after a certain time at night. In case there is any problem concerning the application of those internal rules, a set of disciplinary procedures which have been designed with the workers' representatives can be enforced. Workers are absolutely free to enter or leave the site and do not have any restrictions in relation to accessing their living quarters. Families are not allowed in the living quarters unless they have been registered for a visit.

Benchmarks

1. Restriction of workers' freedom of movement to and from the site is limited and duly justified. It is good practice to provide workers 24/7 access to the accommodation site. Any restrictions based on security reasons should be balanced by the necessity to respect workers' freedom of movement.
2. Where possible, an adequate transport system to surrounding communities is provided. It is good practice to provide workers with free transportation to and from local communities.
3. Withholding workers' ID papers is prohibited.
4. Freedom of association is expressly respected. Provisions restricting workers' rights on site should take into account the direct and indirect effect on workers' freedom of association. It is best practice to provide trade union representatives access to workers in the accommodation site.
5. Workers' gender and religious, cultural and social backgrounds are respected. In particular, workers should be provided with the possibility of celebrating religious holidays and observances.
6. Workers are made aware of their rights and obligations and are provided with a copy of the internal workers' accommodation rules, procedures and sanction mechanisms in a language or through a media which they understand.
7. Housing regulations, including those relating to allocation of housing, should be non-discriminatory. Any justifiable discriminatory rules – for example all-male dormitories – should be strictly limited to the rules which are necessary to ensure the smooth running of the worker camp and to maintain a good relationship with the surrounding communities.
8. Where possible, visitor access should be allowed.
9. Decisions should be made on whether to prohibit alcohol, tobacco and third party access or not from the camp and the relevant rules should be clearly communicated to all residents and workers.
10. A fair and non-discriminatory procedure exists to implement disciplinary procedures including the right of workers to defend themselves (see also next section).



Appendix 17: Guidelines for erection of scaffolding and safe use of temporary ladders

IS 3696 Guidelines for Proper Erection of Scaffolding and Safe Use of Temporary Ladders

1. Proper Erection of Scaffolding

Ensure scaffolds are erected on firm and level ground with base plates and sole boards.
Standards (vertical posts) must be plumb and secured with base jacks.
Install ledgers and transoms at right angles and tie scaffolds to the structure at intervals.
Fully deck platforms with sound planks, free from splits and defects.
Install guardrails (1 m high), mid-rails (0.5 m high), and toe boards (minimum 150 mm).
Provide safe access through ladders or stair towers; never climb cross-braces.
Provide diagonal bracing to prevent sway and ensure stability.
Do not exceed load capacity; consider both workers and materials.
Inspect scaffolds daily and after modifications, storms, or impacts.
Use scaffold tags: Green = Safe, Red = Unsafe.

2. Safe Use and Installation of Temporary Ladders

Ladders must conform to IS 3696 (Part 2): 1991 or equivalent standards.
Position ladders at a 4:1 angle (1 m horizontal for every 4 m vertical rise).
Secure ladders at top and bottom to prevent movement or slipping.
Ladders must extend at least 1 m above the landing point.
Allow only one worker at a time unless designed for multiple users.
Always face the ladder while climbing/descending; maintain 3-point contact.
Do not use makeshift, damaged, or broken ladders.
Inspect ladders daily before use.

Note: Scaffolds and ladders must be erected, inspected, and approved by a competent/qualified person before use.

Appendix 18: SoP on Working on Heights

Working Instruction / SOP on Working at Heights

1. Definition of Working at Heights

Any activity where a person is at risk of falling from one level to another and sustaining injury is defined as working at heights. This generally applies when work is conducted at a height of 1.8 meters or more above ground or a lower level, or where a fall hazard exists.

2. Personal Protective Equipment (PPE)

- Full body safety harness with shock-absorbing lanyard or self-retracting lifeline. Anchorage points rated for fall arrest, positioned above the worker where possible. Safety helmets with chin straps to prevent displacement during a fall.
- Non-slip safety footwear with proper grip.

3. Use of PPE

- Harness must be worn snugly, with chest and leg straps properly fastened.
- Lanyards should always be attached to approved anchorage points before commencing work. Workers must maintain 100% tie-off when moving between positions.
- Inspect PPE before and after each use; defective PPE must not be used.

4. Inspection of PPE and Fall Arrest Systems

All PPE and fall arrest systems must be inspected daily by the worker before use and weekly by a competent safety supervisor. Inspections must check for wear, cuts, fraying, corrosion, damaged buckles, or deformation. Any defective or expired equipment must be immediately withdrawn from service and replaced.

5. Monitoring and Supervision

Supervisors must continuously monitor activities carried out at heights to ensure compliance with safety procedures. All workers engaged in working at heights must receive training on correct use of PPE, emergency procedures, and safe work practices. Records of inspections, training, and equipment maintenance must be maintained and made available for review.

6. Use and Installation of Temporary Ladders

- Ladders must comply with IS 3696 (Part 2): 1991 or equivalent standards.
- Set ladders at the correct 4:1 angle (1 m horizontal distance for every 4 m height). Secure ladders at both the top and bottom to prevent slipping or displacement.
- Ensure ladders extend at least 1 m above the landing or platform level.
- Maintain three-point contact (two hands and one foot, or two feet and one hand) at all times.
- Do not overload ladders; only one worker should be on a ladder at a time unless designed for more users.
- Do not use damaged, makeshift, or unstable ladders.
- Inspect ladders daily before use; defective ladders must be removed from service.


Note: No worker is permitted to work at height without adequate training, proper PPE, safe access via scaffold or ladder, and confirmation of equipment safety by a competent person.

