ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT - ENVIRONMENT AND SOCIAL MANAGEMENT PLAN REPORT FOR TRANSMISSION LINES OF PACKAGE -G (LOOP-IN & LOOP-OUT of 220 kV Rangia-Amingaon transmisison line at 400 kV Rangia Sub-station)

Sl. No.	REVISION	DATE OF SUBMISSION
1	0	
2	1	

ASSAM INTRA-STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT

SUBMITTED TO

ASIAN INFRASTRUCTURE INVESTMENT BANK

SUBMITTED BY

ASSAM ELECTRICITY GRID CORPORATION LIMITED

PREPARED BY: PT FEEDBACK INFRA CONSORTIUM

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

List of Abbreviations

AEGCL	Assam Electricity Grid Corporation Limited
AGM	Assistant General Manager
AIIB	Asian Infrastructure Investment Bank
AISTSEP	Assam Intra-State Transmission System Enhancement Project
ARAP	Abbreviated Resettlement Action Plan
BOQ	Bill of Quantity
CEA	Central Electricity Authority
CESMP	Contractor's Environmental and Social Management Plan
DC or D/C	Double Circuit
DisCom	Distribution Company
E&S officer	Environment and Social Officer
E&S Policy	Environmental and Social Policy
E&S	Environment and Social
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
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
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
IP	Indigenous Peoples
IPP	Indigenous People Plan
IUCN	International Union for Conservation of Nature and Natural Resources
Km	Kilometre
LC	Least Concern
LILO	Loop In Loop out
MoEF&CC	Ministry of Environment, Forest and Climate Change
MVA	Mega Volt Ampere
NGO	Non-Government Organization
OPGW	Optical Power Ground Wire
PAPs	Project Affected Persons
PFA	Power for All
PIU	Project Implementation Unit
PMC	Project Management Consultancy
PMU	Project Management Unit
RoW	Right of Way
S/S	Substation (s)
SC or S/C	Single Circuit

STU	State Transmission Utility
T&T	Tower and Transmission
TL	Transmission Line
VU	Vulnerable

WEIGHTS AND MEASURES

Ha. (hectare)	10,000 sq. m = 2.47105 Acre
km (kilometer)	1,000 meters
kV	kilovolt (1,000 volts)

EXECUTIVE SUMMARY

Background: The Asian Infrastructure Investment Bank (AIIB), through Government of India (GOI), has been approached by Government of Assam (GoA) for financial and technical assistance to upgrade and strengthen Assam's power transmission network under the Power for All (PFA) initiative. To enhance power supply reliability, AIIB has extended their support for the "Assam Intra-State Transmission System Enhancement Project" (AISTSEP) being implemented by Assam Electricity Grid Corporation Limited (AEGCL).

The Project under Phase I includes the construction of 10 new substations in 400kV, 220kV and 132kV voltage level along with the associated (332.945 km) transmission lines (TL), Conversion of one no. of existing AEGCL S/S (132/33kV Gohpur) from AIS to GIS; Augmentation of 18 existing substations (replacement of old transformers with new transformers); Augmentation of 186 km of transmission line (restringing of One Single Circuit (S/C) line and two Double Circuit (D/C) line) by High Temperature Low Sag (HTLS) conductors; Replacement of ground wire to Optical Power Ground Wire (OPGW) for 636 km of existing transmission lines and substation equipment's at substations.

As part of AIIB's E&S policy and its compliance requirements as stipulated in the agreed environmental and social management planning framework (ESMPF) for the project, an Environmental and Social Impact Assessment including an Environmental and Social Management Plan (ESIA - ESMP) is to be in place for transmission lines before commencement of the work.
PT Feedback Infra Limited (PTFIL), Indonesia in Association with Jade Consult Nepal and NIPSA, Spain has been engaged by AEGCL as Project Management Consultant (PMC) including scope of preparation of ESIA–ESMP report for the transmission lines.

Description of the Project: This Environmental and Social Impact Assessment and Environmental and Social Management Plan (ESIA-ESMP) is pertaining to the Transmission Lines namely:

A. LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN) - 31.311 km
B. LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP OUT) – 35.195 Km

The other two (2) nos. Transmission Lines under Pkg-G, tower design and engineering documents are currently under review and yet to be approved. Subsequently after approval, check survey will be initiated. After completion of check survey the EPC Contractor will submit the report to AEGCL for approval. Accordingly, based on the final approved check survey report the ESIA-ESMP report will also be prepared for the following lines:

C. LILO of both circuit of 400kV D/C Balipara-Bongaigaon Transmisstion Line at 400kV Rangia GIS – 0.552 Km
D. 132kV S/C Transmission Line on D/C Tower from Kumarikata (AEGCL-New) S/S to Nalbari (AEGCL-Existing) S/S – 36.271 Km

Key pre-construction & construction phase activities are reconnaissance, walkover, detailed route survey to finalize route alignment & tower spotting, soil investigation to ascertain tower foundation design. Other activities included RoW marking, site clearing, foundation works, tower erection, stringing, tower footing protection (if required) final checking & testing & commissioning.

A brief of activities undertaken during Operation phase are ground inspection by lineman/team, inspection of towers, thermo-vision scanning, punctured insulator detection & attending all defects.

Approx. 60 (3 gangs with 20 persons in each gang) numbers of labour will be engaged by the contractor during construction period.

The above-mentioned 220kV LILO Transmission Lines corridor is located in the Goreswar and Tamulpur in Tamulpur district and Rangia in Kamrup (R) district, State of Assam.

The Right of Way required for the transmission line is 35 m (17.5 m on each side of the transmission line route) which is approx. 319626 sq.m of land i.e. 31.96 hectare. The tower base area required varies from 31 to 45 sq. m (DA type towers), 37 to 53 sq. m (DB type towers) 41 to 61 sq. m (DC type towers) and 47 to 70 sq. m (DD type towers)

The project site is located in the Tehsil Goreswar and Tamulpur in Tamulpur district and Rangia in Kamrup (R) district, State of Assam for LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT) transmission line is spread across 27 villages namely; Garka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Uttar Gandhibari, Baraliapar, Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Uttar Bardal, Gosai Solmari.

The RoW permission for the transmission line has been obtained in keeping 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) MoP new guideline March 2025 & Government of Assam Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024.

Cost of the project is as under:

Supply Portion – Rs. 810850348.16 with GST.

Erection Portion – Rs. 380256763.51 with GST.

Existing and associated facilities in the project

The 220kV D/C Rangia-Amingaon line is an existing facility of Assam Electricity Grid Corporation Limited (AEGCL) which is currently under operation. The proposed transmission line “The LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link” will be looped in and looped out from this existing line.

As per the AIIB’s ESF, 2024 the sub-project does not encompass any associated facilities.

Policy, Legal and Administrative Framework: As per the EIA Notification, 2006 (and its amendments), power transmission projects including substations and lines do not require environmental clearance from MoEF&CC, Govt. of India. However, project linked activities like quarrying (if any) may need clearance. Forest clearance is applicable if the project involves forest land. Wildlife clearance from State/National Board of Wildlife is required, if it falls within notified wildlife or eco-sensitive zones and wetland clearance is required for projects in notified wetlands. However, based on the environmental screening such clearances are not applicable to this transmission line. The detail of the various regulatory frameworks pertaining to the project has been discussed in the main ESIA-ESMP report.

As the Project is funded through the AIIB, the Bank's Environmental and Social Policy (ESP) applies. The Project has been assigned to "Category B" as per the ESP, as the Transmission lines are not located in ecological sensitive areas.

ESS 1 is applicable to the project as civil works may cause a limited number of potentially adverse environmental and social impacts. These impacts are not unprecedented and are limited to the project area.

ESS 2 is applicable and accordingly Abbreviated Resettlement Action Plan/Resettlement Action Plan (ARAP/RAP) will be prepared, finalized and disclosed before commencement of works.

ESS 3 is applicable if indigenous peoples are present in, or have a collective attachment to, the proposed area of the project, and are likely to be affected by the project. Assessment for requirement of **ESS 3** will be evaluated after finalization of land scheduling report and accordingly Indigenous People Plan (IPP) will be incorporated in the ARAP/RAP report.

Description of the Environment: The project site is located in the Tehsil Rangia under Kamrup (Rural) district and Tamulpur and Goreswar under Tamulpur district of Assam. The project footprint (RoW) is spread across 27 villages for the Transmission Line.

The direct impacts of the project are confined to the Right of Way (RoW) of the transmission line and indirect or induced impacts extends to the Area of Influence (AoI) defined by a buffer zone of 2 Km on either side of the transmission line. A 10 Km radius is also considered for evaluating the impact on flora & fauna of the area.

The environmental and social attributes were assessed through both primary and secondary studies. Primary attributes including air environment, water, soil, noise, flora and fauna, and public consultation were evaluated through field studies, on-site monitoring and review of the past studies.

Secondary attributes such as land use patterns, geology, physiological characteristics, and socio-economic profile were analysed through literature review of previous studies conducted by various government Agencies & research publications. An interdisciplinary team through discussions and professional judgment formulated the scoping and the extent of data generation.

In the project area the land is primarily used for agriculture / crops (vegetables). The other land uses in the area are trees / vegetation, built up residential areas and water bodies.

No protected areas (National Park, Wildlife Sanctuaries, Biosphere Reserves), Reserved Forests, notified historical and cultural sites etc. are falling in the Right of Way (RoW) of the proposed transmission line.

Based on the observation at site it has been perceived that the ambient air quality of the project area is good. The ambient air quality monitoring conducted at Rangia (Kumarikata) S/S shows that the value of PM_{10} and $PM_{2.5}$ are 40 & 19 $\mu g/m^3$ respectively.

Based on the observation at site it has been perceived that the project area has very minimal surface & ground water and soil contamination. Therefore, requirement of conducting test for water and soil quality monitoring is not critical.

According to the preliminary survey report, the Loop-In transmission line area contains a total of 4,686 trees, including both fruit-bearing and non-fruit-bearing varieties, along with 5,021 bamboo plants. In the Loop-Out transmission line area, there are 9,278 trees of similar types and 22,040 bamboo plants.

No negative impact from the project is expected on Protected Cultural Resources (PCRs), Common

Property Resources (CPRs) or archaeological/historical sites as assessed during the detailed and check survey.

There are no Protected Cultural Resources (PCRs), Common Property Resources (CPRs), or archaeological/historical sites located within the Right of Way (RoW) corridor of the proposed LILO (Line-In and Line-Out) transmission lines. However, within a 500-meter radius of the proposed LILO (Loop-In) line, the following CPRs have been identified: 10 schools, 17 places of worship, 3 public health centers, and 1 PHED water supply scheme. Similarly, within a 500-meter radius of the proposed LILO (Loop-Out) line, the following CPRs are present: 14 schools, 21 places of worship, 1 public health center, 1 playground, and 1 post office.
During the construction phase, no impact is anticipated on these CPRs, as most of them are located at a considerable distance from the center line of the transmission lines.

Impact Assessment: Environmental sensitive sites and Key Biodiversity Areas (KBA) are not involved in the corridor (RoW) of the transmission line. No land is acquired permanently for tower foundation & RoW, ownership of land will be remains with the owner and agricultural activities are allowed to continue after construction activity. However, compensation for land for tower footing and RoW will be paid as per Ministry of Power, Government of India (MoP, GoI) guidelines and Zirat Value (tree and crop damages) will be paid to the individual landowners as per compensation procedures. As assessed from the site visit and observation, the impacts are manageable as no major environmental and social issues have been recorded. Details of impact and mitigation measures are discussed in the main report.

Climate Risk and Adaptation at the Design Stage: Remedial measures for climate risks have been adapted for Transmission Line at design stage.

Stakeholder & Public Consultation and Information Disclosure:
The community consultations are carried out in all the villages along the transmission line corridor with local habitants where one hundred forty one (141) participants were participated in the LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT) at Rangia/Kumarikata GIS S/s like economically weak communities, women, vulnerable groups and other local community leaders nearby the proposed transmission lines on 7th November 2024, 19th November 2024, 25th December 2024, 8th January 2025, 16th January 2025, 7th March 2025, 8th March 2025 and 10th March 2025.

This draft ESIA - ESMP will be disclosed online on the website of AIIB and AEGCL. The hardcopies of the same (English version) and Assamese version of the Executive Summary will be available at the following locations:

1. PMU: Project Director,
Address: 1st Floor, AEGCL, Bijulee Bhawan,
Contact No.: 0361-2739520
Website: www.aegcl.coc.in

2. PIU: Project Manager
Address: AGM, 220/132 kV Rangia GSS, AEGCL
Contact No.: 94351-38347
Email: agm.rangia@aegcl.co.in

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) / Headquarters level. Tier II: The composition of the Tier II and Tier II GRCs is available in Chapter 9.

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

Environmental and Social Management Plan: ESMP for identified impacts and the administrative aspects to ensure that mitigative measures are implemented at Site and their effectiveness monitored regularly through Environmental and Social Monitoring program has been detailed in the main report.

The ESMP cost to implement the key environmental & social measures and environmental & social monitoring plan which a part of Engineering Procurement Construction (EPC) Contractor's good Engineering practice an amount of **INR 29.50 Lakhs** is estimated for implementation of ESMP.

Arrangement for Monitoring and Reporting of Assam Intra-State Transmission System Enhancement Project (AISTSEP) including Reporting Line (from contractor to AIIB) is in place and detailed in the main report.

Capacity building programmes are being conducted by PMC as per the requirement and PMC contract provision. Apart from these, training and capacity building programme are being conducted by E&S team of AIIB to ensure implementation of E&S requirement.

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 project 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 compensation, preventive measures, and careful planning during the construction & operational phase.

1. Introduction

1.1 Background

Asian Infrastructure Investment Bank (AIIB) extends financial assistance for "Assam Intra-State Transmission System Enhancement Project" (AISTSEP) to Assam Electricity Grid Corporation Limited (AEGCL), the Implementing Agency (IA), to support the implementation of Power for All (PFA) plan. The Project under Phase I includes the construction of 10 new substation in 400kV, 220kV and 132kV voltage level along with the associated (332.945 km) transmission lines (TL), Conversion of one no. of existing AEGCL S/S (132/33kV Gohpur) from AIS to GIS; Augmentation of 18 existing substations (replacement of old transformers with new transformers); Augmentation of 186 km of transmission line (restringing of One Single Circuit (S/C) line and two Double Circuit (D/C) line) by High Temperature Low Sag (HTLS) conductors; Replacement of ground wire to Optical Power Ground Wire (OPGW) for 636 km of transmission lines and substation equipment's at substations.

As part of AIIB's E&S policy and its compliance requirements, an Environmental and Social Impact Assessment - Environmental and Social Management Plan (ESIA - ESMP) is to be in place for transmission lines.

PT Feedback Infra Limited (PTFIL), Indonesia in Association with Jade Consult Nepal and NIPSA, Spain has been engaged by AEGCL as Project Management Consultant (PMC) including scope of preparation of ESIA – ESMP report for the transmission lines.

The present Environmental and Social Impact Assessment and Environmental and Social Management Plan (ESIA - ESMP) report focuses on **(A)** LILO of both circuit of Rangia (Ext) to Amingaon 220 kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP IN) - **31.311 km, and (B)** LILO of both circuit of Rangia (Ext) to Amingaon 220 kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP OUT) – **35.195 Km**.

1.2 Purpose of the report

Power transmission projects are not listed in the list of environmentally sensitive projects and hence no Environmental Clearance (EC) is required as per the Environmental Impact Assessment (EIA) notification of 2006 and its subsequent amendments by the Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt of India. However, project associated activity like quarry operation (if any) for the project may require prior Environmental Clearance.

AIIB requires an ESIA – ESMP for transmission lines to be covered under its investment in compliance with its E & S Policy.

In line with preparation of ESIA – ESMP report, the present report discusses the project description, policy, legal and institutional framework, current (baseline) environmental and social status, analysis of alternatives, assessment for potential environmental and social impacts and mitigation measures, climate risk and adaptation at the design stage, environmental and social management plan, stakeholder consultations and public disclosure, recommendations, and conclusion.

1.3 Objective and scope of ESIA

The objective of this report is to carry out Environment and Social Impact Assessment (ESIA) for the proposed "LILO (Loop-In-Loop-out) of 220 kV Rangia-Amingaon line at Rangia (Tamulpur) 400kV GIS Sub-station" in line with approved Environment and Social Management Planning Framework (ESMPF) of the project.

The scope includes the following:

- Review and update (if any) policy, legal and institutional framework as detailed in approved ESMPF,
- Current (baseline) environmental and social status (Description of the environment baseline of the project in terms of the key sensitivities and potential constraints on the construction and operation and maintenance of the transmission line),
- Analysis of alternatives (assessment of alternatives available for the project),
- Assessment for potential environmental and social impacts and mitigation measures,
- Climate risk and adaptation at the design stage,
- Stakeholder consultations and public disclosure,
- Grievance Redress Mechanism (GRM),
- Environmental and Social Management Plan (ESMP),
- Recommendations

1.4 Approach and key tasks for this ESIA study

The following approach has been considered for preparation of present ESIA – ESMP report.

Screening: Assessment of the requirements of International, National, State and AIIB's legal policy. Environmental Clearance is not required as per the EIA Notification of MoEF&CC. The project has been categorised as "Category B" as per AIIB's E&S policy with reservation as per the approved ESMPF and thus requires an ESIA – ESMP for transmission lines to be covered under its investment.

Scoping: Reconnaissance survey within the project footprint, 2 km and 10 km (for biodiversity assessment) buffer from either side of transmission line to assess environmental and social sensitivity has been done for the project.

Baseline data collection: It includes details about physical environmental resources and social & economic aspects along the project footprint, 2 km; and 10 km (for biodiversity assessment) from either side of transmission lines.

Baseline data collection has been initiated in the month of October 2024 from secondary sources. Site reconnaissance survey has been conducted in February 2025 by comprising team of Environmental & Social Experts of PMU & PMC along with Environmental & Social Investigation officers of PMC.

Public and stakeholder consultations: The public consultation has been conducted with the local community nearby the proposed transmission lines in the month of November and December 2024 and January & March, 2025 for collecting the base line data.

Impact Assessment: Impact Assessment has been done (identification, prediction and evaluation) based on the available data from primary & secondary sources and public consultation.

ESMP: Development of practical mitigation measures and management, monitoring plan, budget and institutional framework has been done in line with the approved ESMPF.

1.5 Limitations

The basis of this ESIA-ESMP report is scientific principles and professional judgement of experts based on available secondary data and data gathered during primary survey for impact assessment, mitigation measures as per the requirement and provide management plan. There are some limitations in preparation of this ESIA-ESMP report assessed as follows:

- ESIA-ESMP is prepared with available information as per approved check survey observations made during site survey and consultation at site.
- The consultations undertaken as part of the ESIA to the stakeholders, who were available for consultation during the site visit; which included local community;

- The number of impacted land owners is likely to be compiled after the socio-economic survey of the Project Affected families (PAFs). 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 and accordingly Abbreviated Resettlement Action Plan (ARAP) will be prepared. Assessment for requirement of ESS 3 will be evaluated after finalization of land scheduling report and accordingly finding of Indigenous People will be incorporated in the ARAP report.

1.6 Report structure

Chapter No.	Chapter Name	Contents
Executive summary		This chapter includes a brief summary of the ESIA- ESMP report.
Chapter 1	Introduction	This chapter includes background of the project, purpose of the report, objective and scope of ESIA, approach and key tasks for this ESIA study, limitations and structure of ESIA-ESMP report.
Chapter 2	Project Description	This chapter covers profile of the project route, overview of project site, profile of the project route, overview of activities during different phases of the project, land requirement and allotment process.
Chapter 3	Policy, legal and institutional framework	This chapter describes the applicable national, state level and AIIB's environmental and social laws and regulations and institutional framework and International treaties and conventions on environment and labours.
Chapter 4	Description of the Environment	This chapter describes the Baseline Environmental features in detail. It includes details about location characteristics, study area, physical environment, biological environment (flora and fauna) and social environment baseline of the study area.
Chapter 5	Analysis of Alternatives	This chapter elucidates detailed analysis about different options of 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 for Potential Environmental and Social Impacts and Mitigation Measures	This chapter details the impact assessment methodology, anticipated project impacts on physical, biological environment (biodiversity assessment, critical habitat assessment using tools like AVISTEP etc.) and social environment, based on baseline environmental features of the project during design, construction and operation phases and mitigation measures for all identified adverse impacts.
Chapter 7	Climate risk and adaptation at the design stage	This chapter describes climate risk and adaptation taken at the design stage.
Chapter 8	Stakeholder consultations and public disclosure	This chapter elaborates stakeholder identification, stakeholder mapping and analysis, stakeholder consultations undertaken as part of the ESIA process in order to assess the impact on project and them and their participation in the project as a continuous process.
Chapter 9	Grievance redress mechanism	This chapter shall highlight the mechanism to redress grievances arises during implementation of the project.

Chapter No.	Chapter Name	Contents
Chapter 10	Environmental and Social Management Plan (ESMP) with specific potential E&S impacts	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 outlined: • Environmental and Social Monitoring program for the project. • Budgetary allocation for implementation of different activities of the ESIA. • Institutional arrangements for the project, monitoring and reporting indicators for performance of ESMP.
Chapter 11	Summary, recommendations and conclusion	This chapter summarizes the project with impact, mitigation and management plan of the project activities with recommendations and conclusion.
Appendices		Appendices of the project related documents shall be detailed at the end of the report.

2 PROJECT DESCRIPTION

2.1 Overview of Project Site

AEGCL, the State Transmission Utility (STU) of Assam, proposes to implement the "Assam Intra-State Transmission System Enhancement Project" in alignment with the Government of India's "Power for All" (PFA) initiative. The project aims to facilitate the evacuation of power from both state based generating stations and central sector utilities, as well as other sources. Additionally, it seeks to reinforce the state's grid infrastructure and minimize transmission losses. AEGCL is responsible for transmission of electricity to the Distribution Company (DisCom) i.e., APDCL of Assam.

The project scope involves construction of substations and associated transmission lines, augmentation, upgradation and installation of equipment of substations. The sub-projects are located in different areas of Assam.

The present Environmental and Social Impact Assessment and Environmental and Social Management Plan (ESIA-ESMP) is pertaining to the Transmission Lines namely:

A) LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP IN) - 31.311 km

B) LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP OUT) – 35.195 Km

The other two (2) nos. Transmission Lines under Package-G, tower design and engineering documents are currently under review and yet to be approved. Subsequently after approval, check survey will be initiated. After completion of check survey the EPC Contractor will submit the report to AEGCL for approval. Accordingly, based on the final approved check survey report the ESIA-ESMP report will also be prepared for the following lines:

C) LILO of both circuit of 400kV D/C Balipara-Bongaigaon Transmisstion Line at 400kV Rangia GIS – 0.552 Km

D) 132kV S/C Transmission Line on D/C Tower from Kumarikata (AEGCL-New) S/S to Nalbari (AEGCL-Existing) S/S – 36.271 Km.