Photographs of Public Consultation at 220/132kV Baghjap & Junebil Site in Morigaon



Appendix 20: Details of Minutes of Meeting of Consultation under Transmission Line

A	<i>Project Title:</i>	AISTSEP Phase II		
B	<i>Stakeholder Title:</i>	Community Members/ Local Villagers		
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>				
C	<i>Basic Details:</i>			
	Location:	Village: Baghjap	Gram Panchayat: Baghjap	
	Date:	08/01/2026	Block: Mayang	
D	<i>Attended By</i>			
	SNo.	Name	Designation	Gender
	1	Jagadish Deka	Village Resident	M
	2	Kartik Nath	Village Resident	M
	3	Bipul Das	Village Resident	M
	4	Tapan Deka	Village Resident	M
	5	Mina Sarma	Village Resident	F
	6	Champa Kalita	Village Resident	F
	7	Dipu Sharma	Village Resident	M
	8	Nirmala Deka	Village Resident	F
9	Arup Deka	Village Resident	M	
E	<i>Purpose of Consultation</i>			
	Collection of information regarding baseline socio-economic condition			
F	<i>Key Points Discussed:</i>			
	<ul style="list-style-type: none"> ● The total number of households live in this village are approximately mixed community population observed in this village. ● Agriculture is the primary occupation. Paddy, maize and vegetables are the crops they used to cultivate in a yearly manner. In the off-season, farmers work as daily wage labours in the local and outside market. ● Anganwadi, Lower primary and Upper Primary school available in the Baghjap Village. Nearest collage available at Jagi Road Town (7km). ● The primary source of water is handpumps. There are 8-10 handpumps available in village installed by the government but only 6-7 are in working condition. 6-7 government wells also reported from the village which is generally used for irrigation only. Residents also have personal deep boring and handpumps installed in their own house. ● Approx. 70% household have toilets in their houses. Toilets were made using the grant received under Swaccha Bharat Mission. The toilets made are not good in design and functioning that's why they do not use toilets. Monitoring of toilet construction was done by Mukhiya Construction of rest of the toilets will be done after the grant of funds. ● 3-4 SHG reported in the village. Each SHG consists of approx. 10-12 women they do small savings and give the financial loan to needy women ● Local people were briefed about the proposed project and informed that proposed TL alignment may traverses through this village area. Local people have raised their concern about practicing agriculture below transmission line tower. They are informed that manually agriculture can be undertaken below the transmission tower. During consultation, some of the villagers have raised concern on devaluation of land falling in transmission lines. They are also informed that compensation will be provided of the land falling within the RoW of transmission lines will be provided to those affected land owners towards diminution of land value. ● At the time of consultation, villagers wanted to know whether compensation would be given to only those giving land for the project, or for crop damage. They are informed that compensation amount would be given to them whose land will fall in transmission line RoW. Also, compensation would be provided, in-case, there are any damages to standing crop. ● During consultation, local people have expressed their hope that, this project will improve electricity supply condition in this area, as presently, load shedding is frequent. They are told that, this is transmission line project, and therefore, it will not directly improve electricity condition in this area. However, in future, it will help to improve electricity supply, once, this substation is connected with existing distribution substation. ● Villagers have informed that all the project affected land owners to be informed and consulted before beginning of the project construction work. ● During consultation, local people were informed about the project site camp to be set up in this area. They 			

	<p>were also informed about possibility of workers (mainly skilled) coming to this area and stay for some time. Local community members have not shown any objection to this proposal. Some of the members have pointed that, it will improve economic transaction of the local market, and will further boost economy.</p> <ul style="list-style-type: none"> ● Lack of unemployment is a major concern of the villagers. During consultation, local people have shown interest to be engaged in this project, as it will provide them livelihood opportunities.
G	<p>Photos:</p> 


A	Project Title:	AISTSEP Phase II		
B	Stakeholder Title:	Community Members/ Local Villagers		
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>				
C	Basic Details:			
	Location:	Village: Junbil & Banthai Gaon	Gram Panchayat: Baghjap	
	Date:	08/01/2026	Block: Mayang	
D	Attended By			
	SNo.	Name	Designation	Gender
	1	Balen Hazarika	Village Resident- Junbil	M
	2	Utpal Sharma	Village Resident- Junbil	M
	3	Madan Doley	Village Resident- Junbil	M
	4	Deepjyoti Sharma	Village Resident- Junbil	M
	5	Rubi Kalita	Village Resident- Junbil	F
	6	Manoj Sharma	Village Resident- Banthai Gaon	M
	7	Kabita Deka	Village Resident- Banthai Gaon	F
	8	Kusum Devi	Village Resident- Banthai Gaon	F
	9	Karma Deka	Village Resident- Banthai Gaon	M
	10	Abani Kalita	Village Resident- Banthai Gaon	M
	11	Balen Doley	Village Resident- Banthai Gaon	M
	12	Tapan Deka	Village Resident- Banthai Gaon	M
E	Purpose of Consultation	Collection of information regarding baseline socio-economic condition		
F	Key Points Discussed:	<ul style="list-style-type: none"> ● SC and ST has the majority of population live in the village. ● Agriculture is the primary occupation of villagers. Paddy and Maize are the crops they used to cultivate in their fields. In the off-season, farmers work as daily wage labors in the local and outside market. ● Anganwadi is available in the Junbil Village. Regular vaccination and cooked food given to babies. Nearest collage available at Jagi Road Town (7km). ● The primary source of water is handpumps. There are 15-16 handpumps available in village installed by the government but only 12-13 are in working condition. 8-10 government wells also reported from the village. Many residents of this village have their own hand pump or well in their house. ● PDS Scheme – Rice are distributed by the PDS dealer. 90% household has a red card and all families get their ration from the dealer. Scholarship schemes - School going children are availing this facility from their school. ● Approx. 80% household have toilets in their houses. Toilets were made using the grant received under Swaccha Bharat Mission. The toilets made are not good in design and functioning that's why they do not use toilets. Monitoring of toilet construction was done by Mukhiya and their team. ● 3-4 SHG reported in the village. Each SHG consists of approx. 10-12 women they do small savings and give the financial loan to needy women 		