The above-mentioned Transmission Line corridors are located in the Tehsil Goreswar and Tamulpur in Tamulpur district and Rangia in Kamrup (R) district in the State of Assam. Map showing two transmission lines and a brief description of the Transmission Line corridors is given in Figure and table below:

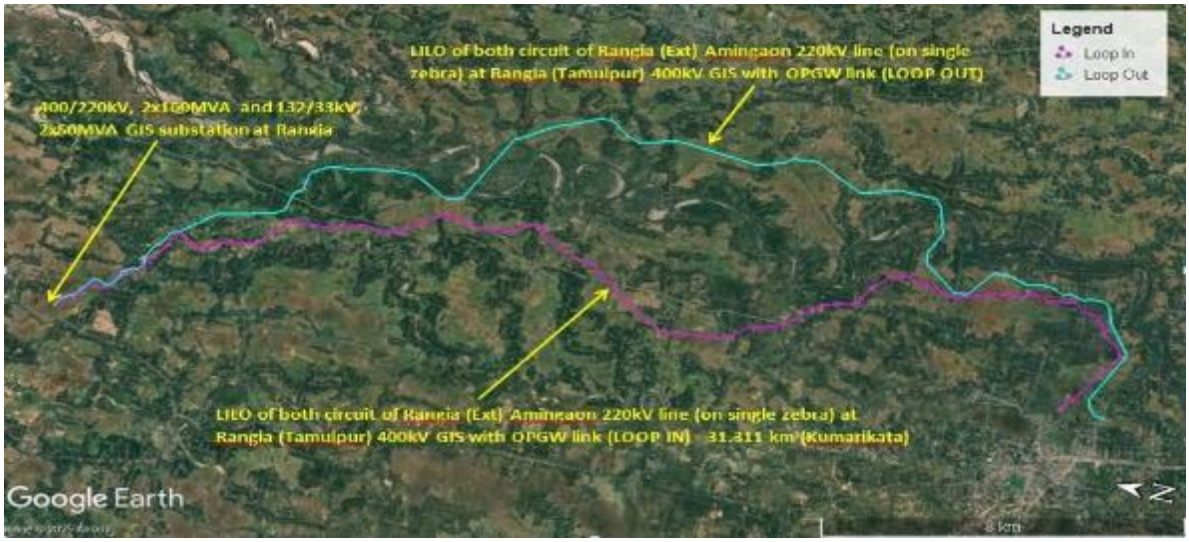


Figure 2.1: Map showing the LOOP-IN-LOOP-OUT Transmission Lines

Table 2.1: Brief Description of Transmission Line corridors

Sl. No.	Particulars	Description	
		LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP IN)	**LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP OUT)**
1	Location Coordinates (start and end)	Starting point of T/L:- 26°26'6.60"N 91°38'23.04"E Ending point of T/L:- 26°38'28.04"N 91°36'30.08"E	Starting point of T/L:- 26°25'42.49"N 91°38'22.38"E Ending point of T/L:- 26°38'29.17"N 91°36'30.09"E
2	Project affected Village	Garaka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Shijiguri, Uttar Gandhibari, Baraliapar, Kachukata, Kachubari.	Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Bakbari, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Deulkuchi, Uttar Bardal, Gosai Solmari, Depteswari, Garaka.
3	Tehsil	Rangia, Goreswar, Tamulpur	Rangia, Goreswar, Tamulpur
4	District Name / State	Tamulpur and Kamruo (Rural) / Assam	Tamulpur and Kamruo (Rural) / Assam
5	Capacity of Transmission line	220 kV	220 kV
6	Power Evacuation	The transmission line will evacuate power from existing 220 kV Rangia-Amingaon transmission line.	The transmission line will evacuate power from existing 220 kV Rangia-Amingaon transmission line.
7	Climatic zone	Subtropical Humid	Subtropical Humid
8	Elevation	Tamulpur district - 60 to 100 meters Kamrup (Rural) district - 48 to 64 meters	Tamulpur district - 60 to 100 meters Kamrup (Rural) district - 48 to 64 meters
9	Site Conditions	Mostly flat agricultural land and Tree/Crop (betel nut/banana/bamboo) plantation are prominent in the RoW of transmission towers.	Mostly flat agricultural land and Tree/Crop (betel nut/banana/bamboo) plantation are prominent in the RoW of transmission towers.
10	Road Accessibility	Site could be accessed through Rangia - Tamulpur road and SH-10 which connects to village roads of the project area.	Site could be accessed through Rangia - Tamulpur road and SH-10 which connects to village roads of the project area.
11	Road crossing	• National Highway: Nil • State Highway: Nil • Village Roads/ cart track: 47 locations	• National Highway: Nil • State Highway: Nil • Village Roads/ cart track: 63 locations
12	Nearest Airport	Nearest Airport is Guwahati Lokpriya Gopinath Bordoloi International Airport Approx. Aerial distance is 36 Km.	Nearest Airport is Guwahati Lokpriya Gopinath Bordoloi International Airport Approx. Aerial distance is 36 Km.
13	Nearest Railway Station	Nearest Railway station is Rangia and Goreshwar.	Nearest Railway station is Rangia and Goreshwar.
14	Railway crossing	1 number - NF Railway (20/0 – 21/0)	1 number - NF Railway (39/0 – 40/0)
15	River/canal/small stream/ pond crossing	• River: 1 (1 time Baralia River) • Canal: 3 locations • Small stream: 13 locations • Pond/ Water body: 62 locations	• River: 3 (1 time Baralia River, 2 times Puthimari River) • Canal: 1 location • Small stream: 17 locations • Pond/ Water body: 44 locations
16	Number of Powerline (66 kV and above) crossing	• Prop0sed LILO of both cir. 400 KV D/C Bangaigaon – Balipara T/L (Loop In) - 1 location • 132kV D/C Rangia - Kamalpur T/L - 1 location • 132kV S/C Rangia - Rowta T/L - 1	• Proposed LILO of 400 KV D/C Bangaigaon – Balipara T/L (Loop In) - 1 location • 132kV D/C Rangia - Kamalpur T/L - 1 location • 132kV S/C Rangia - Rowta T/L - 1

Sl. No.	Particulars	Description	
		LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP IN)	**LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP OUT)**
		location • 132kV S/C Rangia - Sipajhar T/L - 1 location • 132kV S/C D - R T/L - 1 location	location • 132kV S/C Rangia - Sipajhar T/L - 1 location • 132kV S/C D - R T/L - 1 location
17	Reserved Forest / Protected areas (WLS/NP/TR etc.)	NIL	NIL
18	Land Requirement	• Transmission Corridor (109.5885 ha considering 35 m RoW width and 31311 m length of Transmission Corridor) • Tower Base Area: DA type towers 35 to 51 sqm, DB type towers 47 to 66 sqm, DC type towers 50 to 70 sqm and DD type towers 57 to 79 sqm. • The tower base area for 110 numbers of towers will require an area of 1.66 Ha of land.	• Transmission Corridor (123.1825 ha considering 35 m RoW width and 35195 m length of Transmission Corridor). • Tower Base Area: DA type towers 35 to 51 sqm, DB type towers 47 to 66 sqm, DC type towers 50 to 70 sqm and DD type towers 57 to 79 sqm. • The tower base area for 123 numbers of towers will require an area of 1.99 Ha of land.
19	Land Availability	Obtained RoW permission from District Administration.	Obtained RoW permission from 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: Construction Phase	The transmission line generally requires about 50 m^3 of water for casting of foundations for each tower, which shall be sourced from local sources through tankers.	The transmission line generally requires about 50 m^3 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	• Tamulpur district- Mostly alluvial soils (Vary from sandy loams, Clayey to Red loamy soils). • Kamrup (Rural) district- Alluvial soil primarily composed of silt and clay with varying sand content depending on location.	• Tamulpur district- Mostly alluvial soils (Vary from sandy loams, Clayey to Red loamy soils). • Kamrup (Rural) district- Alluvial soil primarily composed of silt and clay with varying sand content depending on location.
24	Seismic Zone	Seismic Zone V – Earthquake Hazard Zone.	Seismic Zone V – Earthquake Hazard Zone.
25	Highest Flood Level	• Tamulpur district- 59.77m • Kamrup (Rural) district- 49.68m	• Tamulpur district- 59.77m • Kamrup (Rural) district- 49.68m
26	Wind zone	The Project area falls in a Very high damage risk zone B (V_b = 50 m/s).	The Project area falls in a Very high damage risk zone B (V_b = 50 m/s).

Source: Check Survey report and site visit

Survey of India Toposheet showing transmission line, Environmental and Social Features within 2 KM buffer are given figure below.

Figure 2.2: Survey of India Topo-sheets showing transmission line, Environmental and Social Features within 2 kM buffer area.

Table 2.2: IS: 5613 & MOEF&CC guidelines on Right of Way and Spacing between the lines/cables as per Electrical standard

Sl. No.	Transmission line voltage (In KV)	Maximum RoW (in meter) as per MoEF&CC	Maximum RoW (in meter) as per Electrical standard (in meter)	Minimum clearance between conductor and trees (in meter)	Minimum ground clearance as per Electrical standard (in meter)	Spacing between the lines/cables (in meter)
1.	132	27.00	27.00	4.0	6.10	3.05
2.	**220**	**35.00**	**35.00**	**4.6**	**7.00**	**4.58**
3.	400 SC/DC	46.00/52.00	46.00 52 – SC Horizontal configuration	5.5	8.84	5.49

Source: IS: 5613 & MOEF&CC guidelines on Right of Way and Spacing between the lines/cables as per Electrical standard

Technical details along with layout, design, and other parameters of the towers (different type) and conductors etc. are given in **Appendix -1, Appendix 2A and 2B.**

Detailed methodology for installation of towers and stringing of conductors given in **Appendix 3A & 3B.**

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

Resources

- No of Foundation Gangs engaged: 3 nos.
- No of workers per gang: 20 nos.

Worker camps - Worker camps are set in high ground finding a suitable spot which has suitable access road and near to the line. Proper illumination will be provided with emergency communication system, Fire Extinguishers & Fire Buckets and First-aid box. Adequate hygiene condition will be maintained.

Material supply and Storage – The materials are supplied from approved vendors only, Centralized storage facility will be made for storing all the items, cement will be stored indoor to avoid damage, from the centralized store the required items will be shifted though tractors or small trucks to the temporary stores at the sites. Usually, the temporary stores are made near to the tower locations. The following will be maintained for choosing storage areas.

- There will be no overhead line in Material storage area/Work Area.
- Proper approach road at site/Store for material handling.
- There will be no waterlogging
- Ground conditions 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. They need to be built through environmentally and socially non-sensitive areas.

2.2 Profile of the project route

The details of the proposed components of the transmission lines are provided in table below.

Table 2.3: Components of the transmission line

Sl. No.	Particulars	Description	
		LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP IN)	**LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP OUT)**
1.	Length of TL route	31.311Km	35.195Km
2.	No. of Transmission Towers	110	123
3.	Circuit type	Double Circuit	Double Circuit
4.	Type of conductor	ACSR Zebra 85^0	ACSR Zebra 85^0

Sl. No.	Particulars	Description	
		LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP IN)	**LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station with OPGW link (LOOP OUT)**
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)	67	69
8.	Span	350 m	350 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-39.6m, B, C, D-33.85m
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	The project shall primarily use the existing roads in the area. In addition to this, temporary access routes through agricultural lands for equipment and personnel movement will be developed in consultation with stakeholders and local people as per requirement.	The project shall primarily use the existing roads in the area. In addition to this, temporary access routes through agricultural lands for equipment and personnel movement will be developed in consultation with stakeholders and local people as per requirement.

Source: Checked Survey report

The profiling of transmission line towers is provided in the following table.

Table 2.4: Profiling of Transmission Line Towers as per check survey

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
A. LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN)						
1.	Ext. T-9	91°38'23.22"E 26°26'10.97"N	Agricultural land	Agricultural land		
2.	AP-1	91°38'23.05"E 26°26'6.60"N	Agricultural land	Agricultural land	11 kV, Drain	---
3.	1/1		Agricultural land	Agricultural land	2 Nos. 11 kV, LT line, Fishery, 33 kV	2 Nos. RCC road
4.	1/2		Agricultural land	Agricultural land	Fishery	---
5.	1/3		Agricultural land	Agricultural land	Nala, Fishery, Ditch	---
6.	1/4		Agricultural land	Agricultural & non agriculture land	Ditch	---
7.	1/5		Agricultural land	Agricultural land	3 Nos. Fishery	Village road
					---	---

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
8.	AP-2	91°39'22.58"E 26°25'33.02"N	Agricultural land	Agricultural land		
9.	AP-3	91°39'32.76"E 26°25'35.93"N	Agricultural land	Agricultural land	---	---
10.	AP-4	91°39'38.34"E 26°25'45.09"N	Agricultural land	Agricultural land	3 Nos. Fishery	---
11.	4/1		Agricultural land	Agricultural & non agriculture land	2 Nos. LT line	Metal road
12.	AP-5	91°39'56.75"E 26°25'53.60"N	Agricultural land	Agricultural land	5 Nos. Fishery, 11 kV	Village road
13.	AP-6	91°40'0.29"E 26°26'4.15"N	Agricultural land	Agricultural & non agriculture land	6 Nos. Fishery	---
14.	AP-7	91°40'6.71"E 26°26'12.44"N	Agricultural land	Agricultural & non agriculture land	LT line, 11 kV, 2 Nos. Fishery	Metal road
15.	AP-8	91°40'5.27"E 26°26'21.62"N	Agricultural land	Agricultural land	Pond, LT line	Metal road
16.	AP-9	91°40'2.20"E 26°26'32.03"N	Agricultural land	Agricultural land	2 Nos. Ditch, Pond	---
17.	AP-10	91°40'6.53"E 26°26'37.69"N	Agricultural land	Agricultural land	132 kV D/C Rangia to Kamalpur TL (AEGCL)	Village road
18.	AP-11	91°40'4.62"E 26°26'47.81"N	Agricultural land	Agricultural & non agriculture land	---	---
19.	AP-12	91°39'59.13"E 26°26'56.76"N	Agricultural land	Agricultural land	2 Nos. Ditch, 2 Nos. Fishery	Metal road
20.	AP-13	91°40'0.76"E 26°27'0.97"N	Agricultural land	Agricultural land	132 kV S/C Rangia to Rowta TL (AEGCL)	---
21.	AP-14	91°39'58.94"E 26°27'6.11"N	Agricultural land	Agricultural land	---	---
22.	AP-15	91°39'59.84"E 26°27'11.15"N	Agricultural land	Agricultural land	132 kV S/C Rangia to Sipajhar TL (AEGCL)	---
23.	15/1		Agricultural land	Agricultural land	---	---
24.	15/2		Agricultural land	Agricultural & non agriculture land	---	---
25.	AP-16	91°39'46.68"E 26°27'39.06"N	Agricultural land	Agricultural & non agriculture land	---	---
26.	16/1		Agricultural land	Agricultural land	11 kV, LT line	Metal road, Village road
27.	16/2		Agricultural land	Agricultural land	---	---
28.	AP-17	91°39'54.32"E 26°28'11.54"N	Agricultural land	Agricultural & non agriculture land	2 Nos. Ditch, Pond	Village road
29.	AP-18	91°39'57.47"E 26°28'19.77"N	Agricultural land	Agricultural land	2 Nos. LT line, 11 kV	Metal road
					---	---

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
30.	AP-19	91°39'53.85"E 26°28'30.32"N	Agricultural land	Agricultural land		
31.	AP-20	91°39'45.13"E 26°28'37.12"N	Agricultural land	Agricultural & non agriculture land	11 kV	---
32.	AP-21	91°39'38.89"E 26°28'43.12"N	Agricultural land	Agricultural & non agriculture land	LT line, Ditch, 33 kV, Railway line, 11 kV, Pond	RCC road
33.	21/1		Agricultural land	Agricultural land	---	---
34.	AP-22	91°39'20.46"E 26°28'49.78"N	Agricultural land	Agricultural land	11 kV	---
35.	22/1		Agricultural land	Agricultural & non agriculture land	11 kV	RCC road
36.	AP-23	91°39'15.36"E 26°29'6.21"N	Agricultural land	Agricultural & non agriculture land	Plantation	Village road
37.	AP-24	91°39'10.35"E 26°29'16.12"N	Agricultural land	Agricultural & non agriculture land	---	RCC road
38.	24/1		Agricultural land	Agricultural & non agriculture land	2 Nos. Pond, Ditch	---
39.	24/2		Agricultural land	Agricultural land	LT line, 2 Nos. Pond	Metal road
40.	AP-25	91°38'48.56"E 26°29'36.90"N	Agricultural land	Agricultural & non agriculture land	Ditch	---
41.	AP-26	91°38'43.32"E 26°29'39.88"N	Agricultural land	Agricultural & non agriculture land	11 kV	Metal road
42.	26/1		Agricultural land	Agricultural land	Nala	---
43.	AP-27	91°38'34.54"E 26°30'4.47"N	Agricultural land	Agricultural & non agriculture land	11 kV, Drain	RCC road
44.	AP-28	91°38'25.71"E 26°30'12.05"N	Agricultural land	Agricultural & non agriculture land	11 kV, Ditch	---
45.	AP-29	91°38'18.30"E 26°30'20.28"N	Agricultural land	Agricultural land	LT line	Village road
46.	29/1		Agricultural land	Agricultural land	11 kV	---
47.	29/2		Agricultural land	Agricultural land	---	---
48.	29/3		Agricultural land	Agricultural land	---	---
49.	29/4		Agricultural land	Agricultural land	---	---
50.	AP-30	91°38'13.16"E 26°31'7.36"N	Agricultural land	Agricultural & non agriculture land	---	---
51.	AP-31	91°38'17.34"E 26°31'12.89"N	Agricultural land	Agricultural & non agriculture land	11 kV, LT line	Metal road
52.	31/1		Agricultural land	Agricultural land	---	---
53.	AP-32	91°38'27.71"E	Agricultural land	Agricultural & non	LT line	Village road

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
		26°31'31.67"N		agriculture land	---	---
54.	32/1		Agricultural land	Agricultural land	---	---
55.	32/2		Agricultural land	Agricultural & non agriculture land		
					11 kV	Metal road
56.	32/3		Agricultural land	Agricultural land		
					---	---
57.	32/4		Agricultural land	Agricultural land	---	---
58.	AP-33	91°39'3.21"E 26°32'10.29"N			---	---
					11 kV	Village road
59.	AP-34	91°39'3.90"E 26°32'20.40"N	Agricultural land	Agricultural & non agriculture land		
					3 Nos. 11 kV, Nala, Ditch	Village road, Metal road
60.	34/1		Agricultural land	Agricultural land		
					Nala	---
61.	34/2		Agricultural land	Agricultural land		
					11 kV	---
62.	AP-35	91°39'18.35"E 26°32'49.49"N	Agricultural land	Agricultural land		
					11 kV	Metal road
63.	AP-36	91°39'27.85"E 26°32'54.39"N	Agricultural land	Agricultural & non agriculture land		
					Ditch	Metal road
64.	AP-37	91°39'29.68"E 26°33'1.88"N	Agricultural land	Agricultural land		
					11 kV, Plantation	Village road
65.	37/1		Agricultural land	Agricultural & non agriculture land		
					LT line	Village road
66.	AP-38	91°39'17.51"E 26°33'19.56"N	Agricultural land	Agricultural land		
					---	---
67.	38/1		Agricultural land	Agricultural land		
					Ditch	---
68.	AP-39	91°39'14.06"E 26°33'41.01"N	Agricultural land	Agricultural land		
					---	Metal road
69.	39/1		Agricultural land	Agricultural & non agriculture land		
					---	Village road
70.	39/2		Agricultural land	Agricultural land		
					---	---
71.	AP-40	91°39'20.80"E 26°34'9.09"N	Agricultural land	Agricultural & non agriculture land		
					---	Village road
72.	40/1		Agricultural land	Agricultural & non agriculture land		
					---	Village road
73.	40/2		Agricultural land	Agricultural land		
					---	---
74.	40/3		Agricultural land	Agricultural & non agriculture land		
					Canal	Metal road
75.	AP-41	91°38'53.91"E 26°34'38.81"N	Agricultural land	Agricultural & non agriculture land		
					2Nos. LT line, Pond, Ditch, 11KV, Nala	RCC road
76.	AP-42	91°38'50.16"E	Agricultural land	Agricultural land		

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
		26°34'48.91"N			11 kV	---
77.	42/1		Agricultural land	Agricultural & non agriculture land	Pond	Village road
78.	AP-43	91°38'52.55"E 26°35'8.07"N	Agricultural land	Agricultural & non agriculture land	11 kV	---
79.	43/1		Agricultural land	Agricultural land	11 kV, Plantation	Un metal road
80.	AP-44	91°38'43.09"E 26°35'30.01"N	Agricultural land	Agricultural & non agriculture land	---	Village road
81.	44/1		Agricultural land	Agricultural land	3 Nos. Nala	Village road
82.	AP-45	91°38'40.90"E 26°36'2.32"N	Agricultural land	Agricultural land	---	---
83.	AP-46	91°38'25.79"E 26°36'11.48"N	Agricultural land	Agricultural land	Baralia river, Pond	---
84.	AP-47	91°38'12.14"E 26°36'20.06"N	Agricultural land	Agricultural land	Ditch	---
85.	47/1		Agricultural land	Agricultural land	---	---
86.	AP-48	91°38'7.36"E 26°36'41.72"N	Agricultural land	Agricultural & non agriculture land	Ditch, LT line, Plantation	Un metal road
87.	48/1		Agricultural land	Agricultural & non agriculture land	Nala	---
88.	AP-49	91°37'55.65"E 26°36'59.74"N	Agricultural land	Agricultural land	---	---
89.	AP-50	91°37'57.67"E 26°37'9.58"N	Agricultural land	Agricultural land	Ditch	---
90.	AP-51	91°38'4.50"E 26°37'16.67"N	Agricultural land	Agricultural & non agriculture land	LT line	Metal road
91.	AP-52	91°38'5.37"E 26°37'22.05"N	Agricultural land	Agricultural & non agriculture land	---	---
92.	AP-53	91°38'3.62"E 26°37'24.02"N	Agricultural land	Agricultural & non agriculture land	2Nos. Canal, 2Nos. Ditch, Nala, 11KV	Metal Road
93.	AP-54	91°37'51.43"E 26°37'24.63"N	Agricultural land	Agricultural & non agriculture land	---	---
94.	54/1		Agricultural land	Agricultural & non agriculture land	Ditch, Nala	Village road
95.	AP-55	91°37'31.15"E 26°37'35.23"N	Agricultural land	Agricultural & non agriculture land	Pond, LT line	Metal road
96.	AP-56	91°37'25.50"E 26°37'35.65"N	Agricultural land	Agricultural land	---	---
97.	AP-57	91°37'21.84"E 26°37'37.41"N	Agricultural land	Agricultural land	---	---
98.	AP-58	91°37'20.29"E	Agricultural land	Agricultural land	---	---

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
		26°37'43.27"N				
99.	AP-59	91°37'15.84"E 26°37'48.87"N	Agricultural land	Agricultural land	---	---
100.	AP-60	91°37'10.86"E 26°37'49.12"N	Agricultural land	Agricultural & non agriculture land	132 KV S/C D-R T/L	---
101.	AP-61	91°37'0.56"E 26°37'55.52"N	Agricultural land	Agricultural & non agriculture land	2 Nos. Pond	Village road
102.	AP-62	91°36'58.05"E 26°37'59.24"N	Agricultural land	Agricultural land	---	---
103.	Gantry-1		Agricultural land	Agricultural land	---	---
104.	Gantry-2		Agricultural land	Agricultural land	Proposed LILO OF BOTH CIR. 400KV D/C BALIPARA TO BONGAIGAON TL. AT 400/220/132/33 KV NEW RANGIA (KUMARIKATA) SUB-STATION.	---
105.	AP-63	91°36'59.25"E 26°38'6.29"N	Agricultural land	Agricultural land	---	---
106.	AP-64	91°36'54.93"E 26°38'11.40"N	Agricultural land	Agriculture & non agriculture land	---	---
107.	AP-65	91°36'43.90"E 26°38'16.89"N	Agricultural land	Agriculture & non agriculture land	Nala	Village road
108.	AP-66	91°36'37.70"E 26°38'25.71"N	Agricultural land	Agricultural land	Nala	---
109.	AP-67	91°36'32.85"E 26°38'27.56"N	Agricultural land	Agricultural land	---	---
110.	Gantry	91°36'30.09"E 26°38'28.06"N	Agricultural land	Agricultural land	---	---
						Tamulpur - Nagrijuli - Guwabari road
B. LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP OUT)						
1.	Gantry	91°36'30.08"E 26°38'29.17"N	Agricultural land	Agricultural land		
2.	AP-1	91°36'32.75"E 26°38'28.65"N	Agricultural land	Agricultural land	---	Tamulpur - Nagrijuli - Guwabari road
3.	AP-2	91°36'38.56"E 26°38'26.85"N	Agricultural land	Agricultural land	---	---
4.	AP-3	91°36'46.15"E 26°38'17.55"N	Agricultural land	Agriculture & non agriculture land	Nala	---
5.	3/1		Agricultural land	Agriculture & non agriculture land	2 Nos. Nala	Village road
6.	AP-4	91°37'2.97"E 26°38'8.93"N	Agricultural land	Agriculture & non agriculture land	---	---
					---	Village road

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
7.	AP-5	91°37'3.69"E 26°38'3.92"N	Agricultural land	Agricultural land		
8.	Gantry-1		Agricultural land	Agricultural land	---	---
9.	Gantry-2		Agricultural land	Agricultural land	PROP. 400 kV D/C Bongaigaon – Balipara T/L. (LOOP IN).	---
10.	AP-6	91°37'1.05"E 26°37'58.58"N	Agricultural land	Agricultural land	---	---
11.	AP-7	91°37'2.58"E 26°37'55.00"N	Agricultural land	Agricultural land	---	---
12.	AP-8	91°37'10.88"E 26°37'50.38"N	Agricultural land	Agriculture & non agriculture land	---	Village road
13.	AP-9	91°37'16.36"E 26°37'50.18"N	Agricultural land	Agricultural land	132 kV S/C D – R T/L.	---
14.	AP-10	91°37'21.81"E 26°37'43.83"N	Agricultural land	Agricultural land	---	---
15.	AP-11	91°37'22.96"E 26°37'39.14"N	Agricultural land	Agriculture & non agriculture land	---	---
16.	AP-12	91°37'28.74"E 26°37'36.74"N	Agricultural land	Agricultural land	Tamul Plantation, LT line	Metal road
17.	AP-13	91°37'37.01"E 26°37'37.18"N	Agricultural land	Agricultural land	Nala	---
18.	AP-14	91°37'46.76"E 26°37'34.75"N	Agricultural land	Agriculture & non agriculture land	LT line, Pond, Nala, Tamul & Banana Plantation	Un metal road
19.	AP-15	91°37'53.42"E 26°37'29.51"N	Agricultural land	Agricultural land	Tamul & Banana Plantation	---
20.	AP-16	91°38'5.35"E 26°37'25.62"N	Agricultural land	Agriculture & non agriculture land	2Nos 11KV, 2Nos Canel, Tamul Plantation	Metal road
21.	AP-17	91°38'6.56"E 26°37'21.04"N	Agricultural land	Agricultural land	Tamul Plantation	---
22.	17/1		Agricultural land	Agriculture & non agriculture land	LT Line, Baralia River	Metal Road
23.	AP-18	91°38'33.06"E 26°36'55.82"N	Agricultural land	Agriculture & non agriculture land	Tamul Plantation	Village road
24.	18/1		Agricultural land	Agricultural land	---	---
25.	18/2		Agricultural land	Agriculture & non agriculture land	---	Village road
26.	18/3		Agricultural land	Agricultural land	Low land	---
27.	AP-19	91°38'45.08"E 26°36'15.82"N	Agricultural land	Agricultural land	Tamul Plantation	---

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
					Nala, Banana Plantation, 2 Nos Tamul Plantation	Un metal road
28.	AP-20	91°38'50.72"E 26°36'9.13"N	Agricultural land	Agriculture & non agriculture land	---	---
29.	20/1		Agricultural land	Agriculture & non agriculture land	2 Nos Pond, 2 Nos LT Line, 11KV	Metal road
30.	AP-21	91°39'8.74"E 26°36'6.85"N	Agricultural land	Agricultural land	---	---
31.	AP-22	91°39'15.17"E 26°36'1.27"N	Agricultural land	Agricultural land	2 Nos Tamul & Banana Plantation	---
32.	22/1		Agricultural land	Agriculture & non agriculture land	Pond, 3 Nos Ditch, LT Line, Banana plantation	Village road
33.	AP-23	91°39'32.72"E 26°36'0.90"N	Agricultural land	Agriculture & non agriculture land	4 Nos banana plantation	Village road
34.	23/1		Agricultural land	Agricultural land	3 Nos tamul plantation	---
35.	AP-24	91°39'43.72"E 26°35'46.80"N	Agricultural land	Agricultural land	Pond, 2 Nos Banana plantation	Village road
36.	24/1		Agricultural land	Agriculture & non agriculture land	Pond	Village road
37.	AP-25	91°39'45.09"E 26°35'29.26"N	Agricultural land	Agricultural land	Tamul & Banana plantation	---
38.	25/1		Agricultural land	Agricultural land	Ditch	Village road
39.	25/2		Agricultural land	Agriculture & non agriculture land	Banana plantation	---
40.	AP-26	91°39'52.44"E 26°35'2.64"N	Agricultural land	Agricultural land	Banana plantation, Pond	---
41.	26/1		Agricultural land	Agriculture & non agriculture land	Banana & 3 Nos Tamul plantation	Village road
42.	AP-27	91°39'53.25"E 26°34'41.50"N	Agricultural land	Agriculture & non agriculture land	LT Line, Plantation, Pond	Village road
43.	27/1		Agricultural land	Agriculture & non agriculture land	Pond	Village road
44.	27/2		Agricultural land	Agriculture & non agriculture land	2 Nos Pond, Nala	Village road
45.	AP-28	91°39'36.71"E 26°34'14.79"N	Agricultural land	Agriculture & non agriculture land	---	Village road
46.	AP-29	91°39'36.29"E 26°34'8.95"N	Agricultural land	Agricultural land	11 kV	---
47.	AP-30	91°39'41.14"E 26°34'0.95"N	Agricultural land	Agricultural land	Nala, Puthimari river, Banana plantation	Un metal road, Village road
48.	30/1		Agricultural land	Agriculture & non agriculture land		

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
					---	---
49.	30/2		Agricultural land	Agricultural land	---	---
50.	30/3		Agricultural land	Agriculture & non agriculture land	Nala	Village road
51.	AP-31	91°40'49.56"E 26°33'37.79"N	Agricultural land	Agriculture & non agriculture land	Nala	Village road
52.	31/1		Agricultural land	Agricultural land	---	---
53.	31/2		Agricultural land	Agricultural land	---	---
54.	AP-32	91°41'11.39"E 26°33'11.33"N	Agricultural land	Agriculture & non agriculture land	Nala	Village road
55.	32/1		Agricultural land	Agricultural land	Nala	---
56.	32/2		Agricultural land	Agriculture & non agriculture land	Proposed NRL pipeline	Village road
57.	32/3		Agricultural land	Agriculture & non agriculture land	Pond, Nala	Village road
58.	AP-33	91°41'30.97"E 26°32'36.61"N	Agricultural land	Agriculture & non agriculture land	LT line, Pond	---
59.	AP-34	91°41'30.71"E 26°32'27.28"N	Agricultural land	Agricultural land	Banana plantation, Ditch	---
60.	34/1		Agricultural land	Agricultural land	11 kV	---
61.	AP-35	91°41'18.09"E 26°32'12.92"N	Agricultural land	Agricultural land	---	Village road
62.	AP-36	91°41'14.55"E 26°32'3.32"N	Agricultural land	Agriculture & non agriculture land	11 kV, Pond	---
63.	36/1		Agricultural land	Agricultural land	11 kV, Nala	---
64.	36/2		Agricultural land	Agriculture & non agriculture land	---	RCC road
65.	AP-37	91°41'24.23"E 26°31'32.99"N	Agricultural land	Agricultural land	---	---
66.	37/1		Agricultural land	Agricultural land	---	Village road
67.	37/2		Agricultural land	Agriculture & non agriculture land	11 kV	RCC road
68.	37/3		Agricultural land	Agriculture & non agriculture land	---	---
69.	37/4		Agricultural land	Agricultural land	---	Metal road
70.	37/5		Agricultural land	Agriculture & non		

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
				agriculture land	---	---
71.	AP-38	91°41'16.67"E 26°30'29.54"N	Agricultural land	Agricultural land	LT line, Pond	Village road
72.	38/1		Agricultural land	Agriculture & non agriculture land	---	RCC road
73.	AP-39	91°41'25.59"E 26°30'9.63"N	Agricultural land	Agriculture & non agriculture land	Drain, Railway line, 33 kV	---
74.	AP-40	91°41'30.25"E 26°30'5.41"N	Agricultural land	Agriculture & non agriculture land	---	---
75.	40/1		Agricultural land	Agricultural land	---	---
76.	AP-41	91°41'33.04"E 26°29'45.70"N	Agricultural land	Agricultural land	---	---
77.	41/1		Agricultural land	Agricultural land	Nala	---
78.	41/2		Agricultural land	Agricultural land	---	---
79.	41/3		Agricultural land	Agriculture & non agriculture land	11 kV	RCC road
80.	AP-42	91°41'10.22"E 26°29'7.81"N	Agricultural land	Agriculture & non agriculture land	---	---
81.	42/1		Agricultural land	Agricultural land	---	---
82.	42/2		Agricultural land	Agriculture & non agriculture land	---	Village road
83.	AP-43	91°41'21.62"E 26°28'40.35"N	Agricultural land	Agriculture & non agriculture land	---	---
84.	43/1		Agricultural land	Agricultural land	11 kV	RCC road
85.	43/2		Agricultural land	Agriculture & non agriculture land	---	---
86.	AP-44	91°41'20.93"E 26°28'11.22"N	Agricultural land	Agricultural land	Nala	---
87.	AP-45	91°41'13.94"E 26°28'6.31"N	Agricultural land	Agricultural land	LT Line, Puthimari River	RCC road, Village road
88.	AP-46	91°40'58.26"E 26°28'2.74"N	Agricultural land	Agriculture & non agriculture land	---	---
89.	AP-47	91°40'46.66"E 26°27'59.81"N	Agricultural land	Agricultural land	LT Line	Village road
90.	47/1		Agricultural land	Agriculture & non agriculture land	Pond, LT line, 11 kV	Metal road
91.	AP-48	91°40'24.25"E 26°28'8.17"N	Agricultural land	Agriculture & non agriculture land	---	Village road
92.	AP-49	91°40'13.51"E	Agricultural land	Agricultural land		

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
		26°28'6.39"N			---	---
93.	49/1		Agricultural land	Agricultural land	---	Village road
94.	49/2		Agricultural land	Agriculture & non agriculture land	Ditch, Pond	Village road
95.	AP-50	91°39'51.13"E 26°27'41.86"N	Agricultural land	Agriculture & non agriculture land	Ditch, 11 kV	Metal road
96.	AP-51	91°39'52.36"E 26°27'32.28"N	Agricultural land	Agriculture & non agriculture land	---	Village road
97.	51/1		Agricultural land	Agricultural land	---	---
98.	51/2		Agricultural land	Agricultural land	---	---
99.	AP-52	91°40'18.67"E 26°27'16.00"N	Agricultural land	Agricultural land	Plantation	Village road
100.	AP-53	91°40'19.72"E 26°27'7.24"N	Agricultural land	Agriculture & non agriculture land	132KV S/C Rangia - Sipajhar T/L, Pond	---
101.	AP-54	91°40'18.54"E 26°27'1.79"N	Agricultural land	Agricultural land	2 Nos. Pond	Village road
102.	AP-55	91°40'15.54"E 26°26'55.33"N	Agricultural land	Agriculture & non agriculture land	132 kV S/C Rangia to Rowta (AEGCL)	Metal road
103.	AP-56	91°40'13.72"E 26°26'49.77"N	Agricultural land	Agricultural land	Pond	---
104.	AP-57	91°40'16.90"E 26°26'39.16"N	Agricultural land	Agricultural land	Ditch	Village road
105.	AP-58	91°40'16.01"E 26°26'29.16"N	Agricultural land	Agricultural land	Ditch, 132 kV D/C Rangia to Kamalpur (AEGCL)	---
106.	AP-59	91°40'12.57"E 26°26'25.20"N	Agricultural land	Agriculture & non agriculture land	2 Nos. Ditch	Metal road
107.	AP-60	91°40'14.51"E 26°26'16.02"N	Agricultural land	Agriculture & non agriculture land	Ditch	Village road
108.	AP-61	91°40'10.74"E 26°26'8.00"N	Agricultural land	Agriculture & non agriculture land	11kV, 2 Nos Fishery	Metal road
109.	AP-62	91°40'13.69"E 26°26'0.95"N	Agricultural land	Agricultural land	4 Nos Fishery	---
110.	AP-63	91°40'13.81"E 26°25'51.21"N	Agricultural land	Agricultural land	2 Nos Fishery	---
111.	AP-64	91°40'7.81"E 26°25'46.28"N	Agricultural land	Agricultural land	2 Nos Fishery	Village road
112.	AP-65	91°39'55.85"E 26°25'44.52"N	Agricultural land	Agriculture & non agriculture land	---	---
113.	65/1		Agricultural land	Agricultural land	11kV, LT line	Village

Sl. No.	Tower No.	Geographical Coordinates	Current Land use and Land Ownership of Tower Base	Current Land use of Transmission Corridor	Environmental Sensitivity within RoW (water body/ streams/ forest)	Access Road within RoW
114.	65/2		Agricultural land	Agriculture & non agriculture land		road, Metal road
115.	AP-66	91°39'26.11"E 26°25'27.89"N	Agricultural land	Agricultural land	Fishery	---
116.	66/1		Agricultural land	Agricultural land	---	---
117.	66/2		Agricultural land	Agriculture & non agriculture land	---	Village road
118.	66/3		Agricultural land	Agricultural land	Ditch, Low land	---
119.	66/4		Agricultural land	Agricultural land	Low land, Fishery	---
120.	AP-67	91°38'37.20"E 26°25'48.94"N	Agricultural land	Agricultural land	Nala	---
121.	AP-68	91°38'29.76"E 26°25'47.42"N	Agricultural land	Agriculture & non agriculture land	---	---
122.	AP-69	91°38'22.37"E 26°25'42.60"N	Agricultural land	Agriculture & non agriculture land	11 kV, 33 kV	Village road
123.	Ext-T-13	91°38'22.01"E 26°25'35.06"N	Agricultural land	Agricultural land	---	Metal road

Source: Checked Survey report

It is evident from the above table that,

- The transmission line passes through the agriculture/crops/trees/vegetation/non-agricultural land and water bodies.
- No major settlements and cultural heritage within 100 m distance from the center line of RoW of transmission line;
- Most of the transmission towers can be accessed through village roads, and cart tracks etc.

Box 2.1 Ground Clearance for different features

- Crossing another power line: 66kV -3.05, 132 kV and 220 kV- 4.58 m; 400 kV- 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;

Source: APTRANSCO- Technical Reference book- 2011-vol. ii.

Map showing road network in area is given below.

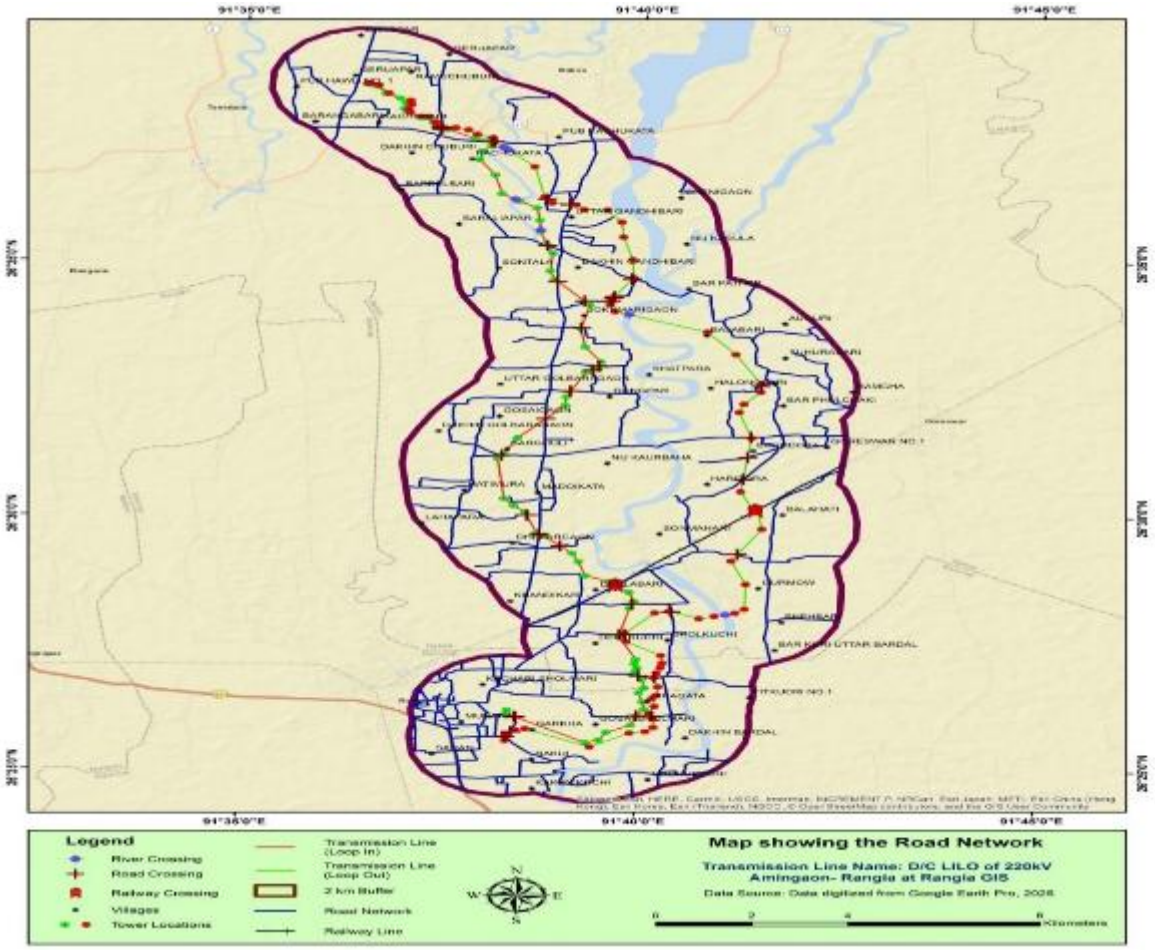


Figure 2.3: Map showing road network in area of LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN & LOOP OUT)

2.3 Overview of activities during different phases of the project

Construction Phase

A brief on activities under taken during construction phase are given in table below.

Table 2.5: Brief on Construction Activities

Activity	Details
Transmission Lines	
Pre-construction Activity	• A reconnaissance, walkover and detailed route survey was carried out to identify the corridor and fixing the alignment; • Preliminary & Detail Survey was conducted for finalizing the tower spotting and alignment of route. • Soil investigation at tower locations was carried out to ascertain the type of foundation to be adopted.
Marking of the Route and Right of Way (RoW)	• The right of way is taken as 35 m for 220kV including both sides from the centre line of the transmission line. • The Tower location will be identified on the ground in accordance with the line route during Check Survey. • Tree enumeration will be finalized as per the Corridor ROW.
Clearing of Towering	• At the tower sites, all vegetation within the footprint of the tower base and for a distance of approximately 2 m beyond the base in all directions will be cleared

Activity	Details
Sites	to ground level.
Foundations for Towers	• Pit marking will be done for the legs of the tower and excavation will be done accordingly. The excavated soil will be stored at the site of each foundation and used for backfilling purposes. Excavated soil ranges from 22.726 m3 to 619.120 m3 at tower locations depending on the type of tower and soil strata; • Foundation for towers will be laid depending upon the type of soils encountered. The formwork, reinforcing bars, the embedded parts of the towers and any earthing elements will be placed in the pits. A concrete cement pad will be laid at the base of the foundation. The depth of foundation below ground will be generally 3.0 - 3.5 m. • Lag time of 28 days, as specified by the Indian Standards, will be maintained for curing of concrete before erection of the towers. About 50 KL of water will be required at each site for foundation and curing activities. • The foundation pits will be backfilled following the removal of the formwork with soil excavated from the site itself. The top part of the stub of the tower leg will remain above the ground level after the backfilling. • The excess soil will be disposed in the surrounding agricultural fields. On an average, 80 m3 of excess earth will be generated at each tower location. • Earthing will be done as per specification.
Erection of Towers	• The time duration for tower erection ranges between 2 - 3 days for all series of tower. Erection of towers will be done by assembling prefabricated components of the lattice structure followed by straightening and then concreting through hydra cranes. The manpower involved in one tower erection will be minimum 20 workers.
Stringing	• The Tower will be checked for any missing parts and tightness of nuts and bolts before stringing. • The stringing operations between two sections normally take 2-4 days. The operation involves 'paying off' the conductors and earth wires on the ground and then hoisting them with the help of winch machine/Tensioner Puller for fixing with the towers at both ends along with insulators and hardware. Stringing of the section between two angle towers will be done at a time. • The tensioning and sagging will be done in accordance with the approved initial stringing charts before the conductors and ground wire will be finally attached to the towers through the ground wire clamps for the ground wire and insulator strings for the conductor as well as earthwires; • The stringing process requires min 20-25 workers.
Protection of Tower Footing (if required)	• Based on site conditions, special measures for protection of foundations are to be taken in respect of locations close to / in nallah, river beds, etc.
Final checking	• The final checks are to be done by the concerned Field Officer jointly with the Contractor for foundation and tower footing / protection work, towers and tower accessories, earthing, Conductor, Insulators, Earthwires, RoW & Clearances.
Testing and Commissioning	• On completion of the construction work, a series of thorough inspections and commissioning tests will be carried out before the Transmission Line will be put into service as Safety Measures for Operation. • After carrying out final checking there will not be any defects / short comings in the work of the transmission line, the line will be considered as having been completed and clear for energizing.

Source: Detailed & Check Survey report

Operation and Maintenance Phase

EPC contractor is obligated to address any issues arises during defect liability period as per the contract terms. The defect liability period is considered as one year from the date of completion and operational acceptance of the facilities or part thereof. AEGCL will perform required Operation and

Maintenance after final handover by EPC contractor. Following are activities to be performed during operation period.

Table 2.6: Brief on Operation Activities

Activity	Details
Transmission Line	
Ground inspection by lineman / team	For 220 kV T/L
Inspection of Towers	Repeated tripping of line-on-line faults and fault is untraceable during ground patrolling.
Thermo-vision scanning	After first charging of T/L
Punctured insulator detection	Lines having insulator de-capping incidents.
Attending all Defects	Foundation- backfilling / soil removal, crack of chimney, tree trimming, cleaning of insulators etc.

Source: Checked Survey report

2.4 Manpower requirements and organization structure

EPC contractor is responsible for the overall engineering, procurement, supply, construction, erection, installation, commissioning of the project. The sub-contractors shall be recruited for the fulfilment of the specific scope of works. Approx. 60 numbers of labour will be engaged by the contractor during construction period. For tower base construction local skilled and unskilled labours are engaged. However, for erection and stringing of towers skilled migrant labours will be engaged.

2.5 Land requirement and allotment process

Land requirement

The land requirement for the transmission lines is comprised primarily of the following:

- The RoW of "LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP-IN) is 35 meter with a line length of 31.311 km and approx. 1095885 sq. m of land i.e. 109.5885 hectare of affected land area is involved. The RoW of "LILO of both circuit of Rangia (Ext) to Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP-OUT) is 35 meter with a line length of 35.195 km and approx. 1231825 sq.m of land i.e. 123.1825 hectare of affected land area is involved.
- The route of "Loop-In" line comprises of land from 16 villages namely Garka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Shijiguri, Uttar Gandhibari, Baraliapar, Kachukata, Kachubari. The route of "Loop-out" line comprises of land from 18 villages namely Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Bakbari, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Deulkuchi, Uttar Bardal, Gosai Solmari, Depteswari, Garaka.
- The ground area required for different types of towers are:- for DA type towers approx. 35 to 51 sqm., DB type towers is approx. 47 to 66 sqm., DC type towers is approx. 50 to 70 sqm. and DD type towers is approx. 57 to 79 sqm.

Table 2.7: Summary of Land Requirement for the Project

Project Sub Component	Affected Village	Total Land (ha)	Approx. Number of Project Affected Families
LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN)			
Transmission line RoW (Corridor Width of 35m)	Garka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Shijiguri, Uttar	109.59	Landowner identification for RoW is under process

	Gandhibari, Baraliapar, Kachukata, Kachubari.		
Base are for Tower footing	Garka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Shijiguri, Uttar Gandhibari, Baraliapar, Kachukata, Kachubari.	1.66	Landowner identification for Tower base area is under process
LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP OUT)			
Transmission line RoW (Corridor Width of 35m)	Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Bakbari, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Deulkuchi, Uttar Bardal, Gosai Solmari, Depteswari, Garaka.	123.1825	Landowner identification for RoW is under process
Base area for Tower footing	Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Bakbari, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Deulkuchi, Uttar Bardal, Gosai Solmari, Depteswari, Garaka.	1.99	Landowner identification for Tower base area is under process

Source: Check survey report

The Joint verification for identification of land owners for two numbers of proposed (LOOP IN/LOOP OUT) transmission line RoW, as well as tower footing is under process. After finalization of the land scheduling report and approval from concerned Circle Office, the ARAP/RAP report will be prepared before commencement of works.

Land allotment process

The RoW permission for the transmission line has been obtained in keeping 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 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.

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 interrupter 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."

- **MoP Guidelines for Payment of Compensation Towards Damages in regard to RoW, October 2015**

  Ministry of Power (MoP), Government ofIndia (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.PEI.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.

Table 2.8: Steps wise Procedure for payment of compensation of RoW

Sl. No.	Procedure for payment of compensation
1.	Apply NOC for ROW as per standard format.
2.	Grant of NOC
3.	Issue notice in State Gazette/local newspaper as per standard format.
4.	Detail survey
5.	Check Survey
6.	Assessment, jointly with concerned district administration, of properties likely to be affected and preparation of estimates as per standard formats and verify the same.
7.	Finalization of tower design/ tower structure/ tower foundation/ tower testing.
8.	Assisting district administration in preparation of valuation report based on Govt. approved rates.
9.	Working out compensation amount to be paid to the individual beneficiaries
10.	Completion of the Assessment report/estimate and countersignature by Circle Officer and verify the same by concerned officials of AEGCL.
11.	Preparation of Provisional Notice as per format, countersigned by Circle Officer and acknowledgement from beneficiaries.
12.	Preparation of Compensation Receipt as per format and countersignature by Circle Officer
13.	Serving the provisional notice to individual beneficiaries and obtaining their acknowledgement.
14.	Documents collection from affected person.
15.	Submission of proposal to HQ for requisition of fund along with all approved documents
16.	Re-Checking of all documents and Payment to individual beneficiaries and acknowledgment to be obtained on each receipt.
17.	Disbursement of compensation directly from AEGCL.

Source: AEGCL T/L Manual

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 zirat 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, Jamabandi copy/ Khajana 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 damage8d 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.

2.6 Costs and implementation schedule

Cost of LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN & LOOP OUT)

Supply Portion – Rs. 810850348.16 with GST.
Erection Portion – Rs. 380256763.51 with GST.

Implementation schedule

The detailed implementation schedule has been approved by AEGCL. The details of work progress as per L2 schedule is presented below.

	Project:	"Construction of 400/220 KV, 2 x 500 MVA, 220/132 KV, 2 x 160 MVA and 132/33 KV GIS at Rangia (Kumarikata) along with the Associated Transmission Lines with Bay Extension works at Existing 132/33 KV Nalbari GSS (Package G)
	Contract No -	AEGCL/MD/AIIB/PACKAGE-G/2024/CON-13 dated 19-03-2025
	Line Name -	LILO of both circuits of Rangia (ext) - Amingaon 220kV line (on Single Zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link
	Completion Period as per LOA:-	24 Months(19-03-2024 - 19-03-2026)
	Effective date of Commencement:-	24 Months(08.07.2024 - 08.07.2026)
	Contractor : -	M/s Shyama Power India Limited JV With M/s Stelmec Limited

Sl. No	Material Description	Start Date	End date	UoM	Quantity	2024						2025												2026						
						Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1	Stub supply	01.12.2024	30.05.2025	Nos	237						156			66		15														
2	Stub Template	01.12.2024	30.03.2025	Nos	133						90			43																
3	Tower supply	01.03.2025	30.07.2025	Nos	237									65	91		57	24												
4	Conductor Supply	01.03.2025	30.08.2025	KM	430									215					215											
5	Line Material Supply	01.03.2025	30.08.2025	%	100									70					30											
6	OPGW Cable	01.08.2025	30.08.2025	%	100														100											
7	OPGW Fittigs & accesores	01.08.2025	30.08.2025	%	100														70			30								
8	Detailed Survey submission & approval	01.09.2024	30.01.2024	KM	67.27			10	20	20	17.27																			
9	Foundation with Earthing	01.01.2025	30.03.2026	Nos	237							7	15	20	20	20	10	10	15	20	20	20	20	20	15	5				
10	Tower erection with tack welding	01.04.2025	30.04.2026	Nos	237										7	10	15	20	20	30	30	20	20	20	20	20	5			
11	Final stringing of Conductor.	01.09.2025	30.05.2026	KM	67.3															3	5	5	8	8	10	10	10	8.30		
11	Final stringing of OPGW	01.01.2026	30.05.2026	KM	67.3																			10	10	15	15	17		
12	Testing & Final Commissioning	01.05.2026	30.06.2026	%	100																							50	50	

CGM (PP&D)
O/O the MD,AEGCL

2.7 Existing and associated facilities of the project

The 220kV D/C Rangia-Amingaon line is an existing facility of Assam Electricity Grid Cooporation Limited (AEGCL) which is currently under operation. The proposed transmission line "The LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link" will be looped in and looped out from this existing line.

No associated facilities have been identified within the subproject area in accordance with AIIB's defined criteria.

3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter describes provisions of Constitution of India, various applicable laws, regulations and policies of Government of India (GoI) and Government of Assam (GoA), International conventions and the Asian Infrastructure Investment Bank (AIIB).

3.1 Provisions of Constitution of India

As a sequel to the UN Conference on the Human Environment (1972), Indian Parliament in 1976 amended the Constitution of India by introducing articles 48A and 51A. These articles incorporated environmental concerns into the Directive Principles of state policy and postulated as a fundamental duty of all citizens to preserve and protect the environment.

3.2 GOI and GOA Laws/Regulations/Policies

Table 3.1: Environmental and Social Policies and Regulatory Requirements (National and Assam State Regulation)

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
Environmental Regulations					
1.	The Electricity Act, 2003	An Act to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas.	Central Electricity Authority, Regulatory Commissions and establishments	Applicable, transmission line projects are constructed under the ambit of Electricity Act, 2003 following the provisions of Section 67 & 68 of act which mandates licensing for the entities involved in the construction, operation and maintenance of the project. Contractor to follow all the requirements as per the Act.	EPC Contractor / PMC / AEGCL
2.	EIA Notification, 2006 and subsequent amendments	Projects indicated in the schedule of this notification require EIA study and environmental clearance.	Ministry of Environment, Forest and Climate Change (MoEF & CC) or State Environmental Impact Assessment Authority (SEIAA)	Not Applicable, transmission line project does not come under purview EIA Notification 2006 and its subsequent amendments. Thus, Environmental Clearance is not required.	