	<ul style="list-style-type: none"> ● Need of villagers: Villages need pucca roads, drinking water facility, a community hall in their village. ● Villagers were happy with the transmission line project. They have not shown any objection regarding this project. Their main concern was timely disbursement of compensation to project affected people. They have suggested for disbursement of compensation, before beginning of project construction work. Some of them have also suggested to directly transfer compensation amount to project affected people's bank account, as it will be transparent. ● At the time of consultation, villages also enquired about the actual position of the transmission line so that they can assess whose land is going to be affected by this project. Those villagers who practice agriculture in their small patch of land requested that transmission line should not pass from their land because that small land patch is the only source of income for them.
G	<p>Photos:</p> 

A	Project Title:	AISTSEP Phase II		
B	Stakeholder Title:	Community Members/ Local Villagers		
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>				
C	Basic Details:			
	Location:	Village: Kharbeel	Gram Panchayat: Baghjap	
	Date:	07/02/2026	Block: Mayang	
D	Attended By			
	SNo.	Name	Designation	Gender
	1	Madhab Deka	Village Resident	M
	2	Hriday Das	Village Resident	M
	3	Purnima Kalita	Village Resident	F
	4	Hiren Kalita	Village Resident	M
	5	Lakhi Kalita	Village Resident	F
E	Purpose of Consultation	Collection of information regarding baseline socio-economic condition		
F	Key Points Discussed:	<ul style="list-style-type: none"> ● Tiwa and mixed tribe population live in the village. ● Agriculture is the prime occupation of the villagers. Paddy and Maize are the crops they used to cultivate in their fields. Some farmers grow vegetables also. In the off-season, farmers work as daily wage labours in the local and outside market. ● Primary health centre is not available in the village. Primary Health Centre available at Jagi Road (7 km) is used for health related requirements. For better health care service, they travel to District headquarter Morigaon (16km) and State capital Guwahati (60 km). ● The primary source of water is handpumps. There are 6-7 handpumps available in village installed by the government but only 4-5 are in working condition. 5-6 government wells also reported from the village. ● Toilets were available in approximately 80% households' toilets in this village. Toilets were made using the grant received under Swaccha Bharat Mission. Monitoring of toilet construction was done by Mukhiya and their teams. Construction of rest of the toilets will be done after the grant of funds. The fund for construction 		

	<p>of toilets was directly given to the resident in their bank account. Toilet design is not good so villagers generally don't use the toilet. Children, ladies and old age peoples use the toilet.</p> <ul style="list-style-type: none"> • Need of villagers: Villages need pucca roads, drinking water facility, a community hall in their village. • During consultation, villagers wanted to know whether all the project affected persons in this village will be consulted before project construction work. It was informed to them that all the project affected persons will be informed timely about the project work. Some of the community members asked about the valuation method to be used for compensation. Is it government rate or market rate? • At the time of consultation, villages also enquired about the actual position of the transmission line so that they can assess whose land is going to be affected by this project. Those villagers who practice agriculture in their small patch of land requested that transmission line should not pass from their land because that small land patch is the only source of income for them. • At the time of consultation, some villagers have suggested that transmission towers should not be constructed at the edge of settlement area, because this will restrict the villagers from expansion of houses in their future generation. • Proposal for labour camp was discussed with villagers, where villagers have not raised any objection. However, they have suggested to engage more local youth.
G	<p>Photos:</p>
	

A	Project Title:	AISTSEP Phase II	
B	Stakeholder Title:	Community Members/ Local Villagers	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic Details:		
	Location:	Village: Bangfor & Tegheria	Gram Panchayat: Baghjap
	Date:	10/02/2026	Block: Mayang
D	Attended By		
	SNo.	Name	Designation
	1	Khagen Deka	Village Resident- Bangfor
	2	Kusum Divi	Village Resident- Bangfor
	3	Dharani Deka	Village Resident- Bangfor
	4	Sumi Deka	Village Resident- Bangfor
	5	Lavita Das	Village Resident- Bangfor
	6	Lakhaya Doley	Village Resident- Bangfor
	7	Rupjyoti Kalita	Village Resident- Bangfor
	8	Niren Sharma	Village Resident- Bangfor
	9	Moni Deka	Village Resident- Bangfor
	10	Nirmali Nath	Village Resident- Bangfor
	11	Gitanjali Kumari	Village Resident- Tegheria
	12	Gobinda Deka	Village Resident- Tegheria
	13	Mintu Singh	Village Resident- Tegheria
	14	Banani Das	Village Resident- Tegheria
	15	Kuldip Kalita	Village Resident- Tegheria
	16	Dharati Deka	Village Resident- Tegheria
	17	Mridul Kalita	Village Resident- Tegheria
	18	Pabitra Doley	Village Resident- Tegheria
	19	Rekha Doley	Village Resident- Tegheria