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
				However, project associated activities like creation of borrow area (if any) extraction of boulders, River Sand etc. for the project will require prior Environmental Clearance.	
3.	National Environment Policy (NEP), 2006	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	MoEF & CC/CPCB MoEF&CC, GoI, CPCB/SPCB, Department of Environment and Forest, GoA MoEF& CC, IRO Guwahati,	Applicable, should adhere to NEP conservation of environmental resources and abatement of pollution.	EPC Contractor / PMC / AEGCL
4.	The National Green Tribunal Act, 2010	An act established for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for	National Green Tribunal (NGT)	Applicable, respected to area where development activities may cause any damage to environment and property. Should adhere to NGT mandate.	EPC Contractor / PMC / AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
		matters connected therewith or incidental thereto.			
5.	Environment Protection Act, 1986 and subsequent amendments and rules Eco-Sensitive Zone Notifications	An umbrella act for environmental protection in India. Various rules, notifications and standards established under the Act. Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards notified.	MoEF & CC/CPCB MoEF&CC, GoI, CPCB/SPCB, Department of Environment and Forest, GoA MoEF& CC, IRO Guwahati,	Applicable, comply with applicable standards for ambient air, air emission, effluents, receiving water bodies, and drinking water at the consumer end.	EPC Contractor / PMC / AEGCL
6.	Biological Diversity Act, 2002 Assam Biodiversity Rules, 2010	The Act provides a comprehensive legal framework for conservation and sustainable use of bio-resources reflects a strict regime for access, control and benefit sharing. It restricts access and use of biological resources by outsiders and creates decentralized institutional structures for conservation of biological diversity.	National Biodiversity Authority (NBA), Assam State Biodiversity Board (ASBB) and Biodiversity Management Committees (BMCs)	Applicable, should adhere measures as per the Act.	EPC Contractor / PMC / AEGCL
7.	The Forest (Conservation) Act,1980 and subsequent amendments and rules	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes shall seek approval of the Central Government	MoEF&CC, GoI, Department of Environment and Forest, GoA MoEF& CC, IRO Guwahati	Not Applicable, no notified forest land within the subproject area.	-
8.	National Forest Policy 1988	It articulates the twin objectives of ecological stability and social justice; recognizes people's dependence and their symbiotic relation with forest, emphasizes protection of people's rights over forest resource and offers space for	Department of Environment and Forest, Assam, MoEF&CC, New Delhi	Not Applicable, no notified forest land within the sub-project area.	-

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
		participation of forest dependent communities in the conservation, protection and management of state-owned forests.			
9.	Assam Forest Policy, 2004	This policy is to ensure progressive sustainable development of the forests of Assam, to meet the twin objectives of environmental stability and ecological balance together with improved livelihood support system for people.	Department of Environment and Forest, Assam	Not Applicable	-
10.	The Compensatory Afforestation Fund Act, 2016 State Compensatory Afforestation Fund Management and Planning Authority Forest (Conservation) Amendment Rules, 2014	This act provides for the establishment of funds under the public accounts of India and the public accounts of each State and crediting thereto the monies received from the user agencies towards compensatory afforestation, additional compensatory afforestation, penal compensatory afforestation, net present value and all other amounts recovered from such agencies under the Forest (Conservation) Act, 1980. The collected funds will be utilized for afforestation, regeneration of forest system, wildlife protection and infrastructure development	Department of Environment and Forest, Assam and MoEF&CC, New Delhi	Not Applicable, no notified forest land within the sub-project area.	-
11.	The Assam Compensatory Afforestation Fund Rules,	Provision to constitute a Fund for the purpose of Compensatory Afforestation to be	Department of Environment and Forest, Assam	Not Applicable, no notified forest land within the sub-project area.	-

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
	1994	raised against the Forest Area diverted for non-forest use under the provisions of Section 4(1) of the Forest (Conservation) Act, 1980			
12.	Assam (Control of Felling & Removal of trees from Non-Forest Land) Rules 2002 and subsequent amendment	These rules prescribe how tree plantations raised in non-recorded forest areas by individuals or institutions are to be governed. They specify which plantations need to be registered, which tree species do not require felling permission, what process is to be followed in order to fell trees outside non recorded forest areas, how is the transit of timber originating from non-recorded forest areas regulated and how and why timber can be confiscated to the Government.	Department of Environment and Forest, Assam	Applicable	EPC Contractor / PMC / AEGCL
13.	The Assam Trees Outside Forest (Sustainable Management Rules), 2022	Provides regulation for Tree Cutting Permission outside forest in a sustainable manner.	Department of Environment and Forest, Assam (PCCF, DFO)	Applicable if tree felling requires during the construction of the sub-projects	EPC Contractor / PMC / AEGCL
14.	Wildlife Protection Act, 1972 and Subsequent Amendments	The Act provides for the protection of wildlife and for all matters that are connected to wildlife and their habitat. This Act prohibits destruction, exploitation or removal of any wildlife, and provides for protection to listed species of flora and fauna.	Department of Environment and Forest, Assam, NBWL, SBWL	Not applicable as per MOEF&CC Notification dated 17 May 2022. Transmission Lines are not located within the boundaries of protected areas.	-
15.	Air (Prevention and Control of Pollution) Act,	This Act was enacted to achieve prevention, control and abatement	State Pollution Control Board, Assam.	Applicable, implement measures to	EPC Contractor / PMC / AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
	1981 and subsequent amendments The Air (Prevention & Control of Pollution) Assam Rule, 1991	of air pollution activities by assigning regulatory powers to Central and State boards for all such functions. The Act also establishes ambient air quality standards.		mitigate air pollution from project activities; construction facilities.	
16.	Noise Pollution (Regulation and Control Act) 2000 and subsequent amendments	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Central Pollution Control Board & State Pollution Control Board, Assam	Applicable, contractors to ensure all noise-producing activities during civil works conform to standards	EPC Contractor / PMC / AEGCL
17.	Water Prevention and Control of Pollution) Act, 1974 and subsequent amendments The Water (Prevention & Control of Pollution) Assam Rule, 1977	Act was enacted to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, by Central and State Pollution Control Boards and for conferring on and assigning to CPCB/SPCBs powers and functions relating to water pollution control. Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974.	State Pollution Control Board, Assam. Prevention of water pollution due to project activities	Applicable, implement measures to mitigate water pollution from project activities; construction facilities.	EPC Contractor / PMC / AEGCL
18.	Wetland (Conservation and Management) Rules, 2010, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central	Central Wetlands Regulatory Authority (CWRA)	Not Applicable, none of the T/L falls within notified wetland areas.	

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
		Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.			
19.	Hazardous & Other Waste (Management and Transboundary Movement) Rules, 2016	Protection to general public against improper handling, storage and disposal of hazardous waste. The rules prescribe the management requirement of hazardous wastes from its generation to final disposal.	State Pollution Control Board, Assam, Local Municipal Board (MCB) and other Local Bodies. Contractor needs to submit plan for reuse or safe disposal.	Applicable, Hazardous & Other Waste generated will be managed and disposed off as per requirement.	EPC Contractor / PMC / AEGCL
20.	Construction and Demolition Management Rule 2016 of MOEF & CC (26 March 2016)	Applies to everyone who generates construction and demolition waste. Every waste generator shall segregate construction and demolition waste and deposit at collection center or handover it to the authorized processing facilities Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains.	State Pollution Control Board, Assam, Local Municipal Board (MCB) and other Local Bodies. Contractor needs to submit plan for reuse or safe disposal.	Applicable, follow all the rules in managing construction debris and waste (soil, road debris etc.,) during construction works	EPC Contractor / PMC / AEGCL
21.	Solid Waste Management Rules 2016	Rules for management of municipal solid waste. Responsibility of solid waste generator include waste segregation, and no throwing, burning or burry the solid waste generated on streets, open public spaces outside the	State Pollution Control Board, Assam and Local Municipal Board (MCB) and other Local Bodies. Contractor needs to submit plans for its safe disposal/burial.	Applicable, follow all the rules in managing solid waste during construction works activities	EPC Contractor / PMC / AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
		premises or in the drain or water bodies, storage and disposal as per the rules.			
22.	E - w a s t e Management Rules, 2016	The rules are applicable to the consumers of electrical and electronic equipment. Large consumers of electrical and electronic equipment are required to ensure that e-waste generated by them is channelized through authorized collection centres or service providers to authorized dismantler or recycler. Additionally, records for e-waste are to be maintained for the State Pollution Control Board.	Central Pollution Control Board & State Pollution Control Board, Assam	Applicable	EPC Contractor / PMC / AEGCL
23.	Batteries (Management and Handling) Rules, 2001	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.	State Pollution Control Board, Assam	Not Applicable	-
24.	Central Motor Vehicle Rules, 1989	To minimize the road accidents, penalizing the guilty, provision of compensation to victim and family and check vehicular air and noise pollution.	Commissionerate of Transport (District Transport Offices, Assam)	Applicable during transportation of manpower and construction material. Also applicable during the use of construction equipment and vehicles.	EPC Contractor / PMC / AEGCL
25.	The Mines and Minerals (Development and Regulation) Act, 1957	For development and regulation of mines and minerals in a sustainable manner. The rules regulate the mining of mineral and dealerships for mining and trading.	Directorate of Geology and Mining, Assam and Department of Environment and Forest, Assam	Applicable, as the construction works shall require stones, aggregates, sand, earth, etc.	EPC Contractor / PMC / AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
26.	Assam Minor Mineral Concession Rules, 2013 and subsequent amendment, 2021	Provide regulations established by state governments or relevant authorities to govern the extraction and management of minor minerals. The amendment prescribes the rates (as per the 3rd schedule) at which Royalties shall be paid when minor minerals are used or consumed by Government Agencies.	Directorate of Geology and Mining, Assam and Department of Environment and Forest, Assam	Applicable, as the construction works shall require stones, aggregates, sand, earth, etc.	EPC Contractor / PMC / AEGCL
27.	Disaster Management Act, 2005	This act provides an effective management of disasters and for matters connected therewith or incidental thereto.	Assam State Disaster Management Authority (ASDMA)	The subproject areas fall under the seismic zone V and hence any construction activities/ interventions will be under purview of this act.	EPC Contractor / PMC / AEGCL
28.	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 dept. in relation to adopted measure.	Assam State Disaster Management Authority (ASDMA)	The subproject areas fall under the seismic zone V and hence any construction activities/ interventions will be under purview of this act.	EPC Contractor / PMC / AEGCL
29.	Energy Conservation Act, 2001	This act provides for efficient use of energy and its conservation and for matters connected therewith or incidental thereto.	Inspectorate of Electricity (IEC), Assam	Applicable all project activities involve use of energy efficient equipment etc.	EPC Contractor / PMC / AEGCL
30.	National Building Code, 2016	The National Building Code of India (NBC), a comprehensive building Code, is a national instrument providing guidelines. For	Approval building plan from appropriate agency.	Not Applicable	-

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
		regulating the building construction activities across the country. The code provides the 'accepted standards' in relation to material specification, testing or other related information. The code provides development control rules and general building requirements (e.g. floor area ratio, specifications on building design, etc.).			
31.	Guidelines to Regulate and Control Ground Water Extraction in India, 2019	This act regulates and control ground water extraction for various construction purpose.	Central Ground Water Board (CGWB)	Not Applicable	-
Social Regulations					
32.	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 Rights of Persons with Disabilities Act, 2016	The act aims to provide fair compensation to landowners and ensure transparency in land acquisition processes. Additionally, it focuses on the rehabilitation and resettlement of affected persons. It gives effect to the proclamation on the full participation and equality of the persons with disabilities and provides the right to equality, life with dignity, and respect for his or her own integrity equally with others.	State Revenue Department/ District Administration Ministry of Social Justice & Empowerment/ Commissionerate of Labour, Government of Assam	No Applicable as involuntary land acquisition is not triggered Yes. For all the sub-project where Persons with Disabilities are present and affected persons. Would comply with relevant provision of the Act.	AEGCL
33.	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	Central Telegraph Authority	Applicable for T/L project.	EPC contractor / PMC / AEGCL
34.	MoP Guidelines	Guidelines for payment	Ministry of Power,	Applicable for T/L	EPC contractor /

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
	for Payment of Compensation Towards Damages in 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.	of compensation towards damages in regard to Right of Way for transmission lines	Govt. of India	project.	PMC / AEGCL
35.	Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024)	Guidelines for compensation related to Right of Way (Row) for transmission lines	Ministry of Power, Govt. of India	Applicable for T/L project.	EPC contractor / PMC / AEGCL
36.	Assam Government Power (Electricity) Department, Dispur, Guwahati-6	Payment of compensation towards damages in regards to Right of Way for transmission lines	Assam Government Power (Electricity) Department	Applicable for T/L project.	EPC contractor / PMC / AEGCL
37.	Right to information Act, 2005	The Act provides for setting out the practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, contain corruption.	Directorate of Economics and Statistics, Government of Assam	The project activities come under the preview of Right to Information Act and any citizen can obtained any information about any aspect of the project. All documents pertaining to the project would be	EPC Contractor/PMC /AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
				disclosed to public.	
38.	Forest Right Act, 2006 /Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	This is an act to recognize and vest the forest rights and occupation in forest land in forest dwelling scheduled tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded; to provide for a framework for recording the forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forest land. The Act provides for use, access and ownership to forest resources, biodiversity and provision for benefit sharing for ST and other forest dwelling communities.	Department of Environment and Forest, Assam and District Administration	Not Applicable, no notified forest land within the subproject area	
39.	Direct Purchase Policy, 2023	In the States policy of Direct Purchase of land, the affected land, immovable assets and other assets attached with the land will be evaluated by the District Level Direct Purchase Committee (DLLPC) according to sections 26 to 30 & Schedule I of RFCTLARR Act 2013 along with Multiplication factor of Assam. The land owners will get an incentive of 25%, inclusive of R&R Benefits, on the compensation calculated as per provisions of Section 26 to 30, Valuation of	Revenue & Disaster Management (LR) Department, Govt. of Assam	Will not be trigger for the TL.	

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
		immovable assets & Schedule I of RFCTLARR Act 2013, as he has readily agreed to be a part of the project assets & Schedule I of RFCTLARR Act 2013, as he has readily agreed to be a part of the project.			
40.	The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	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 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.	Archaeological Survey of India (ASI), Go	No notified Archaeological site is located within 300m of the sub project. However, if any chance findings finds during the construction of TL mitigation measures will be taken.	EPC Contractor/PMC /AEGCL
41.	Government of India Act, 1935 (6th Schedule)	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 state	District Autonomous council	Not Applicable	
Labour Laws Applicable to Establishments Engaged in Building and Other Construction Work					
42.	Building and Other Construction Workers (Regulation of Employment	It regulates the employment and conditions of service of building and other construction workers and provides for their	Commissioner ate of Labour, Government of Assam	Applicable to ensure safety and welfare measures for workers employed at construction sites.	EPC Contractor/PMC /AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
	and Conditions of Service) Act, 1996	safety, health and welfare.		License, Safety and welfare measures for work force employed at construction sites are to be regulated in conformity with this act. Should adhere and follow the act.	
43.	Workmen Compensation Act, 1923	It provides for payment of compensation by employers to their employees for injury/ fatalities / disablement by accident including occupational disease.	Commissioner ate of Labour, Government of Assam	Applicable because contractor shall be applying large number of labours during construction which will include both Men and Women. Should follow as per the requirement of the Act,	EPC Contractor/PMC /AEGCL
44.	Employees State Insurance Act, 1948	Employees State Insurance Act provides sickness benefit, maternity benefit (Female employees), disablement benefit, dependent's benefit and medical benefits as specify in the act to the employees.	Commissioner ate of Labour, Government of Assam	Applicable Should follow as per the requirement of the Act,	EPC Contractor/PMC /AEGCL
45.	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.	Commissioner ate of Labour, Government of Assam	There should not be any child labour (less than 14 years) engaged in any project activity and adolescents (above 14 and less than 18 years) in any hazardous activity. Should follow as per the requirement of the Act.	EPC Contractor/PMC /AEGCL
46.	Sexual Harassment of Women at the Workplace (Prevention, Prohibition and	The Act is meant to serve as guidelines for the employees subject to the provisions of the Sexual Harassment of Women at Workplace	District Administration	Applicable. If women workers at project workplaces are engaged. It will safeguard and protect women	EPC Contractor/PMC /AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
	Redressal) Act, 2013 (POSH Act)	(Prevention, Prohibition and Redressal) Act, 2013. It aims to set out effective measures to avoid & to eliminate & if necessary to impose punishment for any sexual harassment in the workplace.		involved in the project from Sexual Harassment. Should adhere as per the requirement of the Act.	
47.	Contract Labour (Regulation & Abolition) Act 1970 along with the rules, 1971	The objective of the Contract Labour Regulation and Abolition) Act, 1970 is to prevent exploitation of contract labour and also to introduce better conditions of work.	Commissioner ate of Labour, Government of Assam	Contractors shall employ work-force during 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.	EPC Contractor/PMC /AEGCL
48.	Minimum Wages Act, 1948 along with Central Rules, 1950 The minimum wages rules Assam 1952	To ensure that workman gets at least minimum wages as fixed by Govt. Minimum wages sets the lowest limit below which wages cannot be allowed to sink.	Commissioner ate of Labour, Government of Assam	Applicable, Contractor should comply minimum wages act.	EPC Contractor/PMC /AEGCL
49.	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.	Commissionerate of Labour, Government of Assam	Applicable, Contractor should adhere the both Gratuity Act and Rules.	EPC Contractor/PMC /AEGCL
50.	Employees Provident Fund and Miscellaneous Provision Act, 1952 along with EPF Scheme Rules and	It is a beneficent piece of social welfare legislation aimed at promoting and securing the well-being of the employees.	Commissionerate of Labour, Government of Assam	Applicable, Contractor should adhere the Act.	EPC Contractor/PMC /AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
	Forms				
51.	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.	Commissionerate of Labour, Government of Assam	Applicable, Contractor should follow as per the requirement of the Act.	EPC Contractor/PMC /AEGCL
52.	The Bonded Labour (Abolition) Act 1976 Bonded Labour System (Abolition) Rules 1976	An Act to provide for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of the weaker sections of the people and for matters connected therewith or incidental thereto	Commissionerate of Labour, Government of Assam	Applicable, Contractor will ensure that there is no Bonded Labour in the project.	EPC Contractor/PMC /AEGCL
53.	Code on Occupational Safety, Health and Working Conditions, 2020	This is a comprehensive code regulating the occupational safety, health and working conditions of the persons employed in an establishment and for matters connected therewith.	Commissionerate of Labour, Government of Assam	Applicable, Contractor should follow as per the requirement.	EPC Contractor/PMC /AEGCL
54.	National Institute of Occupational Safety and Health (NIOSH) Publication No. 98-126	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Commissionerate of Labour, Government of Assam	Applicable, contractors are required to provide hearing-protection equipment and ensure exposures of workers to noise-generating activities are within allowed NIOSH standards.	EPC Contractor/PMC /AEGCL
55.	National Policy on Safety, Health and Environment at Workplace, 2009	The policy provides an action program for enforcement of national standards on occupational health and safety at construction works, testing and laboratories.	Commissionerate of Labour, Government of Assam	Applicable for ensuring safety of the workforce during the transmission line construction under the project. Contractor should follow as per the	EPC Contractor/PMC /AEGCL

Sl. No.	Relevant Acts and Policies of GoI and GoA	Mandate of the Act/Policy	Competent Authority	Applicability / Requirement	Responsibility / Supervision / Monitoring
				requirement in the construction sites.	
56.	Equal Remuneration Act, 1976 along with allied Rules	An Act to provide for the payment of equal remuneration to men and women workers and for the prevention of discrimination, on the ground of sex, against women in the matter of employment and for matters, connected therewith or incidental thereto.	Commissionerate of Labour, Government of Assam	Applicable, Needed compliance of regulations as per the requirement.	EPC Contractor/PMC /AEGCL
57.	Inter-state Migrant Workers Act, 1979	The purpose of this act is to protect workers whose services are requisitioned outside their native states in India. Whenever an employer faces shortage of skills among the locally available workers, the act creates provision to employ better skilled workers available outside the state.	Commissionerate of Labour, Government of Assam	Applicable, Contractor should comply if migration labours are engaged in construction work.	EPC Contractor/PMC /AEGCL

Table 3.2: International Conventions

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
5.	CAWT, 2005 (Coalition Against Wildlife Trafficking)	No
6.	CBD, 1992 (Convention on Biological Diversity)	No
7.	Commission on Sustainable Development, 1992	No
8.	ITTA, 1983 (International Tropical Timber Agreement)	No
9.	UNFF, 2000 (United Nations Forum on Forests)	No
10.	IUCN-World Conservation Union, 1948 (International Union for Conservation of Nature and Natural Resources)	No
11.	GTF, 1994 (Global Tiger Forum)	No

Sl. No.	Conventions/Treaties/Declarations	Applicability to the project
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	No
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
4.	Montreal Protocol (on Ozone Depleting Substances), 1987	No
D. Marine environment		
1.	IWC (International Whaling Commission), 1946	No

Table 3.3: International Labour Law Conventions

Sl. No.	International Labour Law Convention	Stipulation/ Terms and Conditions
1.	Forced Labour Convention, 1930 (No. 29)	Prohibits all forms of forced or compulsory labour, which is defined as "all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily." The convention also requires that the illegal extraction of forced or compulsory labour is punishable as a penal offence and that ratifying states ensure that the relevant penalties imposed by law are adequate and strictly enforced.
2.	Abolition of Forced Labour Convention, 1957 (No. 105)	Prohibits forced or compulsory labour as a means of political coercion or education or as a punishment for holding or expressing political views or views ideologically opposed to the established political, social, or economic system; as a method of mobilizing and using labour for economic development; as a means of labour discipline; as a punishment for having participated in strikes; and as a means of racial, social, national, or religious discrimination
3.	Equal Remuneration Convention, 1951 (No. 100)	Lays out the principles for equal remuneration for work of equal value and addresses gender discrimination
4.	Discrimination (Employment and Occupation) Convention, 1958 (No. 111)	Prohibits all discrimination and exclusion on any basis including of race or colour, sex, religion, political opinion, national or social origin in employment and repeal legislation that is not based on equal opportunities
5.	Minimum Age Convention, 1973	To ensure the effective abolition of child labour and to raise progressively the minimum age for admission to employment or work. India has ratified this

	(No. 138)	convention with a minimum age of 14 years
6.	Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour, 1999 (No. 182)	Prohibition and elimination of the worst forms of child labour, including slavery, forced labour and trafficking in human beings. It prohibits the use of children in armed conflicts, prostitution and pornography, illegal activities such as drug trafficking and dangerous work.

3.3 Applicability of AIIB Environmental and Social Policy

AIIB is an international financial organization that provides a multilateral financing and investment platform for infrastructure development and enhanced interconnectivity in Asia. AIIB recognizes that E&S sustainability is a fundamental aspect of achieving outcomes consistent with its mandate to support infrastructure development and enhance interconnectivity in Asia. The objective of AIIB's Environmental and Social Policy (ESP) is to facilitate achievement of these development outcomes, through a system that integrates sound Environment and Social (E&S) management into projects. ESP sets forth mandatory E&S requirements for AIIB's investments accomplished with the following:

A. Environmental and Social Standards (ESSs)

ESS 1: Environmental and Social Assessment and Management

ESS1 aims to ensure the environmental and social soundness and sustainability of projects and to support the integration of environmental and social considerations into the project decision-making process and implementation. ESS 1 is applicable if the project is likely to have adverse environmental risks and impacts or social risks and impacts (or both).

The scope of the environmental and social assessment and management measures are proportional to the risks and impacts of the project. ESS 1 provides for both quality environmental and social assessment and management of risks and impacts through effective mitigation and monitoring measures during the course of project implementation. The ESS 1 defines the detailed requirements of the environmental and social assessment to be carried out for any project to be financed by the AIIB.

ESS 1 is applicable to the project as civil works may cause a limited number of potentially adverse environmental and social impacts. These impacts are not unprecedented and are limited to the project area.

ESS 2: Land Acquisition and Involuntary Resettlement

ESS 2 is applicable if the project's screening process reveals that the project would involve involuntary resettlement (including involuntary resettlement of the recent past or foreseeable future that is directly linked to the project). Involuntary resettlement covers physical displacement (relocation, loss of residential land or loss of shelter) and economic displacement (loss of land or access to land and natural resources; loss of assets or access to assets, income sources or means of livelihood) as a result of: (a) involuntary acquisition of land; or (b) involuntary restrictions on land use or on access to legally designated parks and protected areas. It covers such displacement whether such losses and involuntary restrictions are full or partial, permanent or temporary. The ESS 2 defined detailed requirements of resettlement planning of the projects involving involuntary resettlement.

No land is acquired permanently for tower foundation & RoW, ownership of land will remain with the owner and agricultural activities are allowed to continue after construction activity for RoW, however for tower base area agriculture activities are suggested not to carry out considering the electrical safety measures. The ESS2 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 and 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, 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.

ESS 3: Indigenous Peoples

The ESS 3 is applicable if indigenous peoples are present in, or have a collective attachment to, the proposed area of the project, and are likely to be affected by the project. The term indigenous peoples are used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitats or ancestral territories in the Project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social or political institutions that are separate from those of the dominant society and culture; and
- A distinct language, often different from the official language of the country or region.

Assessment for requirement of ESS 3 will be evaluated after finalization of land scheduling report and accordingly Indigenous People Plan (IPP) will be incorporated in the ARAP report.

B. Environmental and Social Exclusion List

Projects that do not comply with the AIIB's ESP and ESSs will not be financed. The Bank will not knowingly finance a Project that: (a) either involves or results in forced evictions[1]; or (b) involves activities or items specified in the list set forth in the Environmental and Social Exclusion List of Environmental and Social Framework, February 2016 of AIIB.

C. Project Categorization

AIIB determines the project's category by the category of the Project's component presenting the highest environmental or social risk, including direct, indirect, cumulative and induced impacts, as relevant, in the project area. It assigns each proposed Project to one out of the 4 designated Categories i.e. Category A, Category B, Category C and Category FI.

[1] Forced eviction is defined as the permanent or temporary removal, against the will of individuals, families and/or communities, from homes or land (or both) which they occupy, without the provision of, or access to, appropriate forms of legal or other protection (such as the provisions of ESS 2: Involuntary Resettlement). The exercise of eminent domain, compulsory acquisition or similar powers, is not considered to be forced eviction, providing it complies with the requirements of national law and the provisions of ESS 2: Involuntary Resettlement, and is conducted in a manner consistent with basic principles of due process (including provision of adequate advance notice, meaningful opportunities to lodge grievances and appeal, and avoidance of the use of unnecessary, disproportionate or excessive force).

Table 3.4: Project Categorization as per AIIB

S. No	Category	Requirement of Assessment
1	Category A	Project will be categorized as 'A' if it is likely to have significant adverse environmental and social impacts that are irreversible, cumulative, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works and may be temporary or permanent in nature. These types of projects require a detailed ESIA.
2	Category B	Project is categorized B when it has a limited number of potentially adverse environmental and social impacts; the impacts are not unprecedented; few if any of them are irreversible or cumulative; they are limited to the Project area; and can be successfully managed using good practice in an operational setting. Requirement of E&S Assessment or another similar instrument as appropriate to be determined by a prior initial review of the environmental and social implications of the Project. The scope of the assessment may vary from Project to Project, but it is narrower than that of the Category A ESIA.
3	Category C	A Project is categorized C when it is likely to have minimal or no adverse environmental and social impacts. Such projects do not require an environmental and social assessment but do require conducting a review of the environmental and social implications of the Project.
4	Category FI	A Project is categorized FI if the financing structure involves the provision of funds to or through a financial intermediary (FI) for the Project.

The Project has been assigned to Category B, as AEGCL is not siting the transmission line in sensitive areas.

3.4 Gap Analysis between National and AIIB Policies and Standards

Following gaps has been identified:

- Power transmission projects are not listed as environmental sensitive projects under EIA notification 2006 and fall in B2 category does not require EIA. However, the ESS of AIIB lists power transmission projects as projects which may have adverse environmental and social impacts as category B project and requires ESIA -ESMP report.
- As per National Laws analysis of alternatives is not mandatory for power transmission line projects. However, as per AIIB guidelines, it is mandatory to analyse alternatives.
- As per the GoI and GoA guidelines ESMP development and budget allocation is not required. The same is required as per AIIB's guidelines.
- As per national regulations, power transmission line projects do not need public consultation. EIA notification does not cover the grievance redress mechanism but AIIB guidelines require public consultation and a mechanism to receive and facilitate resolution of grievances or complaints.
- As per Indian standards information disclosure is not mandatory for Power Transmission projects whereas the AIIB guideline requires information disclosure.
- There are no specific national guidelines on applicability of minimum environmental standards on power transmission line projects. However, IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission clearly sets minimum environmental limits on air, water, noise and soil quality, which should be followed.

- National Regulations do not cover all displaced persons, such as non-titled on government land. While AIIB mandates compensation for all affected people regardless of property title status.
- As per Indian Standards the power transmission projects do not require any monitoring and reporting whereas as per AIIB guidelines the project requires monitoring and reporting.

3.5 AEGCL's Environmental and Social Policy and Procedures

AEGCL has worked with MDBs, such as World Bank (WB) and Asian Development Bank (ADB). Under the previous projects, AEGCL developed its Environmental and Social Policy and Procedures (ESPP)[2] based on the principle of "Avoidance, minimization & Mitigation". As part of ADB funded projects, AEGCL had experience in development and management of E&S instruments per MDBs' requirements. AEGCL's working operation safety manual[3] also serves as its commitment towards fulfilling the E&S responsibilities including occupation health and safety.

[2]https://www.powergridindia.com/sites/default/files/Our_Business/Domestic_Consultancy/NER_Agreements_and_Mo Us/2015/6/ESPPF_ASSAM.pdf

[3] https://www.aegcl.co.in/Safety_Manual_AEGCL.pdf

4 Description of the Environment

This chapter describes the Baseline Environmental features in detail. It includes details about location characteristics, study area, physical environment, biological environment (flora and fauna) and socio-economic environment baseline of the study area.

4.1 Location Characteristics

The project site is located at Goreswar and Tamulpur in Tamulpur district and Rangia in Kamrup (Rural) district of Assam. The project footprint (RoW) is spread across following villages in the 2 nos. Of LOOP-IN & LOOP-OUT lines namely:

A. (LOOP IN): Villages namely Garka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Shijiguri, Uttar Gandhibari, Baraliapar, Kachukata, Kachubari.

B. (LOOP OUT): Villages namely Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Bakbari, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Deulkuchi, Uttar Bardal, Gosai Solmari, Depteswari, Garaka

In the project area of transmission line, twenty-two villages came under Rangia Tehsil under Kamrup District and Goreswar & Tamulpur Tehsil of Tamulpur district which falls under scheduled area as defined by the Indian Constitution.

No national park, wildlife sanctuaries, biosphere reserves, notified reserved forests, notified historical and cultural sites etc. are falling in the entire Right of Way (RoW) of the transmission lines. The location of transmission lines on Survey of India toposheet with surrounding environmental and social features are already given in **Figure 2.1 & Figure 2.2.**

4.2 Study Area

The direct impacts of the project are confined to the Right of Way (RoW) which is designated as 35 m for the 220 kV Transmission Line. Indirect or induced impacts extends to the Area of Influence (AoI) defined by a buffer zone of 2 Km on either side of the transmission line considered for environmental & social baseline assessment and a 10 Km radius for evaluating the impact on flora & fauna of the area. **Figure 4.1** shows the study area map for baseline study.

4.2.1 Project foot print Area

All permanent / temporary land required for following activities comes under the Project Footprint:

- The erection of 233 numbers of transmission towers for both the LILO lines;
- Stringing of conductors across the transmission lines of 66.506 km length from temporary tapping point to substation (RoW of 35 m);
- Temporary access through government and private land for construction and maintenance works in operation phase;
- Temporary use of vacant government land for storage of materials and equipment nearby the location of construction;
- Temporary set up (for 25-35 days) of Labour accommodation arrangement nearby the location of construction.

4.2.2 Project Area of Influence (AOI)

Project's Area of Influence (AoI) is considered the area where potential indirect and induced impacts of the Project and Project activities are anticipated.

The AOI of project is considered within a corridor of 2 Kms either side of the transmission line with respect to the environmental and social features based on the following impacts:

- In normal conditions dust emissions–typically up to 100 m from major construction areas and up to 500 m during windy summer conditions;
- Noise impact area –typically 100-200 m from construction site;
- The impacts on soil and land- typically up to 50 -70 m from project foot print area;
- Apart from the direct impacts of acquiring rights of use / RoW for tower bases and land-use restrictions in transmission corridor for the habitats - within a corridor of 2 km either side.

4.2.3 Project Area of Influence (AOI) – Biodiversity

- Terrestrial and Aquatic Flora & Fauna: (a) the direct footprint of the project; (b) The areas immediately adjacent to the project footprint within which a zone of ecological disturbance is created through increased dust, human presence and project related activities: - Within 2 km of the project footprint;
- Migration of fauna (especially avifauna) – Considered 10 km buffer on either side from centre line of transmission line.

Study area map (RoW, 2 km and 10 km buffer is given below.

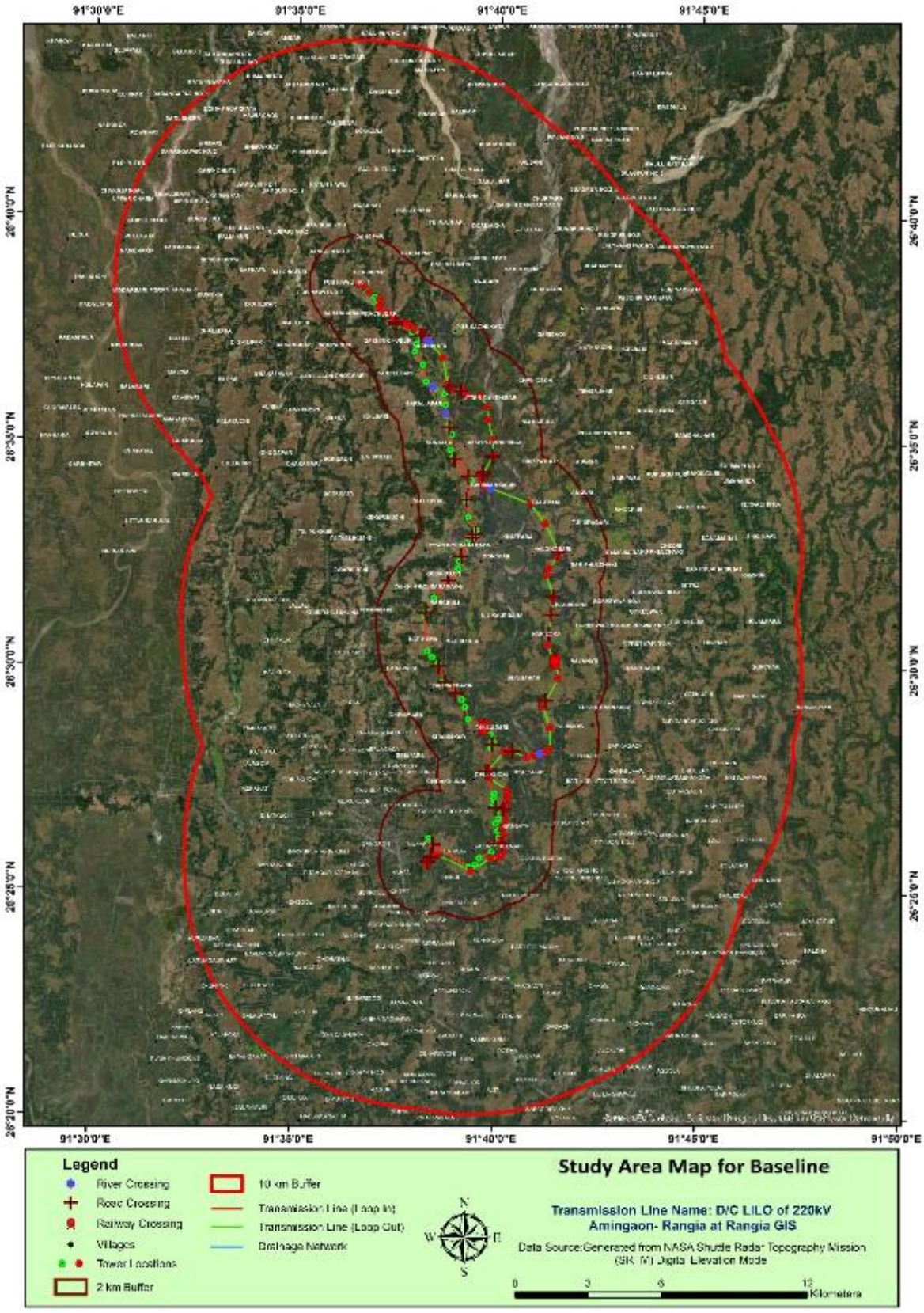


Figure 4.1: Study area map (RoW, 2 km and 10 km buffer) of LILO of both circuit of Rangia (Ext) Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP IN & LOOP OUT)

4.2.4. Methodology of baseline data collection/surveys carried out

The studies were conducted by considering the following:

The various environmental and social attributes were divided into primary and secondary studies. Primary attributes such as air environment, water, soil, noise, flora and fauna, and consultation were assessed and conducted by field studies, on-site monitoring and review of the past studies conducted.

Secondary attributes such as land use studies, geology, physiological characteristics, and socio-economic profile have been assessed by literature review of previous studies conducted by various government publications.

An interdisciplinary team through discussions and professional judgment formulated the scoping and the extent of data generation. The baseline studies started with site visits and reconnaissance survey in the study area. As a secondary data review, various Government agencies information and relevant data of the study area were collected.

Overall, environmental information is based on primary data generated through field survey and also on secondary information from published sources. The primary data have been obtained from environmental monitoring of ambient air quality, ground water quality, soil quality and noise level conducted at Rangia (Kumarikata) S/s. Secondary data / information has been collected from reliable sources like District Disaster Management Report (2024-25), Central Ground Water Board, District Survey Report and Census Data of Assam (2011) for geology, hydrology, landuse, meteorology, ecology and socio-economics.

Brief ecological surveys were carried out. Data of flora and fauna has been gathered from secondary sources, including AVISTEP whereas tree enumeration data were gathered from preliminary route survey report of Transmission line.

Moreover, a study is also conducted to identify Key Biodiversity Areas (KBA) by obtaining data from 'The World Database of Key Biodiversity Areas'. This data was then overlaid with the route of the proposed transmission line to determine whether any KBA sites fall within or near the vicinity of these transmission line routes.

4.3 Physical Environment Baseline of the Study Area

4.3.1 Land use and Land cover

In the study area, the land is primarily used for agriculture / crops. The other land uses in the area are trees / vegetation, built up and water bodies. The land use map of the study area is presented in **Figure 4.2**. The details of the land use of transmission tower base and RoW of transmission line is provided in **Table 2.4.**

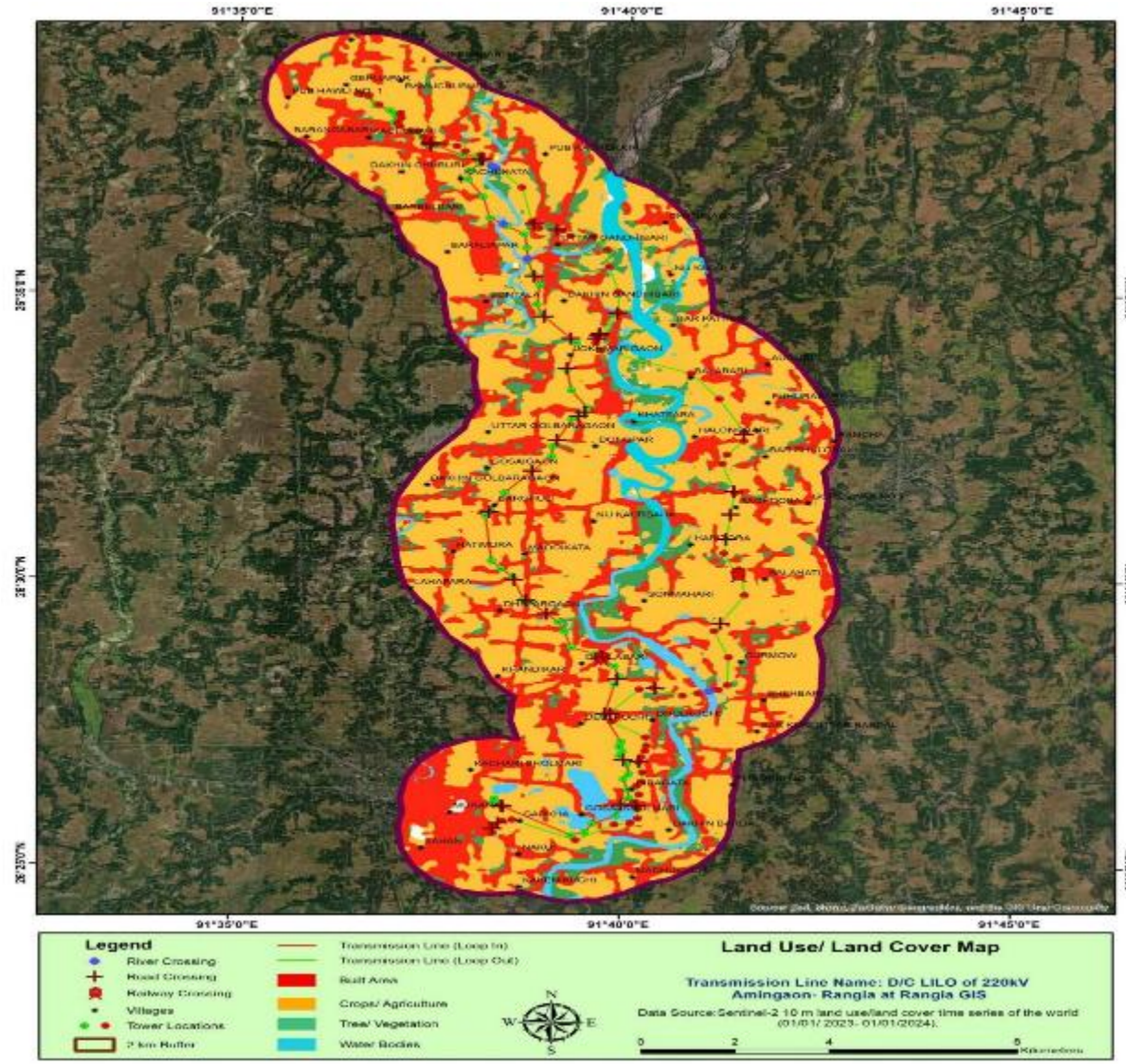


Figure 4.2: Land use and Land cover of study area of LILO of both circuit of Rangia (Ext) Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP IN & LOOP OUT)

4.3.2 Topography

Assam is situated in the North-East of India and is the largest north-eastern state in terms of population while second in terms of area. Assam covers an area of 78,438 km2 (30,285 sq miles). The state is bordered by Bhutan and the state of Arunachal Pradesh to the north; Nagaland, Arunachal Pradesh and Manipur to the east; Meghalaya, Tripura, Mizoram, and Bangladesh to the south; and West Bengal to the west. A significant geographical aspect of Assam is that it contains three of six physiographic divisions of India – The Northern Himalayas (Eastern Hills), The Northern Plains (Brahmaputra plain), and the Deccan Plateau (Karbi Anglong).

Tamulpur district, located in the northwestern part of Assam, exhibits a diverse topography. The district surrounded by Baksa district to the west, Bhutan to the north, Udalguri district to the east, and Nalbari and Barpeta districts to the south. The landscape is characterized by a mix of plains, hills, and riverine systems, contributing to varied topography and land use patterns across the district. The

central and southern parts of the district are dominated by alluvial plains formed by the Brahmaputra River and its tributaries, such as the Pagladiya River. These plains are generally flat and low-lying, with elevations ranging from 60 to 100 meters above sea level.

The topography of Kamrup (Rural) district in Assam is characterized by a diverse landscape that includes vast plains, undulating hills, and riverine areas. The district is situated along the Brahmaputra River, which plays a crucial role in shaping its terrain and supports fertile alluvial plains ideal for agriculture. The region also features numerous wetlands, beels (oxbow lakes), and small streams, contributing to its rich biodiversity. The southern and western parts of the district are marked by small hills and plateaus, which gradually transition into the plains. The varied topography of Kamrup Rural not only influences its agricultural patterns but also affects its climate, with flood-prone areas near the Brahmaputra and relatively drier zones in the elevated regions. Generally, the district's elevation ranges from approximately 48 to 64 meters above sea level.

A mix of plain and undulating topography has been found in the study area of transmission line. Elevation of project corridor of LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN & LOOP OUT) is 60 meters to 100 meters at Tamulpur district, and 48 to 64 meters at Kamrup (Rural) district respectively above the sea level. The DEM map of the study area is presented in **Figure 4.3.**

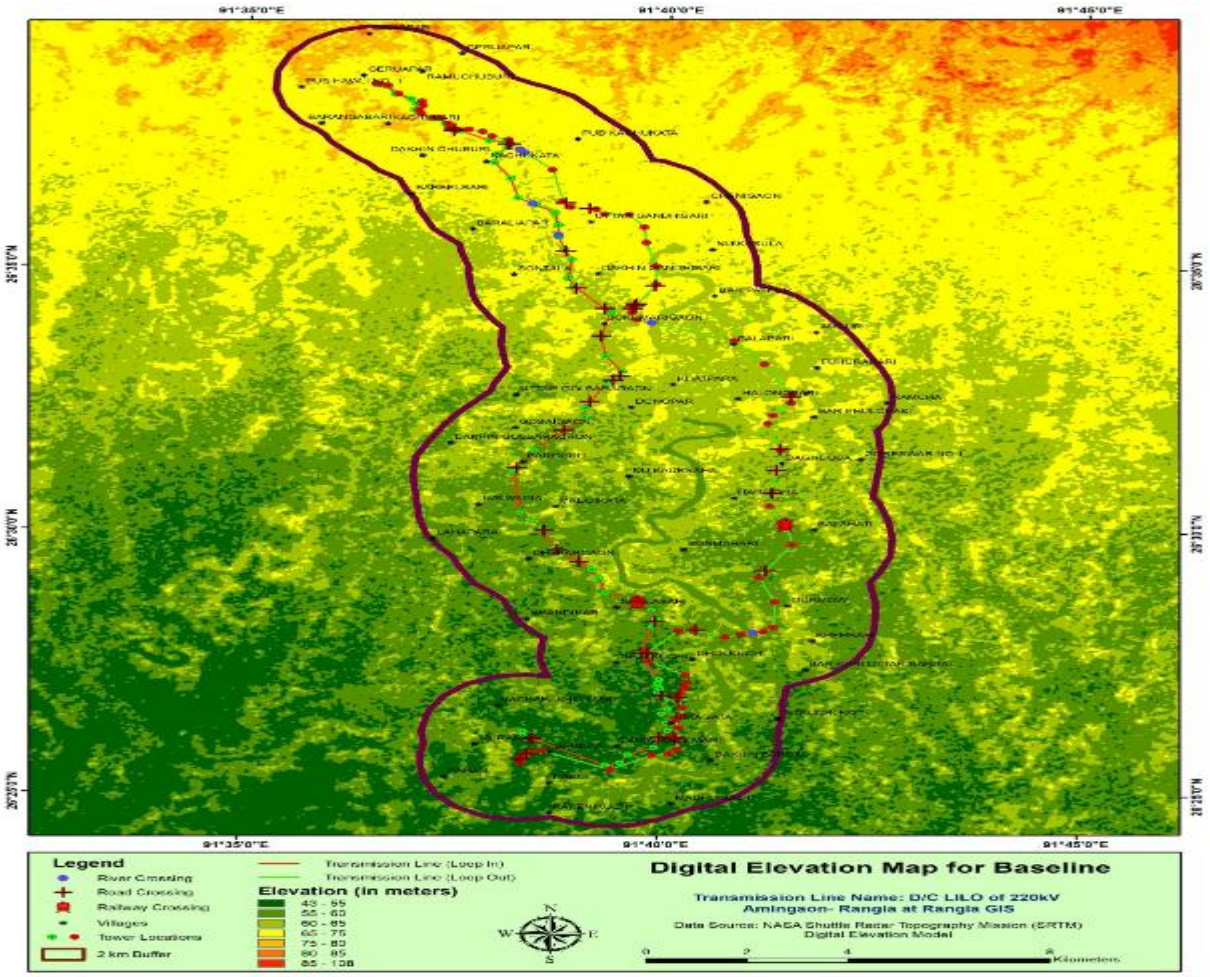


Figure 4.3: DEM map of the study area of LILO of both circuit of Rangia (Ext) Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP IN & LOOP OUT)

4.3.3 Drainage

The drainage of Tamulpur district is dominated by number of perennial streams flow through the district from north to south and joins the Brahmaputra River. The entire drainage system of the district plays an important role in the ground water occurrence and balance of the district. Important Rivers of the district are Puthimari, Pagladiya, Borolla, Baralia, Suklai, Matanga (noona), Balti, Darranga and Barnadi etc.

The Kamrup (Rural) district occupies part of the basin formed by mighty river Brahmaputra passing through the central part with a westerly course. The perennial tributaries like Puthimari, Digaru, Kulsi, Singra etc. drain the district and join the River Brahmaputra.

The RoW of the transmission line passes through Baralia river in between tower no. **AP 46 & 47** for loop in line and Puthimari river in between tower no. **AP 30 & 30/1, 45 & 46,** Baralia river in between tower no. **AP 17 & 17/1** for loop out line. Details are given in **Table 2.4.** Drainage map of the study area is given **Figure 4.4**.

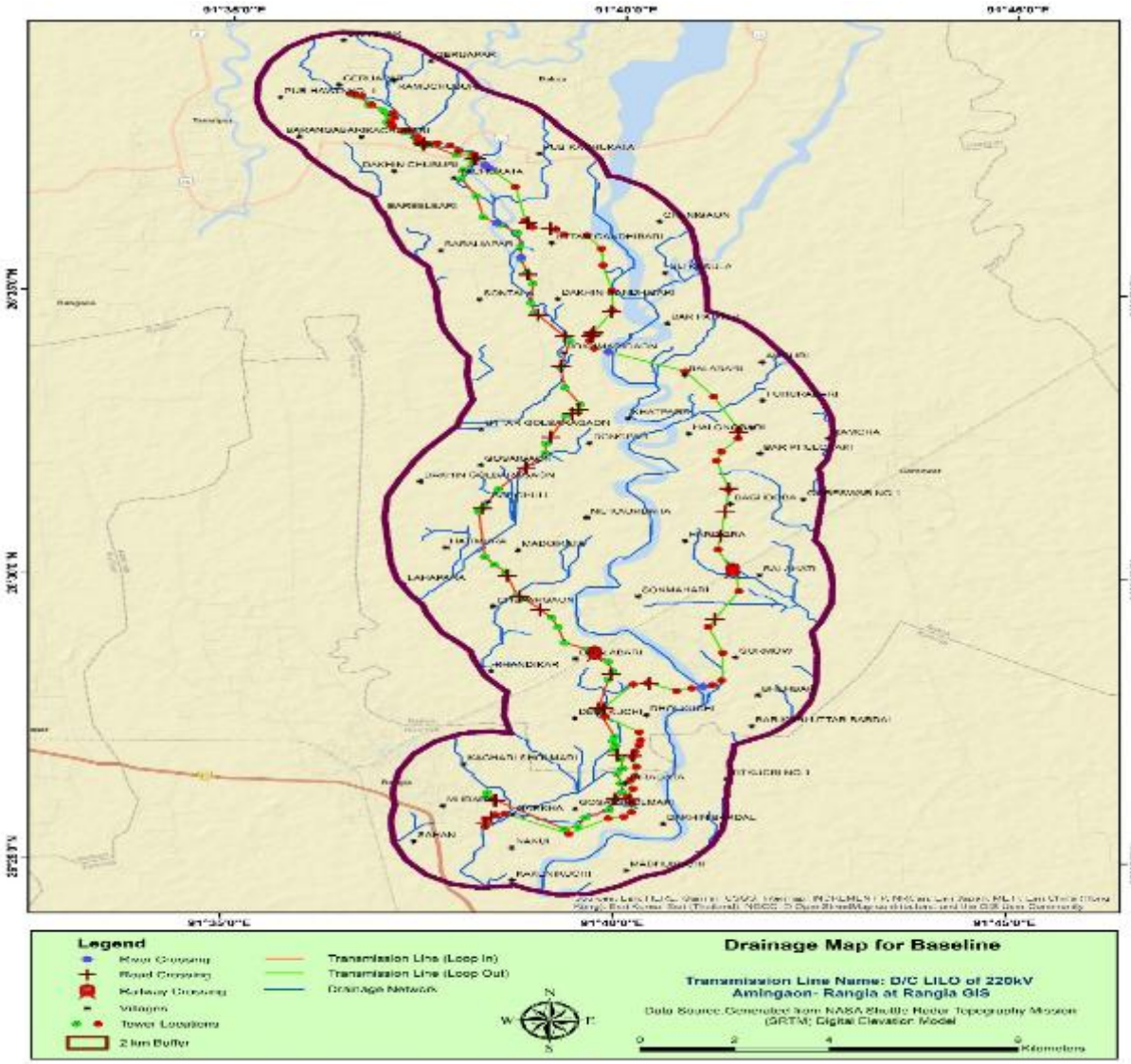


Figure 4.4: Drainage map of the study area of LILO of both circuit of Rangia (Ext) Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP IN & LOOP OUT)

4.3.4 Geology & Soil Characteristics

Kamrup (Rural) district in Assam exhibits diverse geology and soil characteristics. The landscape is marked by alluvium, alluvium-colluvium, and granite-gneiss formations. The district's soils are categorized into newer alluvial, valley fill/older alluvial, and those found on forest and hilly terrains, with varying proportions of sand, silt, clay, and organic matter. A significant portion of the district, 4.69%, experiences slight to moderate soil erosion, while 7.98% suffers moderate to severe erosion.
Elaboration: Kamrup Rural district features three primary geological landscapes: 1) **Alluvium**: Flat, low-lying areas resulting from river deposition 2) **Alluvium-Colluvium**: A mixture of alluvium and material transported from hills 3) **Granite-Gneiss**: Hilly regions with igneous rocks. The soils of the district are broadly classified into: **Newer Alluvial**: Soils deposited by recent river action, rich in nutrients. **Valley Fill/Older Alluvia**l: Soils found in older river valleys, also fertile. **Forest and Hilly Terrain Soils**: Soils developed on the slopes and in forested areas, which may be different in composition.

The district's topography includes flood plains, younger alluvial plains, older alluvium/valley fill, piedmont regions, inselbergs (isolated hills), and denudational hills.

Tamulpur district in Assam exhibits a geology characterized by mixed plains and foothills, influenced by its proximity to the Indo-Bhutan border. The soils are primarily alluvial, classified as Entisols and Inceptisols, and are mostly sandy and silty loam or clay loam in nature. The area also experiences a sub-tropical humid climate with warm, humid summers and cool, dry winters. The district shares its northern boundary with the Indo-Bhutan International boundary and features a mixed topography of plains and foothills. Gentle slopes extend from the foothills of Bhutan to the southern tips of neighboring districts. The geology of the region is also influenced by the surrounding districts like Odalguri (formerly Udalguri) or Chirang to the east and west.