	20	Sunitjyoti Bordoloi	Village Resident- Tegheria	M
	21	Jugal Pator M	Village Resident- Tegheria	M
E	<i>Purpose of Consultation</i>			
	Collection of information regarding baseline socio-economic condition			
F	<i>Key Points Discussed:</i>			
	<ul style="list-style-type: none"> ● Tiwa tribe population live in the village which falls under state legislative law. ● Agriculture is the primary occupation of villagers. Paddy is grown by the village farmers. Some farmers also grow vegetables. In the off-season, farmers work as daily wage labours. Villagers go to Morigaon and Guwahati in search of work. ● One Primary school and one secondary school is available in the village. Nearest college available at Morigaon (20 km). one kendriya vidyalaya is also available at the neighbor village in Tegheria. ● One Primary health centre is available in the village. One HPCL Hospital is also available at their neighbor village Tegheria. For better health care service, they travel to District headquarter Morigaon (16km) and State capital Guwahati (60 km). ● The primary source of water is handpumps. There are 15-20 handpumps available in village installed by the government. ● Toilets were available in approximately 75% households' toilets in this village. Toilets were made using the grant received under Swaccha Bharat Mission. Monitoring of toilet construction was done by Mukhiya and their teams. Construction of rest of the toilets will be done after the grant of funds. The fund for construction of toilets was directly given to the resident in their bank account. ● 9-10 Mahila Samiti reported in the village. Each Mahila Samiti consists of approx. 10-15 women. They do small savings and give the financial loan to needy women. ● Need of villagers: Villages need irrigation facility and drinking water facility in their village. ● During consultation, villagers wanted to know whether all the project affected persons in this village will be consulted before project construction work. It was informed to them that all the project affected persons will be informed timely about the project work. Some of the community members asked about the valuation method to be used for compensation. Is it government rate or market rate? ● Some of the villagers wanted to know compensation will be provided for felling of privately owned trees. They are informed that compensation will be provided in-case privately owned trees are felled. ● During consultation, villagers have suggested to construct transmission line during non-cropping season, as it will avoid damages to standing crop. ● Community people have informed that both male and female workers are available in this village and they can be engaged during construction phase of the project work. 			
G	<i>Photos:</i>			
				

Some Photographs of the Consultations Conducted During the ESIA-ESMP Report Preparation Visit



Meeting with Panchayat Pradhan, Baghja Panchayat (Photo 2)



Meeting with Electrical Eng. Of TATA Semi Conductor Plant



220kV Substation Location Inside TATA Semi Conductor Plant



Public Consultation in Teqheria Village under TL 220kV TATA Line



Junbeel, Assam, India
567c+877, Junbeel, Assam 782411, India
Lat 26.163132° Long 92.220848°
Tuesday, 10/02/2026 02:10 PM GMT +05:30



Meeting with Head Teacher of Bangfor Boro LP School



Meeting with Head Teacher of Tegheria LP School

Tower Location 1A, 1B and 2 of LILO Line



Starting Gantry point from Substation for LILO Line



Starting point from Substation for TATA Line



Tower Location no 21 of TATA Line



Tower Location no 35 of TATA Line




Tower Location no 4, 4A and 4B of LILO Line



Tower Location no 22A, 22B and 22 of LILO Line




Appendix 21: Attendance Sheet and Photographs of Consultation with Staff Residing in existing quarters of Baghjap Substation



Assam Intra State Transmission System Enhancement Project (Phase II)
- AIB Funded

Power Distribution Strengthening Component



ATTENDANCE SHEET					
TOPIC: <u>Consultations with staff and family members</u>					Date: <u>03/01/2026</u>
LOCATION: <u>Baghjap Sub-station, Morigaon</u>					
S.No	Name	Gender	Address/ Organization	Contact No.	Signature
1	Bhaskar Baruah	M	132KV Baghjap	9406316281	<i>[Signature]</i>
2	Jyotshman Gogoi	M	"	7002021953	<i>[Signature]</i>
3	Santosh Phukan	M	"	9101631651	<i>[Signature]</i>
4	Deepraj Karoly	M	"	9212679097	<i>[Signature]</i>
5	Aniruddha Das	M	"	6000293521	<i>[Signature]</i>
6	Tapash Anchi	M	"	6002516550	<i>[Signature]</i>
7	Naba Tumung	M	"	9327955270	<i>[Signature]</i>
8	Miha Tumung	F	"		<i>[Signature]</i>
9	Shruti Tumung	F (wid)	"		<i>[Signature]</i>
10	Rama Borah	M	"	7002425565	<i>[Signature]</i>
11	June Sidi Borah	F	"		
12	Rinu Borah	F	"		
13	Abhinav Borah	M (wid)	"		
14	Shansing Rongpi	M	"	7399137647	<i>[Signature]</i>
15	Mekhi Teronpi	F	"		<i>[Signature]</i>
16	Sanjay Rongpi	M (wid)	"		
17	Cherdi Rongpi	F (wid)	"		
18	Reema Rongpi	F (wid)	"		
19	Changmi Rongpi	F (wid)	"		
20	Siva Das	M	"	9822465613	<i>[Signature]</i>
21	Anita Das	F	"		<i>[Signature]</i>
22	Huoni Das	F	"		<i>[Signature]</i>
23	Uday Das	M (wid)	"		



Appendix 22: Consultation with PIU Officials, AEGCL





Appendix 23: Grievance Register Format (Sample)

Grievance Register	
Date of Grievance Recorded	
Grievance Recorder	
Grievance submitted through (mode)	
Name of Complainant	
Complainant Preferred Contact	
Complainant Address	
Type of Grievance	
Describe Grievance	
Date of Grievance Occurrence	
Date of Acknowledgement	
Mode of Acknowledgement	
Brief Outline of Proposed Resolution	
Action Taken for resolution	
Action Taken on	
Outcome	
Outcome communicated to PAH on	
Status Update	
Mode of Complainant Update	
Acknowledged by	
Date Closed	
Days to Close Grievance	
Date of Grievance Received to Tier-2	
Date of GRC meeting (2ndTier)	
Estimated Time for Resolution	
Action Taken	
Action Taken on	
Outcome	
Outcome communicated to PAH on	
Status Update	
Mode of Complainant Update	
Acknowledged by	
Date Closed	
Days to Close Grievance	

Note: The Contractor shall ensure that while preparing the C-ESMP, the proposed form templates are aligned with those utilized by the Project to maintain consistency and compatibility.