The soils are primarily alluvial with Entisols (new alluvium) and Inceptisols (old alluvium) being the dominant soil orders. The soil is generally acidic in nature. Sandy and silty loam or clay loam textures are prevalent in the district.

4.3.5 Climate Characteristics

Normal climate profile for the whole state of Assam is humid sub-tropical climate zone. The seasons experienced by the area is described below:

- Pre-monsoon: March-May
- Monsoon: June – September
- Post-monsoon: October- November
- Winter: December- February

As per the district disaster management plan (DDMP, 2024-2025) of Tamulpur district, the district witnessed a sub-tropical humid climate with a hot summer and moderate winter. The winter temperature drops to 10 degree Celsius and summer temperature goes up to 38 degree Celsius. The drastic Climate Change have been witnessed in Tamulpur district in the month of April with a temperature 38 degree Celsius and changes in Rainfall intensity and early pre-monsoon due to global Warming. The total annual rainfall of the district is 1346 mm from May to October 2023. The maximum rainfall was 60. 98 mm on 21 June 2023.

The climate of the Kamrup (Rural) district has been classified as sub-tropical humid climate with heavy

rainfall, hot summer and high humidity. Average temperature ranges from 12 to 38°C during the year. In winter, temperature ranges from 15 to 25°C during day and 8 to 15°C during night. The summer temperature ranges from 25 to 38°C during day and 15 to 25°C during night. Average annual rainfall of the district is 1752 mm and co efficient of variation is 15.3%. The annual normal rainfall of the district as compiled from IMD data is 2125.4 mm with 96.5 rainy days.

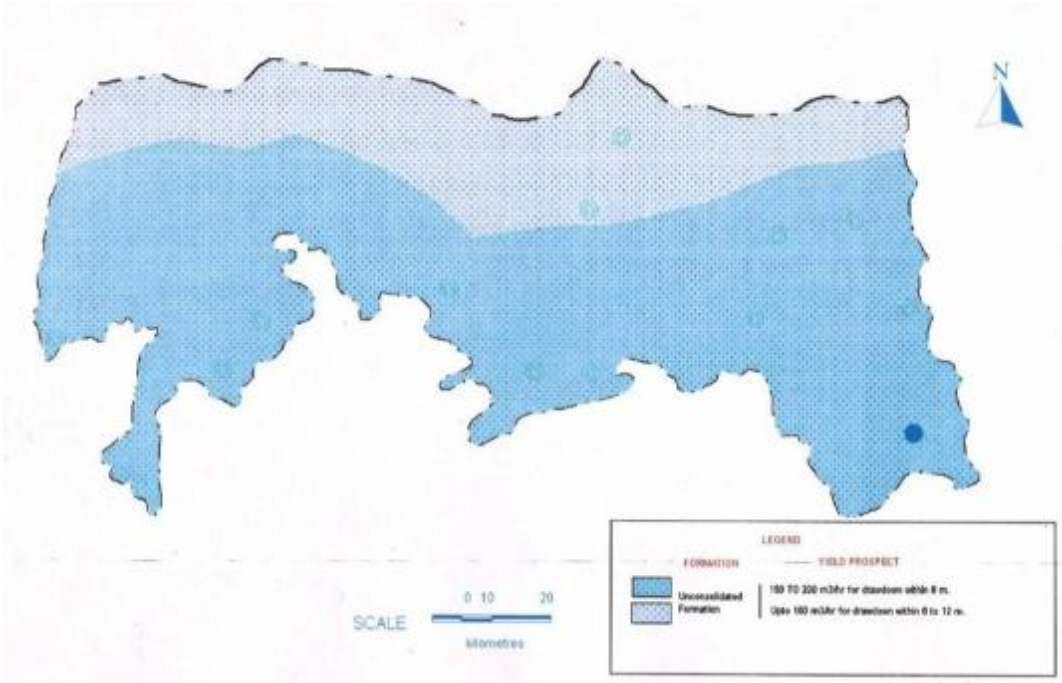
4.3.6 Ground Water Characteristics

Based on the behaviour and occurrence of ground water, the regional ground water flow system of Tamulpur district has been described under following categories. i. Shallow aquifer group occurring within 50 m depth. ii. Deeper aquifer group beyond a depth of 50 m and down to 200 m bgl. i. Shallow Aquifer Group: It constituted of a mixture of boulders, gravel, sand, silt and clay. The thickness of the aquifer varies from 15 to 40 m. Ground water in this aquifer generally occurs under water table to semi-confined conditions. The development of ground water from this aquifer for both domestic and irrigation purposes is by open wells and shallow tube wells. The boulders are restricted mostly to the northern parts of the district. They occur between GL to 50 m bgl and thickness varies from 20-30 m. The thickness increases from south to north. The water level in the major part of the district generally lies between 2 to 4 m bgl. The northern most part occupied by the piedmont zones and the areas adjoining to the inselbergs are having deeper water level. ii. Deeper Aquifer Group: It constituted of coarse to medium sand with intercalation of clay. Ground water occurs under water table to semi-confined conditions. Detailed hydrogeological surveys aided by exploratory drilling revealed the existence of two to three promising aquifer zones down to the depth of maximum 200 m bgl.

In the alluvial plain of Kamrup (Rural) district, groundwater occurs in regionally extensive aquifers down to the depth of 305 m. It has a very good yield prospect. The aquifers are consisting of sands of various grades with gravel and are suitable for construction of both shallow and deep tube wells. Groundwater occurs under unconfined to semi-confined condition occupying an area of about 200 sq. km. in and around Haihata-Dumunichowki which is under artesian condition. In other parts also, the water level rests at the shallow depth and in major part, it rests between 2-5m bgl during pre-monsoon period.

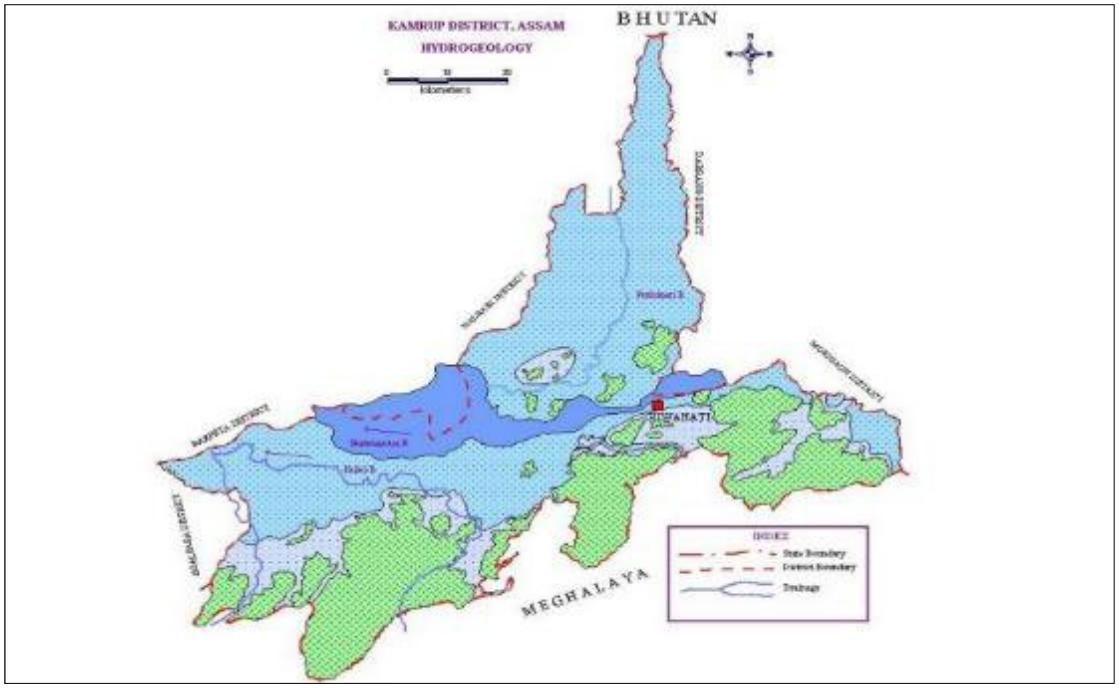
The shallow tube wells tapping aquifers within 50 m depth are capable of yielding about 10 lps in major places of Kamrup (Rural) district, deep tube wells constructed within 95 m depth tapping about 30 m granular zones are yielding 10-20 lpm. The transmissivity of the aquifer ranges from 41 to 6162 m^2/day and the permeability varies from 10 to 59 m/day.

Hydrogeological map of Tamulpur and Kamrup (Rural) district are given in **Figure 4.5.A & B.**



Source: Central Ground Water Board

Figure 4.5.A: Hydrogeological map of Tamulpur district



Source: Central Ground Water Board

Figure 4.5.B: Hydrogeological map of Kamrup (Rural) district

4.3.7 Sensitive Receptors

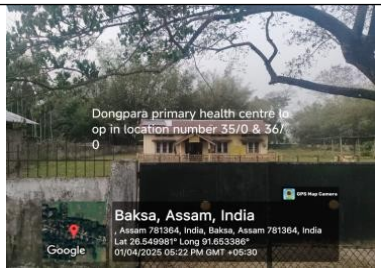
There are no sensitive receptors located within the Right of Way (RoW) corridor of the proposed LILO (Line-In and Line-Out) transmission line. However, within a 500-meter radius of the proposed LILO (Loop-In) of both circuits of the Rangia (Ext)–Amingaon 220kV line (using single zebra conductor) at the Rangia (Tamulpur) 400kV GIS with OPGW link, the following sensitive receptors have been identified: 10 schools, 17 places of worship, 3 public health centers, and 1 PHED water supply scheme.

Similarly, within a 500-meter radius of the proposed LILO (Loop-Out) of both circuits of the same transmission line at Rangia (Tamulpur) 400kV GIS with OPGW link, the following are present: 14 schools, 21 places of worship, 1 public health center, 1 playground, and 1 post office. Details of sensitive receptors within 500 m from the centerline of the TL against the tower are given in table below.

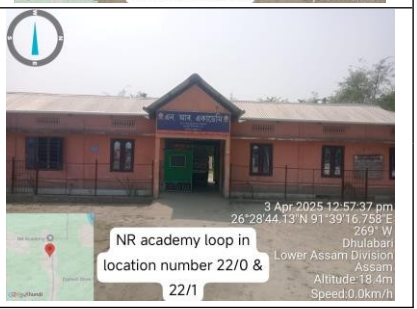
Table 4.1: Details of sensitive receptors within 500 m from the centerline of the TL

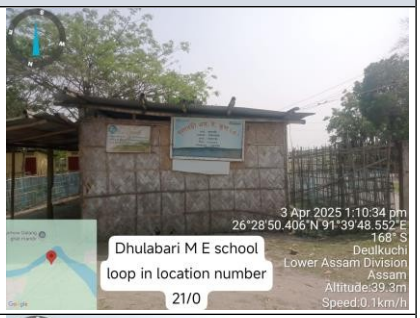
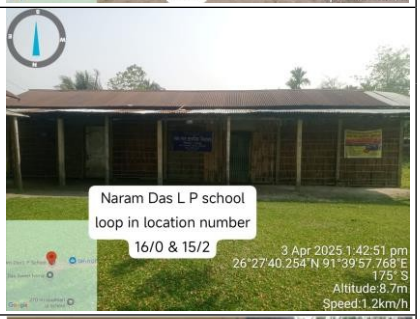
Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
A. LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN) - 31.311 Km					
1.	AP-65	91°36'43.90"E 26°38'16.89"N	Gopal Mandir (91°36'32.82"E 26°38'9.49"N) – Right Hand Side (RHS) from CL	378	
2.	AP-64	91°36'54.93"E 26°38'11.40"N	Meru Gokhai Than (91°36'47.37"E 26°38'12.87"N) – RHS from CL	58	
3.	AP-57	91°37'21.84"E 26°37'37.41"N	Ganesh Mandir (91°37'7.65"E 26°37'33.03"N) – RHS from CL	410	
4.	AP-56	91°37'25.50"E 26°37'35.65"N	Kachukata Mini PHC (91°37'19.71"E 26°37'28.02"N) – RHS from CL Kachukata High School (91°37'17.14"E 26°37'29.40"N) – RHS from CL	280 274	

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
					
5.	AP-54	91°37'51.43"E 26°37'24.63"N	Kachukata Bodo L.P school (91°37'53.70"E 26°37'16.53"N) – RHS from CL	244	
6.	AP-53	91°38'3.62"E 26°37'24.02"N			
7.	AP-52	91°38'5.37"E 26°37'22.05"N	Bonnibari Shiva Mandir (91°38'15.31"E 26°37'28.74"N) – Left Hand Side (LHS) from CL	340	
8.	AP-51	91°38'4.50"E 26°37'16.67"N	Kachukata Bathou Mission School (91°38'9.45"E 26°37'20.40"N) – LHS from CL	110	
9.	48/1		Banllubari Public Health Water Supply (91°37'53.76"E 26°36'41.79"N) – RHS from CL	336	
10.	AP-48	91°38'7.36"E 26°36'41.72"N			

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
11.	AP-46	91°38'25.79"E 26°36'11.48"N	Baraliapar Gopaal Tample (91°38'14.79"E 26°36'0.22"N) – RHS from CL	469	
12.	AP-44	91°38'43.09"E 26°35'30.01"N	Gandhibari Girls ME School (91°38'59.51"E 26°35'31.46"N) – LHS from CL	444	
13.	43/1				
14.	AP-42	91°38'50.16"E 26°34'48.91"N	Gurmu Bathou Temple (91°38'54.62"E 26°34'42.83"N) – LHS from CL	53	
15.	AP-41	91°38'53.91"E 26°34'38.81"N			
16.	AP-36	91°39'27.85"E 26°32'54.39"N	Dongpar Primary Health Sub Center (91°39'22.90"E 26°32'56.26"N) – RHS from CL	116	
17.	AP-35	91°39'18.35"E 26°32'49.49"N			
18.	34/1		Dongpara Bathou Temple (91°39'22.82"E 26°32'29.28"N) – LHS from CL	370	
19.	34/2				

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
20.	AP-34	91°39'3.90"E 26°32'20.40"N	Jhargami Bathou Thansali (91°39'17.68"E 26°32'16.12"N) – LHS from CL	408	
21.	AP-33	91°39'3.21"E 26°32'10.29"N	106 No. Gossaigami L. P. School (91°38'48.04"E 26°32'15.99"N) – RHS from CL	458	
22.	AP-32	91°38'27.71"E 26°31'31.67"N	Samanay Nagar Vaishnav Namghar (91°38'22.51"E 26°31'30.76"N) – RHS from CL	112	
23.	31/1				
24.	AP-31	91°38'17.34"E 26°31'12.89"N	Durga Temple (91°38'10.44"E 26°31'12.99"N) – RHS from CL	157	
25.	AP-30	91°38'13.16"E 26°31'7.36"N	Niz Kaurbaha Medical (91°38'13.38"E 26°31'10.60"N) – RHS from CL	32	

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
26.	AP-27	91°38'34.54"E 26°30'4.47"N	Batabari Shiva Mandir (91°38'27.38"E 26°30'1.31"N) – RHS from CL	218	
27.	26/1		Janopar Jame Masjid (91°38'46.22"E 26°29'53.17"N) – LHS from CL	199	
28.	AP-26	91°38'43.32"E 26°29'39.88"N			
29.	24/2		Bathou Temple, Dhepargaon (91°38'56.70"E 26°29'22.61"N) – RHS from CL	140	
30.	24/1				
31.	AP-24	91°39'10.35"E 26°29'16.12"N	Pub Dhepargoan Jame Masjid (91°39'1.68"E 26°29'10.12"N) – RHS from CL	290	
32.	AP-23	91°39'15.36"E 26°29'6.21"N			
33.	22/1		NR Academy (91°39'16.53"E 26°28'49.74"N) – RHS from CL	96	
34.	AP-22	91°39'20.46"E 26°28'49.78"N			

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
35.	AP-21	91°39'38.89"E 26°28'43.12"N	Dhulabari M.E. School (91°39'48.26"E 26°28'49.35"N) – LHS from CL	320	
36.	AP-16	91°39'46.68"E 26°27'39.06"N	Naram Das L.P School (91°39'57.77"E 26°27'39.70"N) – LHS from CL	290	
37.	15/2				
38.	AP-8	91°40'5.27"E 26°26'21.62"N	Hiragata High School (91°40'11.53"E 26°26'17.22"N)– LHS from CL	153	
39.	AP-7	91°40'6.71"E 26°26'12.44"N	1 No Hiragata Masjid (91°39'58.91"E 26°26'15.91"N) – RHS from CL	197	
			2 No Jame Masjid (91°40'21.21"E 26°26'4.80"N) – LHS from CL	463	

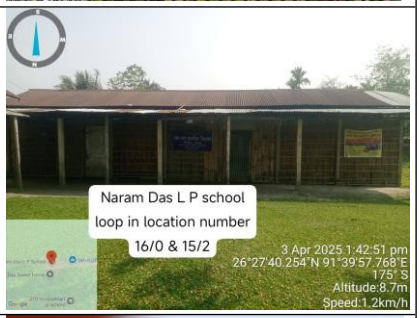
Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
40.	AP-6	91°40'0.29"E 26°26'4.15"N	East Hiragata LP School (91°39'57.52"E 26°26'5.34"N) – RHS from CL	83	
41.	1/1		Maldhapara Harekrishna Siba Ashram (91°38'30.57"E 26°26'0.77"N) – LHS from CL	40	
42.	AP-1	91°38'23.05"E 26°26'6.60"N			
B. LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP OUT) - 35.195 Km					
1.	AP-2	91°36'38.56"E 26°38'26.85"N	Gopal Mandir (91°36'32.82"E 26°38'9.49"N) – Right Hand Side (RHS) from CL	430	
2.	AP-3	91°36'46.15"E 26°38'17.55"N			
3.	3/1		Meru Gokhai Than (91°36'47.37"E 26°38'12.87"N) – RHS from CL	104	
4.	AP-11	91°37'22.96"E 26°37'39.14"N	Kachukata Mini PHC (91°37'19.71"E 26°37'28.02"N) – RHS from CL	370	
5.	AP-12	91°37'28.74"E 26°37'36.74"N	Kachukata High School (91°37'17.14"E 26°37'29.40"N) – RHS from CL	340	

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
					
6.	AP-13	91°37'37.01"E 26°37'37.18"N	Brahma Mandir (91°37'42.84"E 26°37'49.60"N) – Left Hand Side (LHS) from CL	410	
7.	AP-14	91°37'46.76"E 26°37'34.75"N	Ganesh Mandir (91°37'55.97"E 26°37'41.83"N) – LHS from CL	339	
8.	AP-15	91°37'53.42"E 26°37'29.51"N			
9.	AP-16	91°38'5.35"E 26°37'25.62"N	Kachukata Bodo L.P school (91°37'53.70"E 26°37'16.53"N) – RHS from CL	379	
			Bonnibari Shiva Mandir (91°38'15.31"E 26°37'28.74"N) – LHS from CL	292	
			Kachukata Bodo L.P school (91°37'53.78"E 26°37'16.77"N) – RHS from CL	380	

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
10.	AP-17	91°38'6.56"E 26°37'21.04"N			
11.	17/1		Kachukata Bathou Mission School (91°38'9.45"E 26°37'20.40"N) – LHS from CL	40	
12.	26/1		Gandhibari L.P school (91°39'38.16"E 26°34'53.31"N) – RHS from CL	437	
13.	AP-27	91°39'53.25"E 26°34'41.50"N	Jaganath Mandir (91°39'41.99"E 26°34'44.95"N) – RHS from CL	327	
14.	AP-30	91°39'41.14"E 26°34'0.95"N	Jokmari Bathou Mandir (91°39'37.26"E 26°33'47.39"N) – RHS from CL	427	
15.	30/1		Sikhajyoti LP School (91°39'49.75"E 26°34'9.65"N) – LHS from CL	334	

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
					
16.	AP-32	91°41'11.39"E 26°33'11.33"N	Balabari Bathou Thansali (91°41'26.81"E 26°33'7.59"N) – LHS from CL	317	
17.	32/1				
18.	AP-33	91°41'30.97"E 26°32'36.61"N	Thangabari Football Ground (91°41'35.09"E 26°32'36.19"N) – LHS from CL	110	
19.	AP-34	91°41'30.71"E 26°32'27.28"N			
20.	AP-35	91°41'18.09"E 26°32'12.92"N	Halongbari L.P. School (91°41'9.15"E 26°32'13.55"N) – RHS from CL	320	
21.	AP-36	91°41'14.55"E 26°32'3.32"N	Halongbari Bathou Mondir (91°41'9.37"E 26°32'13.34"N) – RHS from CL	240	

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
22.	37/2		Dwlfara Bathou temple (91°41'33.70"E 26°31'5.07"N) – LHS from CL	340	
23.	37/3				
24.	AP-39	91°41'25.59"E 26°30'9.63"N	751No. Balahati L.P. School (91°41'35.61"E 26°30'11.81"N) – LHS from CL	245	
25.	AP-40	91°41'30.25"E 26°30'5.41"N			
26.	41/3		Gurmow M.V. School (91°41'23.88"E 26°29'11.34"N) – LHS from CL	277	
27.	AP-42	91°41'10.22"E 26°29'7.81"N	Gurmou High School (91°41'20.33"E 26°29'14.18"N) – LHS from CL	107	
28.	AP-43	91°41'21.62"E 26°28'40.35"N	Sri Sri Jagnnath Mandir Gurmow (Bhatkhola) (91°41'35.36"E 26°28'29.81"N) – LHS from CL	187	
29.	43/1				

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
30.	43/2		Gurmow (Bhatkhola) Bathou Thansali (91°41'28.20"E 26°28'21.98"N) – LHS from CL	190	
31.	AP-44	91°41'20.93"E 26°28'11.22"N	Bhairabeswari Devalaya (91°41'19.26"E 26°28'4.13"N) – LHS from CL	138	
32.	AP-45	91°41'13.94"E 26°28'6.31"N			
33.	AP-50	91°39'51.13"E 26°27'41.86"N	Naram Das L.P School (91°39'57.77"E 26°27'39.70"N) – LHS from CL	175	
34.	AP-51	91°39'52.36"E 26°27'32.28"N			
35.	AP-54	91°40'18.54"E 26°27'1.79"N	Bunda chowk ancholic Durga mandir (91°40'30.44"E 26°26'57.95"N) – LHS from CL	355	
36.	AP-55	91°40'15.54"E 26°26'55.33"N			
37.	AP-59	91°40'12.57"E 26°26'25.20"N	Hiragata High School (91°40'11.53"E 26°26'17.22"N) – RHS from CL	75	
38.	AP-60	91°40'14.51"E 26°26'16.02"N			

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
			1 No Hiragata Masjid (91°39'58.91"E 26°26'15.91"N) – RHS from CL	391	
39.	AP-61	91°40'10.74"E 26°26'8.00"N			
40.	AP-62	91°40'13.69"E 26°26'0.95"N	2 No Jame Masjid (91°40'21.21"E 26°26'4.80"N) – LHS from CL	236	
			East Hiragata LP School (91°39'57.52"E 26°26'5.34"N) – RHS from CL	380	
41.	AP-63	91°40'13.81"E 26°25'51.21"N	Lakhaitara Academy, Bordal (91°40'27.52"E 26°25'57.53"N) – LHS from CL	383	
42.	AP-64	91°40'7.81"E 26°25'46.28"N	Bordal Post Office (91°40'17.16"E 26°25'43.24"N) – LHS from CL	240	

Sl. No.	Tower No.	Geographical Coordinates	Environmental Sensitive receptors within 500m from Centre Line (CL)	Distance (in m) of Environmental Sensitive receptors from CL	Photograph
43.	AP-65	91°39'55.85"E 26°25'44.52"N	Dipteshwari Temple (91°39'51.52"E 26°25'30.99"N)) – LHS from CL	293	
44.	65/1				
45.	AP-66	91°39'26.11"E 26°25'27.89"N	Shiv Mandir (Nadipar) (91°39'13.74"E 26°25'18.38"N) – LHS from CL	398	
46.	66/1				
47.	AP-68	91°38'29.76"E 26°25'47.42"N	Maldhapara Harekrishna Siba Ashram (91°38'30.57"E 26°26'0.77"N) – RHS from CL	412	
48.	Ext.-T-13	91°38'22.01"E 26°25'35.06"N	Garaka Mandir (91°38'4.86"E 26°25'31.14"N) - RHS from CL	493	
			Nakul Jame Masjid (91°38'32.77"E 26°25'27.88"N) - LHS from CL	371	

Source: Environment and Social Team

4.3.8 Ambient Air Quality

Based on the observation at site it has been perceived that the ambient air quality of the project footprint and study area is good. The ambient air quality monitoring conducted at Rangia (Kumarikata) S/S is given below.

Table 4.2: Ambient air quality monitoring results

Pollutant	Time Weighted Average	Concentration in Ambient air (mg/m^3), NAAQS, MoEF&CC 2009		WHO AQGs 2021	Results (Baseline data)	Results (Data generated for post-monsoon season 2024)
		Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Areas			
Particulate Matter: PM_{10} (<10 µm)	Annual 24 hr	60 100	60 100	15 45	49	40
Particulate Matter: $PM_{2.5}$ (<2.5 µm)	Annual 24 hr	40 60	40 60	5 15	26	19

The ambient air quality of the project area is found within the permissible limit. **The test results are provided in Appendix-8.**

4.3.9 Ambient Noise Level

The ambient noise level monitoring conducted in Rangia (Kumarikata) S/S is given below.

Table 4.3: Ambient noise level monitoring results

Sound Parameters (dBA)				CPCB Ambient Noise Standards [Limit in dB (A) Leq]		Results (Baseline data)		Results (Data generated for post-monsoon season 2024)	
Area Code	Category	Limits in dB(A) / (Data generated for post-monsoon season 2024)							
		Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time
A	Industrial	75	70	70	70				
B	**Commercial**	**65**	**55**	**70**	**70**	53.4	41.3	58.7	40.8
C	Residential	55	45	55	45				
D	Silence Zones	50	40	55	45				

The ambient noise level of the project area is found within the permissible limit. **The test results are provided in Appendix-8.**

4.3.10 Surface and Ground Water Quality

The Water Quality monitoring conducted in Rangia (Kumarikata) S/s is given below.

Table 4.4: Water Quality monitoring results

Parameters	Results (Baseline data)	IS-10500-2012 Requirement Acceptable Limit)	IS-10500-2012 Permissible Limit in the absence of alternate source	Results (Data generated for post-monsoon season 2024)	Requirement Acceptable Limit	Permissible Limit in the absence of alternate source
pH	6.22	6.5-8.5	No relaxation	6.60	6.5-8.5	No relaxation
Conductivity	0.097	_	_	0.129	---	---
Colour	Colourless	5	15	Colourless	5	15
Total Dissolved Solids	81	500	2000	107	500	2000
Total Suspended Solids	<10	_	_	<10	---	---
Turbidity	<1	1	5	1.7	1	5
Chlorides	<1	250	1000	<2	250	1000
Fluoride	<2	1	1.5	<0.5	1	1.5
Iron	0.21	0.3	No relaxation	0.24	0.3	No relaxation
Oil and Grease	<2	_	_	<2	---	---
Sulphates	11.5	200	400	<2	200	400
Hardness	48	200	600	84	200	600
Nitrate	<5	45	No relaxation	<5	45	No relaxation
Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable

The water quality of the project area is found within the permissible limit. **The test results are provided in Appendix-8.**

4.3.11. Soil Quality

The Soil Quality monitoring conducted in Rangia (Kumarikata) S/s is given below.

Table 4.5: The Soil Quality monitoring results

Parameters	Results (Baseline data)	Results (Data generated for post- monsoon season 2024)	CPCB Soil Standards
pH value (1.5)	6.1	4.86	6-7.5 (ISO: 10390)
Sulphite in SO_3 in %	5.86	6.2	---
Chloride in mg/kg	8.2	10.6	< 100 mg/kg (ISO: 10304-1)
ORP in mV	445	390	---
Water soluble salts as EC in mS/m	397	110	400 mS/m (ISO: 11265)
Organic matter in %	2.1	2.6	2–10%
Moisture Content in %	24.6	22.6	• Sandy: 5–10%,

Parameters	Results (Baseline data)	Results (Data generated for post- monsoon season 2024)	CPCB Soil Standards
			• Clayey: up to 30% or more.

The soil quality of the project area is found within the permissible limit. **The test results are provided in Appendix-8.**

4.4 Biological Environment- Flora and Fauna

4.4.1 Floral Assessment

The project area is primarily comprising of agricultural land, homestead plantation, water bodies etc. The vegetation associated with these habitats is described below.

Agricultural Field

The staple food of the people in the study region is rice and wheat. Agro-climatic conditions of the area provide a range of potentialities for growing cash crop like off seasonal vegetable i.e. onion, chilly, brinjal, bhindi, fruits and flowers. Kitchen gardening is also common because of sufficient available space in and around house. The commercial cultivation of tea (*Camellia sinensis*) is also found in some pockets of the study area.

Main agricultural crop production in project area is paddy (*Oriza sativa*). sThe common rabbi crops grown in the study area are wheat, maize, gram, mustard, turmeric, potato, carrot, pea etc. whereas rice, jowar, arhar, tur, moong, til, groundnut, soyabean, chilly, ginger, etc. are kharif crops. Other than cereals, fruits like mango, pineapple, orange, jackfruit, banana, litchi, lemon, papaya, guava etc. are also grown in the study area.

Homestead Plantation

Homestead plantations mostly comprise of *Dipterocarpus macrocarpus*, *Azadiracta indica*, *Aegle marmelos*, *Albizia procera*, *Butea monosperma*, *Cassia fistula*, *Tectona grandis*, *Ficus religiosa*, *Carica papaya*, *Mangifera indica*, *Tamarindus indica*, *Eucalyptus tereticornis*, *Areca catechu* etc.

Trees within the transmission line corridor

According to the preliminary survey report, the Loop-In transmission line area contains a total of 4,686 trees, including both fruit-bearing and non-fruit-bearing varieties, along with 5,021 bamboo plants. In the Loop-Out transmission line area, there are 9,278 trees of similar types and 22,040 bamboo plants. Detail tree enumeration provided in **Appendix-9.**

4.4.2 Faunal Assessment

Since the proposed LILO lines do not involve any Protected area or reserved forest or critical wildlife habitats of the project districts, therefore, the faunal assessment of the project area reveals presence of common domesticated fauna only like Cow, buffalo, goat, pig, dog etc. Also, common species of birds and other mammals are found. As per the site assessment presence of wildlife species are very rare but chance finding of some wildlife species like deer, elephant, wild boar, wild buffalo, fox, leopard etc. in the vicinity of project area can not be ruled out.

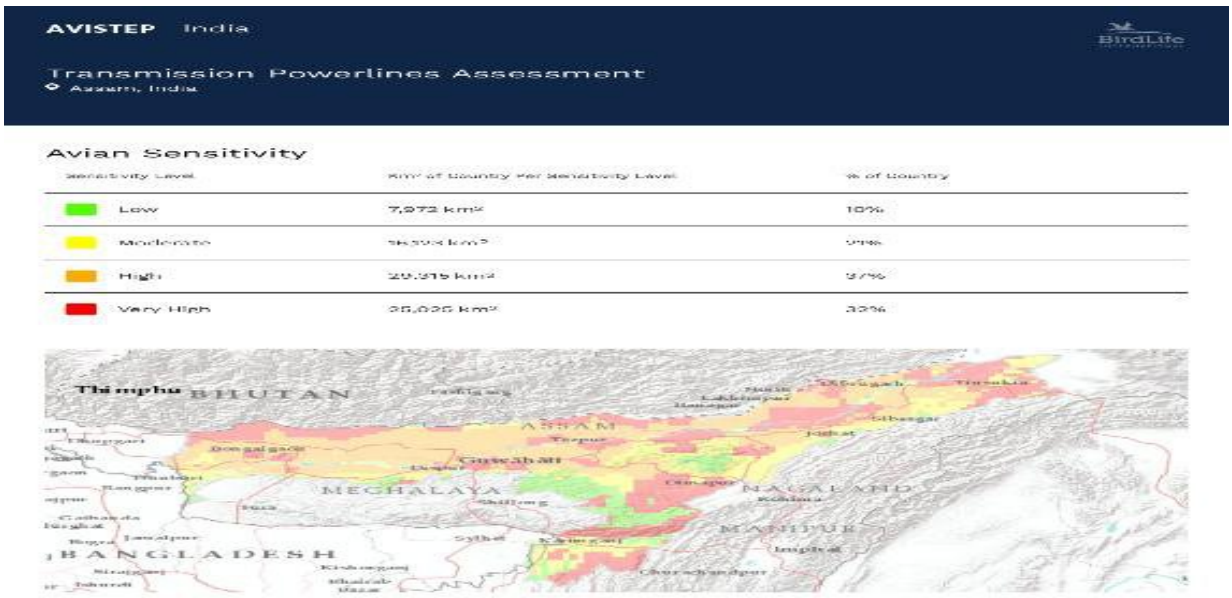
Avifauna assessment (As per AVISTEP)

AVISTEP as the Avian Sensitivity Tool for Energy Planning has been used for the project area to 1. Identify areas of high avian sensitivity across landscapes where power infrastructure like

transmission lines is proposed. 2. Minimize impacts on bird habitats and migratory paths during planning and route alignment. 3. Support environmentally responsible decision-making in the energy sector. 4. Promote biodiversity conservation while allowing energy infrastructure development.

AVISTEP analysis is based on spatial data such as: Important Bird Areas (IBAs), Migratory corridors, Wetlands, forests, and other ecologically sensitive zones of the area. Based on the AVISTEP analysis, the likelihood of occurrence of some avifauna species like Baer's pochard (CR), Bengal Florican (CR), Greater adjutant (EN), Sarus Crane (VU), Lesser adjutant (VU), Asian Woollyneck (NT), Painted stork (NT), Swamp francolin (VU), Black neck stork (NT), Manipur Bush-quail (EN) within the project area (occurrence certainty) ranges from low to medium. Since the nearest Important Bird Area (IBA), Barnadi Wildlife Sanctuary (WLS), lies beyond the 10 km buffer zone from the LILO transmission lines and site assessment reveals presence of common bird species only, hence the occurrence of these CR/EN/VU species in the project area is assessed to be minimal. However, the possibility of their occasional presence cannot be entirely ruled out in the project area.

Detail list of Avifauna species wrt collision sensitivity & occurrence certainty in the project area is provided in **Appendix – 10.**



Source: Environmental and Social team

Figure 4.6 A: AVISTEP map of Assam

Source: AVISTEP

Figure 4.6 B: AVISTEP map project area of LILO of both circuit of Rangia (Ext) Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP IN & LOOP OUT)

4.4.3 Critical habitats in the Project areas

An analysis for Key Biodiversity Areas (KBA) within 10 Km buffer from the center line of LILO lines were assessed by obtaining data from 'The World Database of Key Biodiversity Areas' and it is found that no critical wildlife habitat including KBA Sites are present within 10 KM buffer of the transmission lines. A map showing the project area vis-a-vis location of Critical Wildlife Habitat is shown in **Figure 4.7** below.

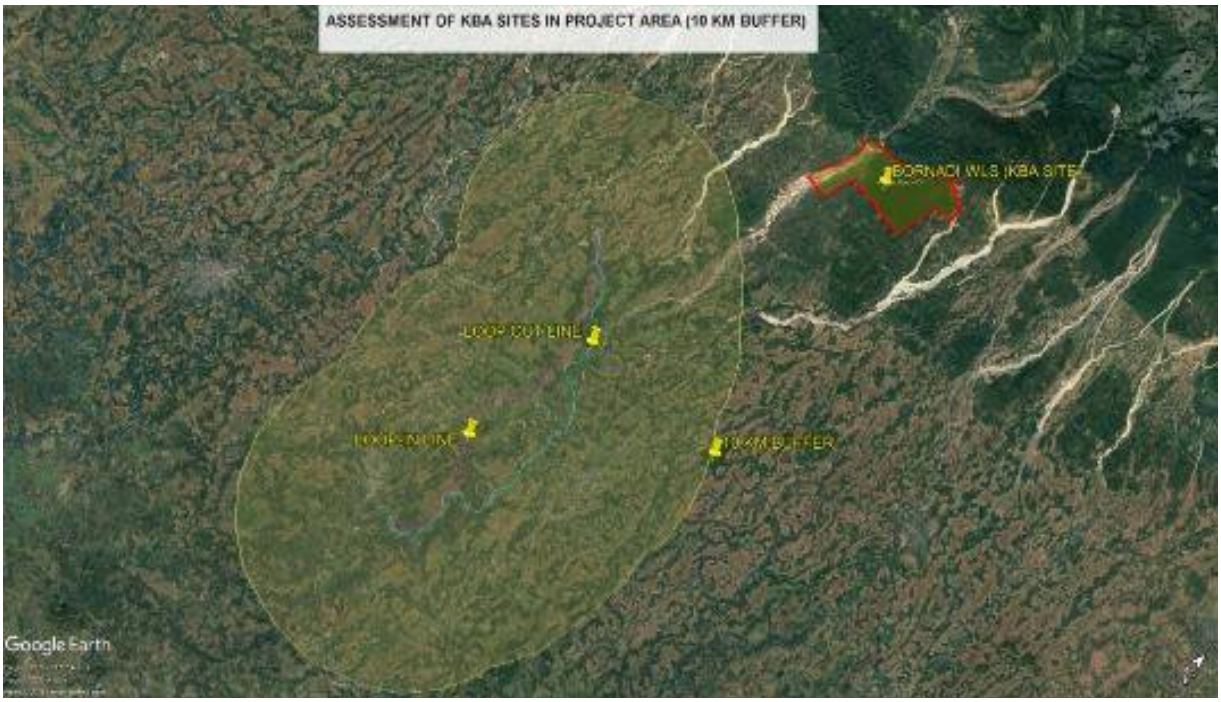


Figure 4.7: Critical habitat vis-a-vis transmission line routes.

4.4.4 Migratory Routes

Migratory birds use loosely fixed routes for their migration. Globally, certain routes have been identified that connect both the northern and southern hemispheres. Every year, millions of water birds follow these routes to reach their destinations and return journeys.

Usually, migratory birds follow a north-south axis to spend the duration of their non-breeding winter season.

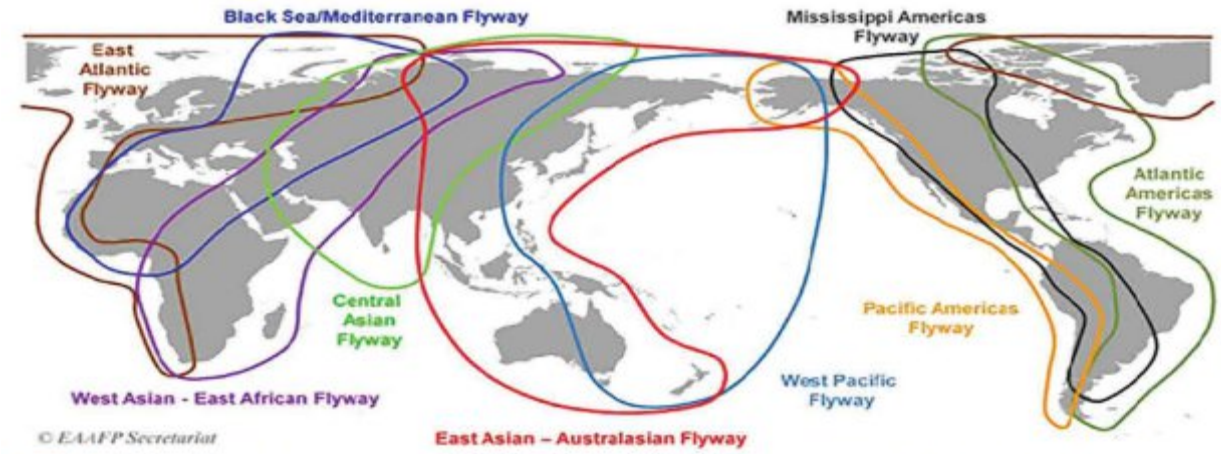


Figure 4.8: The map of the world is showing the migratory birds flyways. (Image Source: East Asian-Australasian Flyway Partnership (EAAFP); https://www.eaaflyway.net/the-flyway/)

4.5 Social Environment Baseline of the Study Area

4.5.1 State Profile: Assam

As per the Census 2011, the total population of Assam is 3.12 Cr. Thus, the population of Assam forms 2.58 percent of India in 2011. Assam has total population of 31,205,576 in which males were 15,939,443 while females were 15,266,133.

The total area of Assam is 78,438 square km. Thus, the population Density of Assam is 398 per square km which is higher than the national average of 382 per square km.

Table 4.6: Assam Demographic Profile

Attribute	Number	% of India
Area (sq. km)	78,438	9.37
Total population	31,205,576	6.0
Males	15,939,443	6.03
Females	15,266,133	5.97
Sex ratio	958	NA
Percentage of rural Population	86	NA
Percentage of urban population	14	NA
Population density	398	NA
Percentage of SC population	7.15	NA
Percentage of ST population	12.4	NA
Total literacy rate	72.19	NA
Male Literacy rate	77.85	NA
Female Literacy Rate	66.27	NA
Rural Literacy	69.34	NA

Source: Census of India, 2011 data

Demography & Socio-Economic Condition

The literacy rate of Assam is nearly 72 % (of which the rural literacy stands at 69.34%) which lower is slightly than that of the country, at 74.04%. The male literacy rate is relatively higher, at 77.85% while

the female literacy rate is 66.27% which is slight high when compared to the national female literacy rate of 65.46%.

According to the census of India, life expectancy in Assam has changed from 57.8 years of Males and 58.3 years of females in 2001 to 62.7 and 65.5 years in 2011 for males and females respectively.

Assam is categorized as a low HIV Prevalence state with an estimated adult HIV Prevalence of 0.07% which is lower than the National Prevalence of 0.27%. However, the adult HIV Prevalence in the state has increased from 0.04% in 2007 to 0.07% in 2011.

In 2011, Assam had 1,48,124 Sub Centers, 23,887 Primary Health Centers, and 4,809 Community Health Centers, along with 7,347 hospitals in rural areas and 4,146 in urban areas.

In 2011, Assam had 48,050 elementary schools, with a significant increase from 41,579 in 2000-01. The Ministry of Education's data for 2011-12 categorized schools based on highest class level, including Senior Secondary, Secondary, Upper Primary, and Primary schools.

The energy sector in 2011 was largely dependent on hydro power, fossil fuels, with gas and coal contributing significantly to electricity generation. Only 37% of the state was electrified, with a significant rural-urban disparity in electricity access. The Power demand for Assam ranged between 700 MW to 2400 MW at present.

Assam's economy was predominantly agrarian, with agriculture being the largest source of income and employment, and a significant portion of the population residing in rural areas as per census 2011. In 2011, Assam had a workforce participation rate of 53.26% for males and 25.51% for females. This indicates a significant gender gap in employment in Assam. Specifically, the male workforce participation rate was more than double that of females.The state's economy also included sectors like oil and gas production, tea cultivation, and tourism. The growth of 8.42 percent in Grass State Domestic Product (GSDP) of the State for 2011-12 comprises of a growth of 6.43 percent in Agriculture and Allied sector, 7.19 percent in Industry sector and 9.74 percent in Services sector.

In Assam, GBV is a widespread and persistent issue that affects women and girls of all ages, backgrounds, and regions. According to the National Crime Records Bureau (NCRB), Assam recorded the rate of crimes against women in India in 2019, with 177.8 cases per 100,000 population, compared to the national average of 62.42 . Some of the common forms of GBV in Assam are: Domestic violence, which includes physical, sexual, emotional, and economic abuse by intimate partners or family members. Sexual violence, which includes rape, molestation, stalking, and sexual harassment. Trafficking of women and girls, which involves the recruitment, transportation, transfer, harbouring, or receipt of persons by means of threat, force, coercion, fraud, or deception for the purpose of exploitation. Witch-hunting, which is a form of violence against women who are accused of practicing witchcraft or causing harm to others by supernatural means. The data was collected from the “International Journal of Research and Analytical Reviews (IJRAR)."

4.5.2 District Profile: Kamrup Rural and Tamulpur District

Kamrup Rural District

Kamrup is an administrative district in the Indian state of Assam. The present Kamrup district with its headquarter at Amingaon has proved to be an exemplary and model civil district. It came into being on 31st day of March 2003 with great promises with alacritous drive to go ahead. The area the district covers is about 2740 sq. km. The population of the district, as per the census report of 2011 is also stated to be 1,517,542 with the literacy rate of 75.55%. Kamrup district has 1027 villages, administered under twelve revenue circles.

The Kamrup District is situated between 25.46 and 26.49 North Latitude and between 90.48 & 91.50 East Longitude. The District is bounded by: -North - Udalguri and Baska District, South - Meghalaya East - Darrang District and Kamrup Metropolitan District and West - Goalpara District and Nalbari District

Table 4.7: Kamrup Rural district Demographic Profile vis-à-vis Assam

Attribute	Kamrup (Rural) District
Population	1,517,542
Population Density	489
SC population percentage	7.1%
ST population percentage	12.0%
Sex Ratio (number of females per thousand male)	949
Total literacy rate percentage	75.5%
Male literacy rate percentage	81,30
Female literacy rate percentage	69.47
Rural population percentage	81.3%

Source: Census of India 2011 data

Demography & Socio-Economic Condition

The total Kamrup district population living in rural area is 1,375,148 of which male and females are 706,140 and 669,008 respectively. The total population of Kamrup district in 2011 was 15,17,542.

The population density of Kamrup district in 2011 was 489 people per square kilometer. The sex ratio of Kamrup district in 2011 was 947 females per 1,000 males in rural areas. The literacy rate of Kamrup district in 2011 was 75.55%. The district covers an area of about 2,740 square kilometers. The district has 1,027 villages, administered under 12 revenue circles. The district is part of the Lower Assam division. The district headquarters is in Amingaon.

The district has a population growth rate of 15.67% from 2001 to 2011. The district has a mix of Scheduled Castes and Scheduled Tribes, making up 7.11% and 12.00% of the population respectively.

The economy of the district is mainly dependent on both the agricultural and industrial sector. More than half of its population are engaged in agriculture in order to earn their livelihood. The chief agricultural products in the district are wheat, paddy, coconut, sugarcane, orange, pineapple, lemon, coconut, etc. The main economic activity in Kamrup Rural District, Assam is agriculture, with more than half of the population involved in the sector. Other economic activities in the district include dairy and tea cultivation: Livestock in Assam is highly livelihood-oriented and is generally owned by small and marginal farmers and landless agricultural labourers which forms more than 90% of the households in the district. Dairy has potential to be taken up successfully as a main occupation by unemployed educated youth and as an important source of subsidiary income by small / marginal farmers, agricultural labourers and women in the scheme area of Bezera, Bihdia-Jajikona, Hajo, Kamalpur, Rangia, Sualkuchi, Goraimari, Rani, Chayagaon, Chayani-Barduar, Chamaria, Boko, Rampur and Bongaon block/s in the district.

The life expectancy data in Kamrup Rural district in 2011, life expectancy at birth was higher than the state average, with males having 62.08 years and females having 65.5 years. In Kamrup Rural district, HIV prevalence is relatively low compared to other areas in the state. The Kamrup Rural district HIV positive in 2011 is 2.47 %.

Kamrup Rural district in Assam has numerous hospitals and healthcare facilities, including various Primary Health Centers (PHCs) and a few larger hospitals. Some notable hospitals in the area include the All-India Institute of Medical Sciences (AIIMS), Sygnus Hospitals, and Life Save Hospital.
As per 2011 census Kamarup Rural has 280 sub centre 69 PHCs 9 CHCs 0ne Sub-Divisional Hospital and one District Hospital respectively. Moreover, the district administration has been focusing on improving healthcare infrastructure and services to cater to the needs of its residents.
The district had a total of 2262 schools government schools, comprising 1895 lower primary schools and 376 upper primary schools. Moreover, the District Profile of Kamrup Rural indicates the presence of 216 High Schools, 71 Higher Secondary Schools and 25 Colleges.

In Kamrup Rural District, energy consumption is primarily driven by electricity, with the industry sector being the largest consumer, followed by domestic, agriculture, and commercial sectors. The development and economic activities in the district have led to a significant increase in electricity demand, both in rural and urban areas. The district's electricity supply comes from sources like the Assam Power Generation Corporation Ltd. (APGCL). The district is working on providing electricity to un-electrified households through both on-grid and off-grid (solar) systems.
In 2011, the Kamrup Rural district in Assam had an economy heavily reliant on both agriculture and industry. Approximately 90% of the population was involved in traditional and modern agriculture, allied activities. The district was particularly known for its Muga silk, Pat silk, and Eri silk, with Sualkuchi being a major hub for silk weaving, especially mekhela-chadar and gamosas. Besides agriculture and the silk industry, Kamrup Rural also had a significant presence of non-farm and service-related activities.
Women in Kamrup Rural district often experience greater mobility and visibility compared to other regions in India. This increased mobility is partly due to the district's demographic composition, which includes a mix of tribal and non-tribal populations, and the predominance of agriculture as the main occupation. However, despite this relative mobility, traditional gender norms persist, and women continue to face significant challenges. While specific data for Kamrup Rural district may be limited, available information indicates that GBV, particularly domestic violence, remains a significant issue.

Tamulpur District

Tamulpur district, also known as Tamolpur district, is an administrative district in Bodoland Territorial Region of Assam, one of the North-Eastern states of India. The administrative headquarters is at Tamulpur. It is the 35th district of the Indian state of Assam, carved out of Baksa district. Tamulpur become a full-fledged district on 23 January 2022. The Tamulpur District sharing 29.6 km of Bhutan, having geographical area of 461.25 sq km approx.

Table 4.8: Tamulpur district Demographic Profile vis-à-vis Assam

Attribute	**Tamulpur District in Lakhs**
Population	2,35,403
Population Density	440/km²
SC population percentage	10.86
ST population percentage	31.17
Sex Ratio (number of females per thousand male)	970

Total literacy rate percentage	69.25%
Male literacy rate percentage	77.03
Female literacy rate percentage	61.27
Rural population percentage	98%

Source: Census of India 2011 data

According to 2011 census the district has a population of 2,35,403, where male population – 1,19,705, and female – 1,15,698 and literacy rate 85.71% included in the district in two Administrative Revenue Circle namely Tamulpur Revenue Circle and Goreswar Revenue Circle. The three Development Block-Tamulpur, Nagrijuli and Goreswar Dev Block. The district has a sex ratio of 970 (females per 1000 males). The district includes 440 persons per sq. km. The decadal population growth rate of Tamulpur district in Assam between 2001 and 2011 was 11.17%.

According to 2011 census, 36.96% of the population spoke Assamese, 25.40% Boro, 22.33% Bengali, 5.18% Nepali and 4.67% Santali, 0.96% Sadri and 0.93% Rajbongshi as their first language

The literacy rate of Tamulpur district is 69.25 % of which 77.03 % is for males and 61.27 % is for females as per 2011 census.

The life expectancy in Tamulpur district is 66 years, which is below the state average for Assam. The level of HIV positivity among antenatal care (ANC) clients in the district is low, indicating a generally low prevalence of HIV in the area.

In 2011, Tamulpur district in Assam has one District Hospital and 23 PHCs spread across Tamulpur district, providing basic healthcare services in rural areas.

Tamulpur district has 692 schools. The district receives electricity from the state grid, which is utilized for various purposes, including domestic, industrial, and commercial use. Conventional grid-based electricity is primarily used for domestic and industrial needs.

The economy of Tamulpur district is predominantly agrarian, with agriculture serving as the main source of income and employment for the majority of the population. The district is highly dependent on agriculture, and a large portion of its land is dedicated to crop cultivation. Paddy is the most important crop, accounting for a substantial area of the gross cropped area, followed by vegetables, mustard, and horticultural crops. Pig farming also plays a role in providing livelihoods for the poor and marginalized farmers.

Tamulpur district, like many other regions in Assam, faces serious challenges related to gender-based violence (GBV). Traditional patriarchal norms and deeply rooted gender roles significantly contribute to the persistence of these issues. Domestic violence and other forms of GBV remain prevalent, underscoring the urgent need for targeted and sustained interventions. Although specific data for Tamulpur district may be limited, available reports suggest that domestic violence is a particularly widespread concern.

PCRs/CPRs/ Archaeological and Historical Monuments

As per the check survey, no impact is expected on Protected Cultural Resources (PCRs), Common Property Resources (CPRs) or archaeological/historical sites as assessed during the detailed and check survey. However, there are schools, an Anganwadi Centre (AWC), places of worship, and a hospital located beyond the RoW. Moreover, no such monuments are coming in the proposed route alignments. Furthermore, "Utmost care shall be taken during the check survey to avoid such areas.

However, if any archaeological or cultural artifacts are discovered during construction, all work in the area will be stopped immediately, the site will be secured, and the concerned authorities will be notified prior to resuming of construction activities.