Annexure 24: Sample Guidelines/Checklist for developing C-ESMP

Contractors shall develop a "Construction Environment and Social Management Plan (CESMP)", which shall include the following aspects, but not limited to, before commencement of physical works:

➤ Describe the working Areas

- identifying all construction activities, and working areas
- schedule,
- access routes,
- anticipated traffic volumes,
- construction methods to be used,
- temporary construction facilities needed and their location
- prohibitions on fishing, hunting, poaching, protected areas etc.
- identify and list down numbers and type of trees to be cut/ trimmed
- a wildlife identification and rescue protocol including an emergency fauna rescue and handling procedure, including contacts of forest and protected area management, nearest veterinary etc.
- measures to avoid the spread of invasive species including the installation of washing stations for the pressure washing of vehicles at the site entrance, and
- a Chance Find Procedure for physical cultural resources in accordance with the ECOP.

➤ Contractors' facilities

- Contractor to locate all temporary construction facilities within the boundaries of Baghjap SS land;
- But for overnight accommodation of workers, Contractor will identify and provide space in existing properties off-site.
- If other public or private land is required for temporary construction facilities due to lack of space within Baghjap SS lands. Such facilities to be located least 500m from residential property and outside of biodiversity sites and physical cultural resources.
- Lay-down and storage areas that are not potential pollution sources may be located minimum of 50m distant but must be away from residential properties and not block accesses or road use.
- No land requiring clearance of vegetation/supporting forest habitat is to be used

➤ Contractors to provide all basic requirements to workers in temporary living spaces

- beds and beddings,
- mosquito nets,



- artificial lights,
- natural lights,
- windows and ventilation,
- fans,
- emergency exits,
- fire-fighting equipment,
- kitchen and dining halls,
- mobile charging points,
- toilets and washing facilities,
- potable drinking water,
- recreational space etc.

➤ **CESMP's sub-plans**

- Labour Management Plan (refer Appendix 12)
- a Materials Management Plan (MMP) and a Pollution Prevention Plan (PPP) covering:
 - dust and emissions to air management,
 - noise and vibrations management,
 - protection of water resources and
 - environmentally sound and safe storage,
 - bio-diversity conservation
 - protection of soil and water resources from contamination
 - construction waste management
 - use and disposal of all fuels, chemicals and oils on-site
- Emergency Preparedness and Response Plan - Fire; Electrocutation; Oil, Chemical and Gas leaks or spills; Earthquake, Flooding, Pandemic
- Spill clean-up and remediation.
- Construction Waste Management Plan (CWMP)
- No piling or blasting is to be undertaken for construction.
- sound handling and management of:
 - Food waste which can be composted to reduce the need for landfill
 - Plastic waste – prioritize reuse and recycling
 - Other domestic waste - to be recycled
 - Demolition waste - can be reused during construction
 - Metals – can be recycled



- Wood – can be recycled
- Hazardous waste including used oil which can be reused
- Liquid waste (wastewater) Interstate movement of construction waste will need to be factored, given the lack of suitably engineered and licensed solid and hazardous waste facilities within Tripura.

➤ **Social Management Program (SMP) [also refer Appendix 12]**

- As part of the C-ESMP, Contractor shall devise a Social Management Sub-plan
- Addressing concerns of local communities
- Ensure compliance with Angolan regulatory requirements
- Build and maintain trust among stakeholders

Components of the Social Management Program

- Stakeholder engagement and communication plan
 - Regular consultations with local communities
 - Transparent communication channels
- Impact assessment and mitigation strategies
 - Identification of potential social impacts
 - Development of mitigation measures
- Monitoring and evaluation mechanisms
 - Periodic reviews of program effectiveness
 - Feedback collection from stakeholders

Implementation Strategy

- Coordination with relevant authorities and organizations
- Allocation of resources for program execution
- Training for project teams on social responsibility

Expected Outcomes

- Enhanced community relations and trust
- Compliance with legal and regulatory standards
- Sustainable operation of the upgraded substation

➤ **Occupational health and safety risks**

- Contractors to comply with Government of Angola's Labour Regulations;
- Develop Labour Management Sub-plan addressing:
 - Policies on Human Resources, EHS, Environment Protection and Social Responsibility
 - Adherence to ISO certifications (as above)
 - Workers' Appointment, Benefits, Facilities, Retrenchment, etc
 - Engagement Employment of migrant workers,
 - Sanitation and welfare,



- Gender-based violence/sexual exploitation, abuse, and harassment prevention etc.
- Contractors to undertake facilitated H&S risk assessment;
- Facilitated workshop will involve the design and construction team of the contractors and SS operational staff.
- **Devise a H&S Plan as a sub-plan to the CESMP;**
- H&S Plan** will include:
 - **Safety Training Program**, which will consist of:
 - ✓ Safety Induction
 - for all WORKERS prior to being allowed to work on site;
 - all VISITORS and PROJECT WORKERS when within the working area, and
 - ✓ periodic safety training refreshers, possibly once every six months.
 - ✓ all sub-contractor workers required to participate;
 - ✓ only trained workers (incl. subcontractor workers), must undertake certain activities such as working at height, working in confined spaces, working with electricity, etc.
 - ✓ Workers must have attended such training before they are involved in relevant works and the contractor must either offer an internal training course or organize for attendance at an external specialist training course.
 - ✓ Workers must have a training record of attending a suitable training course.
 - ✓ Untrained workers will not be permitted to work at height, enter confined spaces, work with live electricity etc.
 - ✓ Medical Check-Up/Health Surveillance
 - ✓ Regular Safety Meetings
 - Conduct Regular Safety Inspections
 - Signage – devise, install at various places
 - Lighting
 - Ensure integrity of Equipment
 - Site Audit
 - Personal Protective Equipment (PPE)
 - ✓ will be provided to workers before start of work at no cost to ALL the workers.

- ✓ recommended PPEs according to Hazard in IFC EHS Guidelines on OHS including safety shoes, helmets, goggles, earmuffs, and face masks
- ✓ ensure PPEs are worn at all times during working hours, with strict disciplinary actions for any non-compliance.
- Work Zone Noise Levels
- Electricity
 - ✓ only licensed electricians permitted to work;
 - ✓ live lines will be deactivated and properly grounded;
 - ✓ checked and certified in writing by the contractor's H&S Officer;
 - ✓ PPEs for working at heights
- **Emergency Preparedness and Response Sub-Plan**
 - will cover health emergency, work-related accident including fire, electrocution, traffic accident, accident involving the community, natural disaster including flooding, earthquake, virus outbreak, etc.
 - will include communication systems/ protocols to report an emergency
 - to be developed in consultation with local emergency services with adequate fire and first aid first-responders based on the construction site to facilitate immediate response.
 - provide readily available first-aid for workers
 - provide an ambulance for more serious cases
 - make arrangements for a doctor on call and nearest Health Center and/or Hospital for emergency cares of workers
 - regular drills will be required involving all workers to prepare for an incident.
 - Contractors will set up an accident reporting system for any health and safety incidents (near miss, minor, lost time, fatal) involving workers or community
 - to be reported to AEGCL within 24 hours of occurrence (PMU to immediately report to AIIB)
 - with a response plan detailing the incident and how its re-occurrence will be avoided.
 - EPC/ PMU/ PMC to then report any lost time or fatal incidents to AIIB within 48 hours.
 - Record of all incidents and response taken should include date, time, details of incident, treatment given and outcome, and lessons learnt for the future.
 - Contractors will ensure all workers are covered by insurance to pay out in the event of a disability or fatality.



- Emergency contact number and details for medical, fire, etc. are to be displayed in all construction sites.

➤ **Worker Code of Conduct**

As part of the CESMP, Contractors will prepare, with guidance document, a Worker Code of Conduct prior to site establishment, and its information in the form of video/ brochure/ leaflet be distributed to all workers during induction addressing culturally acceptable practices etc. and address the following aspects:

- Zero tolerance in respect of health and safety
- Requirement on always wearing PPE on site
- Zero tolerance of bribery or corruption
- Respect for local community and customs, avoiding community conflict situations especially in tribal areas
- Zero tolerance of illegal and unacceptable activities/ behaviour - prostitution; gender-based violence/sexual exploitation, abuse, and harassment; illegal sale or purchase of alcohol; sale, purchase, or consumption of drugs; gambling; fighting, etc.
- Alcohol and drugs policy and testing regime
- Role of workers in good housekeeping
- Role of workers in maintaining good hygiene including COVID-19 measures e.g., social distancing
- Respect of wildlife and the environment
- Description of disciplinary measures for infringement of the code of conduct and other employer rules (e.g., immediate removal from site, fine etc.)
- Contractors to familiarize and ensure their workers are aware of the cultural requirements of the areas in which works are undertaken, especially TTAADC and minority community villages, and reflect this in the code of conduct.
- Contractor to consider the use of security personnel to ensure workers comply with the code of conduct especially adjacent to the international border and in other areas with a higher conflict risk.
- For security purposes, escorts from the local police may be requested if any conflict situation arises or is assessed as hostile.
- Contractors will prepare with guidance for health
 - HIV/ AIDS and any other Communicable diseases
 - information video/brochures/leaflets to be distributed to all workers during induction, covering factual health & behavioral change issues around the transmission and infection of HIV/AIDS and other communicable diseases.
- Contractors to continue delivering short monthly EHS refresher sessions to construction management staff and all workers and cover pertinent environmental, health and safety topics on daily basis in toolbox talks to be delivered to all workers.

- ❑ Contractors to ensure workers with a specific role have attended or received trainings
 - specialized health and safety trainings such as health and safety stewards, first aiders, fire safety officers,
 - task-specific trainings for working at height, demolition, working with electricity, etc.
 - Only allow suitably trained and qualified workers to work on electrical equipment and at height,
 - workers wear the appropriate PPE for their role.
 - untrained workers must not be permitted to work with live electricity or at height.
- **Other Aspects**
 - ❑ Insurance to include a community liability clause for payment of compensation in case of any accidents because of construction.
 - ❑ Contractors to undertake facilitated H&S risk assessment with AEGCL through a workshop
 - attended by all concerned during the detailed design (and at other key stages)
 - inform both the detailed design and pre-construction preparations,
 - considering both occupational and community H&S risks resulting from subsequent stages of the project.
 - resulting H&S Plan especially the Emergency Preparedness and Response Sub-Plan will address the management of both occupational and community health and safety risks.
 - Contractors along-with local municipalities, tribal/village heads, and the media, to organize
 - ✓ health and safety campaigns for construction and electrical safety
 - ✓ community awareness raising activities in
 - local communities
 - schools within 500 m of the substations and
 - 50m of the transmission line ROW
 - ✓ prior to construction and
 - ✓ again, prior to commissioning of substations/energizing the distribution lines/installation of smart meters
 - about how to avoid electrical incidents having greater emphasis on operational hazard and risks, etc.

- The local community is required to be educated by the Contractors and PMU/PMC on the importance of maintaining the horizontal and vertical clearance from buildings, so that they do not erect new buildings within this zone
- Community awareness programs will use distribution of posters, leaflets, and safety booklets to all households in Bengali language
 - ✓ within 500m of the substations
 - ✓ 25m on either side of the line alignment, along the RoW transmission lines
 - ✓ face-to-face orientation at the village/community level.
 - ✓ translations will also be available in local languages in the tribal area and other areas with tribal or minority communities.
 - ✓ these posters and safety booklets will be available to also pick up within substations, local electrical offices of AEGCL.

Contractors to develop and distribute leaflets/pamphlets/posters to the local community covering (i) health awareness including HIV/AIDS/Covid-19 and other communicable diseases, and (ii) the conduct of construction workers that can be expected.



Annexure 25: Sample Checklist for developing Emergency Response Plan as part of C-ESMP

I. Introduction

- A. Purpose of Emergency Response Plans
- B. Importance of Safety and Preparedness

II. Risk Assessment and Identification

- A. Potential Hazards in Substation Renovation
 - 1. Electrical Hazards
 - 2. Fire Risks
 - 3. Structural Failures
 - 4. Environmental Hazards (e.g., chemical spills)
- B. Risk Mitigation Strategies

III. Emergency Response Framework

- A. Roles and Responsibilities
 - 1. Project Manager
 - 2. Safety Officer
 - 3. Emergency Response Team
 - 4. Contractors and On-Site Personnel
- B. Communication Protocols
 - 1. Emergency Contact List
 - 2. Notification Procedures

IV. Specific Emergency Scenarios and Response Plans

- A. Electrical Accidents
 - 1. Immediate Response Actions
 - 2. Isolation of Power Supply
 - 3. First Aid and Medical Assistance
- B. Fire Incidents
 - 1. Fire Detection and Alarm Systems
 - 2. Evacuation Procedures
 - 3. Use of Fire Suppression Equipment
- C. Structural Failures or Collapses
 - 1. Securing the Area
 - 2. Search and Rescue Operations
 - 3. Coordination with External Emergency Services
- D. Chemical Spills or Leaks
 - 1. Containment Measures
 - 2. Decontamination Procedures
 - 3. Disposal of Hazardous Materials

V. Evacuation Plan

- A. Designated Evacuation Routes and Assembly Points
- B. Evacuation Drills and Training
- C. Accountability for All Personnel

VI. First Aid and Medical Support

- A. Availability of First Aid Kits and Equipment



- B. On-Site Medical Personnel or Arrangements with Local Hospitals
- C. Training for Basic First Aid

VII. Coordination with External Emergency Services

- A. Local Fire Department and Emergency Medical Services (EMS)
- B. Utility Companies for Power Shutdowns
- C. Communication with Regulatory Authorities

VIII. Training and Drills

- A. Regular Emergency Response Training for Staff and Contractors
- B. Mock Drills for Various Scenarios
- C. Evaluation and Improvement of Emergency Procedures

IX. Post-Emergency Actions

- A. Incident Reporting and Documentation
- B. Root Cause Analysis and Corrective Actions
- C. Review and Update of Emergency Response Plans

X. Conclusion

- A. Commitment to Safety and Preparedness
- B. Continuous Improvement of Emergency Response Strategies

Annexure 26: Guidelines/ Checklist for developing Labour Management Plan as part of C-ESMP or stand-alone document

I. Introduction

- A. Overview of the project
 - 1. Scope of the electric substation
 - 2. Importance of effective labour management
- B. Objectives of the strategies
 - 1. Ensure project efficiency and productivity
 - 2. Minimize risks and disruptions
 - 3. Promote worker safety and compliance

II. Key Challenges in Labour Management

- A. Workforce skill gaps and training needs
- B. Cultural and language barriers in a diverse workforce
- C. Labour laws and regulations in Angola
- D. Health, safety, and environmental (HSE) considerations
- E. Logistics and resource allocation

III. Workforce Induction

- A. Comprehensive orientation program
 - 1. Introduction to project scope, goals, and timelines
 - 2. Overview of workplace safety protocols and emergency procedures
 - 3. Familiarization with organizational structure and team roles
- B. Training sessions for skill enhancement
 - 1. Technical training specific to substation renovation tasks
 - 2. Cultural awareness training for local workforce integration

IV. Employee Engagement

- A. Regular communication channels
 - 1. Weekly team meetings to discuss progress and challenges
 - 2. Open forums for feedback and suggestions
- B. Recognition and rewards programs
 - 1. Acknowledgment of outstanding performance
 - 2. Incentives for achieving project milestones

V. Contract Agreement

- A. Transparent contract terms and conditions
 - 1. Clearly defined roles, responsibilities, and deliverables
 - 2. Compliance with national labor laws and industry standards
- B. Inclusion of dispute resolution mechanisms

VI. Code of Conduct

- A. Establishment of ethical guidelines and workplace behavior standards
- B. Zero tolerance policy for misconduct, harassment, or discrimination

VII. Employee Benefits

- A. Competitive salary structures aligned with industry benchmarks



- B. Provision of health insurance, transportation, and accommodation
- C. Opportunities for career development and training
- VIII. Labor Management by EPC Contractor
 - A. Adherence to Local Labour Laws
 - 1. Hire legal consultants to ensure compliance with Angolan regulations
 - 2. Regularly update contracts and policies as per local requirements
 - B. Adherence to project labor management plan (LMP)
 - 1. Recruitment aligned with local content requirements
 - 2. Ensuring fair treatment and equal opportunities for all workers
 - C. Resource Planning and Allocation
 - 1. Optimize workforce scheduling to prevent delays
 - 2. Ensure availability of tools, equipment, and materials
 - D. Workforce Training and Development
 - 1. Conduct skills assessment and training programs
 - 2. Provide technical workshops and certifications for local workers
 - E. Communication and Team Integration
 - 1. Develop multilingual communication tools and resources
 - 2. Facilitate team-building activities to foster collaboration
 - F. Health, Safety, and Environmental Standards
 - 1. Implement strict HSE protocols and regular safety audits
 - 2. Provide personal protective equipment (PPE) and safety training sessions
 - G. Monitoring and reporting mechanisms for labor practices compliance
 - H. Performance Monitoring and Evaluation
 - 1. Establish key performance indicators (KPIs) for labour efficiency
 - 2. Conduct regular reviews and provide feedback to workers
 - I. Collaboration with local authorities and community stakeholders
- IX. Grievance Redress Mechanism
 - A. Establishment of a formal grievance handling system
 - 1. Dedicated grievance officers or committees
 - 2. Timely resolution of complaints with confidentiality assured
 - B. Regular review and improvement of grievance procedures
- X. HIV/AIDS, Gender-Based Violence (GBV) and Sexual Exploitation & Abuse (SE&A) Prevention
 - A. Awareness campaigns and training programs on HIV/AIDS, GBV/SE&A prevention
 - B. Strict enforcement of anti-harassment policies
 - C. Support systems for victims, including counseling and reporting mechanisms
- XI. Retrenchment Strategy
 - A. Transparent retrenchment policies in compliance with labor laws
 - 1. Clear communication of retrenchment rationale to affected employees
 - 2. Provision of severance packages and support for job placement or re-skilling
 - B. Minimization of workforce impact through phased retrenchment
- XII. Management Strategies
 - A. Stakeholder Engagement



1. Collaborate with local authorities and community leaders
2. Address community concerns related to workforce impact

XIII. Contingency Planning

- A. Emphasizing the importance of proactive planning in labour management
- B. Reinforcing the role of contingency planning in achieving project success while adhering to environmental and social safeguards

Annexure 27: Guidelines/ Checklist for developing Social Management Plan as part of C-ESMP or stand-alone document

The construction and operation and maintenance phase of the substation renovation and upgrade project is critical for ensuring the long-term sustainability of the infrastructure while minimizing potential social impacts. A well-structured Social Management Program (SMP) is essential to address the concerns of local communities, ensure compliance with regulatory requirements, and foster trust among stakeholders.

1. Stakeholder Engagement and Communication: To maintain open and transparent communication with all stakeholders, including local communities, government authorities, and other relevant entities.

Activities:

- Disseminate information through newsletters, brochures, and an online portal.
- Conduct quarterly stakeholder meetings to share updates on substation operations.
- Establish a dedicated grievance redressal mechanism (GRM) to address community concerns.

Duration: Continuous throughout the Construction and O&M phase

Key Deliverables: Stakeholder meeting minutes, GRM reports, and communication materials.

2. Community Development Initiatives: To contribute to the well-being of the local community and strengthen relationships.

Activities:

- Implement skill development programs for local residents in electrical safety and maintenance.
- Support local educational institutions by providing learning materials and infrastructure.
- Partner with local organizations to promote health awareness campaigns.

Duration: 5 years (throughout the Construction and O&M phase) (reviewed annually)

Key Deliverables: Training completion certificates, reports on community projects, and health campaign participation records.

3. Environmental and Health Safety Awareness: To educate the community about environmental conservation and safety measures associated with substation operations.

Activities:

- Organize workshops on electrical safety for schools and community groups.
- Distribute educational materials on the importance of environmental conservation.



- Conduct periodic safety drills in collaboration with local emergency services.

Duration: Quarterly workshops and annual drills

Key Deliverables: Workshop attendance records, distributed materials, and drill performance assessments.

4. Monitoring Social Impacts: To monitor and mitigate any adverse social impacts arising from substation operations.

Activities:

- Conduct biannual social impact assessments to identify potential issues.
- Engage third-party auditors to ensure unbiased evaluation of social performance.
- Develop and implement corrective action plans based on assessment findings.

Duration: Biannual assessments throughout the Construction and O&M phase

Key Deliverables: Social impact assessment reports, corrective action plans, and audit findings.

5. Employment Opportunities for Local Residents: To prioritize local hiring and create job opportunities within the community.

Activities:

- Establish a transparent recruitment process for operational roles.
- Provide on-the-job training to enhance skills and employability.
- Maintain a database of local candidates for future vacancies.

Duration: Continuous throughout the Construction and O&M phase

Key Deliverables: Employment records, training completion reports, and recruitment statistics.

6. Cultural Heritage Preservation: To respect and preserve local cultural heritage during substation operations.

Activities:

- Collaborate with local cultural organizations to support traditional events.
- Ensure operational activities do not disrupt culturally significant sites.
- Conduct awareness programs about cultural heritage preservation among staff.

Duration: Annual review of activities

Key Deliverables: Event participation records, site preservation reports, and staff training logs.



7. Emergency Preparedness and Response: To ensure readiness to handle emergencies while minimizing risks to the community.

Activities:

- Develop an Emergency Response Plan (ERP) in consultation with local authorities.
- Conduct training sessions for staff and community members on emergency procedures.
- Regularly test ERP effectiveness through simulated drills.

Duration: Annual ERP updates and quarterly drills

Key Deliverables: ERP document, training attendance records, and drill evaluations.

Conclusion

This Social Management Program is to be designed to address the social dimensions of the Construction and O&M phase of the substation renovation and upgrade project effectively. By maintaining a focus on stakeholder engagement, community development, environmental awareness, and emergency preparedness, this program ensures that the project operates in harmony with the surrounding community. Regular monitoring and evaluation will be essential to adapt strategies as needed and maintain positive social outcomes over time.