The major archaeological and historical monuments found in Kamrup Rural and Tamulpur District is as follows:

1. The Manikarneswar temple is in *devottar* land located at Manikarneswar hill in North Guwahati, Kamrup Rural facing the river Brahmaputra which is 51.3 Km from Tamulpur district.
2. The Kanai Borosibowa Rock Inscription is located at North Guwahati, Kamrup Rural is 50.5 Km from Tamupur district.
3. The Dirghesvari Devalaya is located in North Guwahati, Kamrup Rural about 49.1 km from Tamulpur district.
4. The Madan Kamdev Archaeological Site, Baihata Chariali, Kamrup Rural is about 37.6 Km from Tamulpur district.
5. The Pingaleswar Archaeological Site, located in Karara of Kamrup Rural district, is approximately 39.3 km from Tamulpur district. Moreover, other archaeological and historical monuments in Kamrup Rural district are situated far from the proposed transmission line area.
6. Tamulpur district is not specifically known for a large number of well-documented or widely recognized archaeological sites. However, its proximity to the Indo-Bhutan border and the Barnadi River may have implications for the presence of historical or pre-historic sites. Presently, there are no known archaeological sites in the district, although there are several religious sites in the area.

4.5.3 Study Area Profile

The study area, for the LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT) transmission line is spread across 27 villages namely; Garka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Uttar Gandhibari, Baraliapar, Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Uttar Bardal, Gosai Solmari. in Kamrup Rural and Tamulpur distict.

As per the 2011 Census, Rangia Circle under Kamrup Rural district of Assam had a total population of 155,333, with 122,800 residing in rural areas and 32,533 in urban areas. The overall literacy rate stood at 75.66%, with male literacy at 80.29% and female literacy at 70.66%, reflecting a moderate gender gap in educational attainment. The Scheduled Tribe (ST) population constituted 6.02% (9,350 individuals), while the Scheduled Caste (SC) population accounted for 3.54% (5,505 individuals). The total workforce was recorded at 9,880 persons, with 8,167 engaged as main workers and 1,713 as marginal workers. The region is known for cultivating crops such as paddy, mustard, and vegetables, with agriculture continuing to play an important role in the rural economy.

As per the 2011 Census, Goreswar Circle—now part of Tamulpur district in Assam—had a total population of 153,747, with a nearly balanced gender distribution: 77,872 males and 75,875 females, resulting in a sex ratio of approximately 975 females per 1,000 males. The literacy rate in Goreswar Circle was 67.72%, with male literacy at 74.1% and female literacy at 61.2%, indicating a gender gap in

educational attainment. Scheduled Tribes (ST) comprised about 35.03% of the population, making Goreswar a significant tribal region within the district. Regarding agriculture, while specific data on average agricultural land size per village in Goreswar Circle is limited, the broader region is predominantly agrarian. The main crops cultivated include paddy, mustard, and various vegetables.

As per the 2011 Census, Tamulpur Circle—then part of Baksa district in Assam—had a total population of approximately 106,403, residing in urban and rural areas. The sex ratio stood at 967 females per 1,000 males, and the child population (0–6 years) was 32,415. The average literacy rate was 63.9%, with male literacy at 72.2% and female literacy at 55.28%, indicating a significant gender gap in educational attainment. Scheduled Tribes constituted 28.7% of the population, while Scheduled Castes made up 13.3%. The region is predominantly agrarian. Agriculture is the mainstay of the local economy, with paddy being the principal crop. Other crops include mustard, vegetables, and pulses. The area also engages in beekeeping, contributing to honey production.

The socio-economic census survey of the study area would be carried out and the findings of the census survey will be incorporated in the Abbreviated Resettlement Action Plan.

5. ANALYSIS OF ALTERNATIVES

This chapter elucidates detailed analysis about different options of transmission line route alignment with respect to design, environmental, social and economic aspects during project conception and planning phase.

It is to be noted that during ESIA study, the route for transmission line was already finalized by AEGCL considering following environmental and social criteria for route selection apart from the technical consideration:

- TL route does not involve any human settlement;
- TL route does not affect on any archaeological / cultural monument;
- Avoid forest area;
- TL route does not pass through any protected area such as National Park / Wildlife Sanctuary;
- TL route avoid disturbance to public utility services such as school, hospital playground, bus stop etc.;

Further, optimization was done during the detailed survey. During route alignment, all possible efforts were made to avoid the environmental and social sensitivities or to keep it to the minimum. Following table shows the analysis of 3 Alternative routes.

Figure 5.1: Map showing all three alternatives for both Loop-in Loop-out lines

Table 5.1: Assessment of Alternative Routes

Description	Alternative- I (Optimum/Proposed Route)	Alternative-II	Alternative-III
LILO of both circuit of Rangia-Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP IN section) BEE LINE Length:- 22.899 KM			
Route Length (in Kms.)	31.311 KM	33.595 KM	34.370 KM
Angle Point	69	72	87
River Crossing (Major)	NIL	2	2
River Crossing (Minor)	01	02	02
Forest (Reserved Forest & Protected Forest)	NIL	NIL	NIL
Tea Garden (Affected Route length)	NIL	NIL	1 KM
Low Land Area	Appx. 3 KM	Appx. 5 KM	Appx. 6 KM
Habitation area	Mostly avoided	Partially involved	Partially involved

Description	Alternative- I (Optimum/Proposed Route)	Alternative-II	Alternative-III
Railway Crossing	1	1	1
Power Line crossing	5	5	5
Road crossing	Crossing at village roads involved only.	Major crossing at State PWD roads involved	Major crossing at State PWD roads involved
Trees and Bamboo	9707	11878	12929
RoW issues	Anticipated very few	Anticipated very high	Anticipated very high
Compensation related issues	Anticipated to be minimum	High	High
Accessibility to tower location	Easily accessible	Difficult to access	Difficult to access
LILO of both circuit of Rangia-Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP OUT section) BEE LINE Length: - 24.045 KM			
Route Length (in Kms.)	35.795 KM	36.354 KM	38.170 KM
Angle Point	74	76	99
River Crossing (Major)	2	2	5
River Crossing (Minor)	1	2	2
Forest (Reserved Forest & Protected Forest)	NIL	NIL	NIL
Tea Garden (Affected Route length)	NIL	NIL	1.5 KM
Low Land Area	Appx 2 KM	Appx 3 KM	Appx 3 KM
Habitation area	Mostly avoided	Partially involved	Partially Involved
Railway Crossing	1	1	1
Power Line crossing	5	5	5
Road crossing	Crossing at village roads involved only.	Major crossing at State PWD roads involved	Major crossing at State PWD roads involved
Trees and Bamboo	31318	38203	39645
RoW issues	Anticipated very few	Anticipated very high	Anticipated very high
Compensation related issues	Anticipated to be minimum	High	High
Accessibility to tower location	Easily accessible	Difficult to access	Difficult to access

Source: Check Survey report

Pros and cons of the alignment options

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

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

Justification for the selected alignment option

LILO of both circuit of Rangia-Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP IN section) Alternative III is longest in length than Alternative I & II. Angle Point in alternative I is less i.e. 69 as compared to alternate II & III, i.e. 72 & 87 respectively. Route length of Alternative I is shorter than alternate II & III. Also based on Environmental & Social considerations analysed for all the three route alternatives, Alt-I route is found to be most feasible. Based on above facts, Alternative I was considered as the most optimal route and recommended for erection of transmission line.

LILO of both circuit of Rangia-Amingaon 220kV line at Rangia (Tamulpur) 400kV GIS Sub-station (LOOP OUT section) Alternative III is longest in length than Alternative I & II. Angle Point in alternative I is less i.e. 74 as compared to alternate II & III, i.e. 76 & 91 respectively. Route length of Alternative I is shorter than alternate II & III. Also based on Environmental & Social considerations analysed for all the three route alternatives, Alt-I route is found to be most feasible. Based on above facts Alternative-I was considered as the most optimal route and recommended for erection of transmission line.

6. ASSESSMENT FOR POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

6.1 Introduction

This chapter details the impact assessment methodology, anticipated project impacts on physical, biological environment (biodiversity assessment, critical habitat assessment using tools like AVISTEP etc.) and social environment based on baseline features of the project during design, construction and operation phases and suggested mitigation measures for all identified impacts and provide summary of impact assessment.

6.2 Impact Assessment Methodology

Understanding of the project and selection criteria of transmission line with regards to environment and social consideration, different construction activities during different phases, social and

environmental screening and scoping, Key baseline environmental and social features, identification of environmental and social impacts on physical, biological and social environment and their management plan along with institutional arrangements for implementation.

6.2.1 Screening and Scoping

Screening and Scoping involves review of the available environmental and social information about the project and its surrounding areas.

The details of the project have been collected from different project documents, secondary data and reconnaissance survey are summarized below.

Table 6.1: Screening for Impacts

Environmental and Social features	Description	Potential Impacts/ Impacts Occurred
Physical Environment		
Land use Land cover	In general the land use of the project area including transmission line RoW and tower footing are agricultural land, tree/crop plantation area, some habitation area etc. The Right of Way is considered 35 Mtr. Area required for transmission tower for the LILO line:- for DA type towers 35 to 51 sqm, DB type towers 47 to 66 sqm, DC type towers 50 to 70 sqm and DD type towers 57 to 79 sqm.	• Permanent change in land use at Tower locations. • Limited change in land use of the RoW of Transmission line in form of restrictions on activities such as growing of large trees;
Topography	Topography of Kamrup (Rural) & Tamulpur districts a Tamulpur district in Assam exhibits a geology characterized by mixed plains and foothills, influenced by its proximity to the Indo-Bhutan border. The soils are primarily alluvial, classified as Entisols and Inceptisols, and are mostly sandy and silty loam or clay loam in nature. re mainly plain including some hilly areas. Topography of the project area of transmission line is mostly plain land.	• There will be no significant change in the existing topography due to implementation of this project.
Soil	Kamrup (Rural) district in Assam exhibits diverse geology and soil characteristics. The landscape is marked by alluvium, alluvium-colluvium, and granite-gneiss formations. The district's soils are categorized into newer alluvial, valley fill/older alluvial, and those found on forest and hilly terrains, with varying proportions of sand, silt, clay, and organic matter. Tamulpur district in Assam exhibits a geology characterized by mixed plains and foothills, influenced by its proximity to the Indo-Bhutan border. The soils are primarily alluvial, classified as Entisols and Inceptisols, and are mostly sandy and silty loam or clay loam in nature.	• Generation of construction debris; • Impact on soil and land environment due to improper management of domestic solid waste; • Improper storage and handling of hazardous materials (e.g., fuel and lubricant) and generation of hazardous waste during operation. • Waste generated from operation of construction equipment and machinery and their maintenance leading to soil contamination due to leakage / spillage;
Water Resources and Quality	In the alluvial plain of Kamrup (Rural) district, groundwater occurs in regionally extensive aquifers down to the depth of 305 m. It has a very good yield prospect. The aquifers are	• Insignificant stress on local water resources due to water requirement for the foundation activities, labour camp;

Environmental and Social features	Description	Potential Impacts/ Impacts Occurred
	consisting of sands of various grades with gravel and are suitable for construction of both shallow and deep tube wells. Based on the behaviour and occurrence of ground water, the regional ground water flow system of Tamulpur district has been described under following categories. i. Shallow aquifer group occurring within 50 m depth. ii. Deeper aquifer group beyond a depth of 50 m and down to 200 m bgl.	
Drainage	Transmission line passes through river, nallah, ponds in some tower locations.	• Sediments including residual construction waste transport to nearby water bodies from tower locations.
Ambient Air Quality	Based on the observation at site it has been perceived that the ambient air quality of the project footprint and study area is good.	• Dust emissions associated with foundation activities at tower locations, transportation of construction material, machineries etc.
Ambient Noise Level	Based on the observation at site it has been perceived that the ambient noise level of the project footprint and study area is good.	• Noise generation due to movement of vehicles; • Noise from construction activities; • Generation of noise during operation of DG Set.
Biological Environment		
Ecology	• Critical wildlife habitats are not present in the project area since the land use is mainly agricultural land, tree/crop plantation, water bodies, some residential areas etc. • The project area specifically the transmission line corridor (35 m) does not involved part of any critical wildlife habitats and any reserved of protected areas. In the study area of 10 KM buffer from the project site, no critical wildlife habitats are found.	• Removal of vegetation causing impact on ecology of the area; • Habitat destruction during temporary laying of wires adjacent to the RoW of transmission lines; • May collision and electrocution risks to avifauna and other fauna during operational phases.
Occupational health and safety	• Workers may also face physical hazards from working at heights, lifting heavy materials, and operating machinery. Prolonged exposure to noise, extreme weather conditions, and electromagnetic fields can further impact health. Additionally, poor ergonomics and inadequate personal protective equipment (PPE) may contribute to musculoskeletal injuries and long-term health issues if safety protocols are not strictly followed.	• Occupational health hazards due to dust; • Exposure to noise during construction activities; • Safety risk due to wrong handling of construction machinery, working at height, during stringing and erection; • Exposure of workers to Electromagnetic field (EMF) while working in proximity to charged electric power lines during operation and maintenance.
Social Environment		
Demographics	• The study area of LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT)	• Influx of people for employment opportunity. • Migrant labour from other districts. • Potential for social conflict and unrest

Environmental and Social features	Description	Potential Impacts/ Impacts Occurred
	Transmission Line tower base is comprised of land from twenty-seven villages. • The other details shall be provided after conducting the socio-economic survey.	due to conflict of local community with labourers.
Economy and Employment	• The economy of the study area in Kamrup Rural district in Assam had an economy heavily reliant on both agriculture and industry. Approximately 90% of the population was involved in traditional and modern agriculture, allied activities. The district was particularly known for its Muga silk, Pat silk, and Eri silk, with Sualkuchi being a major hub for silk weaving, especially mekhela-chadar and gamosas. Besides agriculture and the silk industry, Kamrup Rural also had a significant presence of non-farm and service-related activities. • The economy of Tamulpur district is predominantly agrarian, with agriculture serving as the main source of income and employment for the majority of the population. The district is highly dependent on agriculture, and a large portion of its land is dedicated to crop cultivation. Paddy is the most important crop, accounting for a substantial area of the gross cropped area, followed by vegetables, mustard, and horticultural crops. Pig farming also plays a role in providing livelihoods for the poor and marginalized farmers.	• For the project activity more job opportunities will be created. • Indirect positive impact on local economy through development of secondary amenities.
Land based, Livelihood	--	• Due to project activities the loss of access (temporary and permanent) parcels of land for transmission tower foundation / erection activities will impacts on livelihood. • Erection of transmission tower and the RoW of the transmission line will result in an impact on approx. 233 land owners. • While the construction of towers is not likely to result in landlessness or physical displacement, it will result in economic displacement due to crop losses during foundation, erection and stringing activities in the RoW.
Loss of CPRs, and Access	• The land within the RoW of the Transmission Lines is mainly of Agriculture land and some fall on government land. No CPRs are available within the RoW.	• However, any loss of access and CPRs during the time of construction of Transmission Line shall be provided in ARAP.
Community health and safety	• Most of the tower locations are situated beyond residential areas and other sensitive zones, and therefore, no electromagnetic radiation impact on the	• Transportation of tower components, other construction materials and increased vehicular movement will lead to traffic hazards for community

Environmental and Social features	Description	Potential Impacts/ Impacts Occurred
	surrounding community is anticipated. • Labourers in close proximity to community.	residing close to the access roads; • Damage to access roads. • Potential gender-based violence (sexual exploitation and abuse/sexual harassment)
Labour Welfare	• The labours would be engaged by the EPC contractor. • The labourers would be engaged from both local and migrant workers from other districts of Assam.	• The key potential impacts in terms of labour welfare include the following: • Access to resources such as water, sanitation, cooking fuel etc.; • Conflict with local community. • Timely payment of wages and other labour compliances.

6.2.2 Identification of Impacts

Various project features and activities that could reasonably act as a source of impact which has been identified for detailed assessment for different stages of the project are as follows:

Planning and Construction Phase

- Land use and Land cover
- Soil environment
- Water resources and quality
- Drainage
- Ambient air quality
- Ambient noise level
- Occupational health and safety
- Flora and fauna- vegetation Clearance
- Flora and fauna- Construction activities
- Impact on Private Land owners in Tower Base Area and below conductors during Stringing Exercise
- Impact on private land owners within RoW due to imposition of land use restrictions
- Impacts due to Labour Influx
- Impact on Community Health and Safety
- Impact on Economy and Employment in the Study Area

Operation Phase

- Soil Environment
- Noise Level
- Visual Impacts
- Electro-magnetic fields
- Health and safety
- Flora and fauna- Collision and Electrical hazards for avifaunal species
- Impacts of economic loss due to damage to standing crops during maintenance work
- Impact on Community Health and Safety

6.2.3 Assessment of Impact Significance

Table 6.2: Impact Assessment Significance

Significance Rating	Interpretation
Very High	Impacts where an accepted limit or standard is far exceeded, changes are well outside the range of normal variation, or where long-term to permanent impacts of large magnitude (or

	consequence) occur to highly sensitive resources or receptors. For adverse residual impacts of very high significance, there is no possible further feasible mitigation that could reduce the impact to an acceptable level or offset the impact, and natural recovery or restoration is unlikely. The impact may represent a possible fatal flaw and decision making will need to evaluate the trade-offs with potential social or economic benefits. Positive social impacts of very high significance would be those where substantial economic or social benefits are obtained from the project for significant duration (many years).
High	Impacts where an accepted limit or standard is exceeded; impacts are outside the range of normal variation or adverse changes to a receptor are long-term. Natural recovery is unlikely or may only occur in the long-term and assisted and ongoing rehabilitation is likely to be required to reduce the impact to an acceptable level. High significance residual impacts warrant close scrutiny in decision-making and strict conditions and monitoring to ensure compliance with mitigation or other compensation requirements. Positive social impacts of high significance would be those where considerable economic or social benefits are obtained from the project for an extended duration in the order of years.
Medium	Moderate adverse changes to a receptor where changes may exceed the range of natural variation or where accepted limits or standards are exceeded at times. Potential for natural recovery in the medium-term is good, although a low level of residual impact may remain. Medium impacts will require mitigation to be undertaken and demonstration that the impact has been reduced to as low as reasonably practicable (even if the residual impact is not reduced to Low significance). Positive social impacts of medium significance would be those where a moderate level of benefit is obtained by people or a community, or the local, regional or national economy for a sustained period, generally more than a year.
Low	Minor effects will be experienced, but the impact magnitude (or consequence) is sufficiently small (with and without mitigation) and well within the range of normal variation or accepted standards, or where effects are short-lived. Natural recovery is expected in the short-term, although a low level of localised residual impact may remain. In general, impacts of low significance can be controlled by normal good practice but may require monitoring to ensure operational controls or mitigation is effective. Positive social impacts of low significance would be those where a few people or a small proportion of a community in a localised area may benefit for a few months.
Very Low	Very minor effects on resources or receptors are possible but the predicted effect represents a minimal change to the distribution, presence, function or health of the affected receptor and no mitigation is required.
Insignificant	Predicted impacts on resources or receptors of very low or low sensitivity are imperceptible or indistinguishable from natural background variations, and no mitigation is required.

The significance of an impact is based on expert judgement of the sensitivity (importance or vulnerability) of a receptor and the magnitude (or consequence) of the effect that will be caused by a project-induced change. In summary, the impact assessment method is based on the following approach:

Significance = Magnitude x Sensitivity

Where, Magnitude = Intensity +Extent + Duration

Once ratings are applied to each of these parameters the following matrix is used to derive Significance:

Table 6.3: Impact Sensitivity Assessment Matrix

		SENSITIVITY				
		VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
MAGNITUDE (OR CONSEQUENCE)	VERY LOW	NEGLIGIBLE	NEGLIGIBLE	VERY LOW	LOW	LOW
	LOW	VERY LOW	VERY LOW	LOW	LOW	MEDIUM
	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	HIGH
	HIGH	MEDIUM	MEDIUM	HIGH	HIGH	VERY HIGH
	VERY HIGH	HIGH	HIGH	HIGH	VERY HIGH	VERY HIGH

Broad definitions of impact significance ratings are provided in the table. Impacts of 'High' and 'Very High' significance require careful evaluation during decision-making and need to be weighed up against potential long term socio-economic benefits of the project to inform project authorisation. Where there are residual biodiversity impacts of 'High' and 'Very High' significance this will require careful examination of offset feasibility and confirmation that an offset is possible prior to decision-making.

6.2.4 Preparation of Environment and Social Management Plan

The universally accepted mitigation hierarchies adopted for impact assessment is described below:

- Avoid, if possible;
- If avoidance is not possible reduce the magnitude of the impact by applying mitigation measures at source;
- If mitigation measures at source of impact did not succeed to mitigate the impact, then abatement or compensatory measure or offsets are recommended.

The mitigation measures recommended in individual impact assessments will be compiled for project construction and operation phases. The ESMP prepared has also taken organization structure for implementation of mitigation measures.

6.3 Impacts on Physical Environment

Impact assessment focuses on the following which are impacted due to the project activities.

- Land use and land cover;
- Soil environment;
- Ambient Air Quality;
- Ambient Noise Level;
- Water resources, Quality and Drainage; and
- Occupational health and safety.

6.3.1 Impacts during Planning and Construction Phase

The project activities during construction phase include:

- Selective clearing of vegetation in designated areas for Transmission tower erection and RoW;
- Movement of construction machineries, transportation of construction material, tower components, stringing wire etc.;
- Establishment of labour camp;
- Storage of materials;
- Excavation, foundation and construction works;
- Erection of Tower;
- Stringing activities.

Mitigation measures provided for construction activities at site (tower foundation, erection of remaining towers, stringing) are given table as follows.

Table 6.4: Impacts on physical environment and mitigation measures during construction phase

Land use and Land Cover	
Context and receptor	• In the project area the land is primarily used for agriculture / crops. The other land uses in the area are trees / vegetation, some residential areas and water bodies (Table 2.3). • No major anthropogenic activities are observed in the project area except agricultural activities and tree/crop plantation. • The project shall be resulting in change of the land use within the land parcels where the transmission towers are located. The actual area of land use impact is limited to the footprint (tower base) of the 233 transmission towers which represent around 3.65 hectares for the LILO lines. Besides this the land falling under the RoW of transmission line will also have limited change in land use in terms of restriction of activities to be undertaken on this area.
Mitigation measure	The land requirement for the tower base has been considered optimum as per the IS standards.
Impact Significance	A total of 3.65 hectares will experience permanent change in land use. The RoW of transmission line required 48422 (both loop in & loop out) numbers of trees including fruit & non fruit bearing, bamboos etc. to be felled or looped. During operation phase, RoW will have limited restriction in terms of prohibiting plantation of any large tree, construction of any structure. The agricultural activities in the RoW area could be continued as earlier. Considering this, the magnitude of the impact is assessed as **medium.** Out of total land to undergo permanent land use change is 236.420 hectares are primarily used for agriculture, trees / crops, residential, water bodies and range land. Hence, the resource sensitivity is assessed as **medium**. As per the Impact Sensitivity Assessment Matrix **(refer Table 6.3)** a combination of medium impact magnitude with medium receptor sensitivity results in impact significance as **moderate.**
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	-
Soil Environment	
Context and receptor	• Digging of foundation pits for the towers may affect the soil quality. • Foundations shall dig up to a depth of 3-3.5 m depending upon the tower type and soil characteristics. At the tower sites, all vegetation within the footprint of the tower base and additional surrounding area shall be cleared for ground vegetation. Foundation pits shall be backfilled by the excavated soils; • Compaction of soil during excavation, transportation of construction material & tower components, foundation work, backfilling, tower erection and stringing lead to temporary effects on natural infiltration of rainwater, but these impacts are temporary, localized and marginal; • Soil contamination at tower locations shall be from result of leaks and spills of oil, lubricants, or fuel from construction equipment. • General construction waste generated onsite comprised of waste concrete, wooden pallets, steel cuttings / filings, packaging paper or plastic, wood, metals etc. Municipal domestic wastes consisting of food waste, plastic, glass, aluminium cans and waste paper shall also be generated by the construction workforce and labour camp site. A small proportion of the waste generated during construction phase shall be hazardous and

	include used oil, grease and waste oil containing rags. • During foundation activities at tower locations, excess excavated material shall be generated.
Mitigation measure	• Vegetation clearance and excavation to be done in the marked excavation and construction area only; • The excavated soil to be stored on site for back filling; • Any top soil that is to be removed for construction of tower Footings / foundations to be temporarily stored in a proper manner and then be used as a (soil) top cover after construction activities are complete; • After completion of construction activities, site will be cleared for any excess excavated material and leftover construction material. Disposal areas for same will be identified in consultation concerned department; • Spill management kit will be provided and immediately clean-up of any spillages; • Provision of waste collection bin and disposal of domestic waste will be provided at labour camp site; • Tower components and materials shall be placed properly at construction site, thereby reducing disturbance to surrounding standing crop and vegetation; • The existing roads to be used for approaching tower locations.
Impact Significance	• The impact on soil quality will be limited to transmission tower locations. The land area already disturbed during foundation activities for some tower footing and foundation and shall be continued for remaining tower footing and foundations. • Compaction of soil may be happened due to vehicular movement for remaining tower footing and foundations, tower erection and stringing activities. However, the compacted soil in surroundings of tower locations will reinstate their original conditions through ploughing activities in fields. • On basis of this, the magnitude of impact is assessed as **small.** • The foundation activities at 48 tower locations shall cause disturbance to the fertile top soil in agricultural fields. Considering this, the resource sensitivity is assessed as medium. • As per the impact significant assessment matrix (refer Table 6.2) a combination of small impact magnitude with medium receptor sensitivity results in impact significance as minor.
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	No change in impact significance rating for remaining construction activities.
Ambient Air Quality	
Context and receptor	Ambient air quality will largely impact from the following sources during the construction phase: • Fugitive dust emissions from transportation of material, excavation, drilling, back filling, emission due to movements of vehicles, plying of heavy construction machinery etc.; • Emissions from diesel generator for construction activities. • The nearest receptor for dust emissions located outside 500 m distance from transmission line route. • No ecological sensitivities located in the RoW of transmission line route.
Mitigation measure	• All vehicles shall be properly maintained; • Excavation activities to be avoided during windy weather conditions; • The unpaved access roads shall be sprinkled with water as necessary to reduce dust, especially during summer windy conditions.
Impact Significance	• The major activities contributing to air emissions, i.e., foundation activities along the transmission line. • The vehicles and construction machinery plying onsite will generate particulate and gaseous emissions of CO, SO2, NOx and CO2. These emissions will be dispersed into

	the unpolluted environment of the project area. Dust and air emissions resulting from the above activities may affect environment depending upon prevailing wind directions and speed. In addition, fugitive dust emissions generated in the project activities will add to the particulate levels in the project area. Emissions from the DG set and other stationary machines will also generate gaseous emissions. • Considering above, magnitude of impact is assessed as medium. • As mentioned above, there are habitations present within 500 m distance from the Transmission line route. • There are no ecological sensitivities located in the RoW of transmission line route. • Hence, the receptor sensitivity is considered as **medium.** • As per the impact significant assessment matrix (refer Table 6.3) a combination of small impact magnitude with high receptor sensitivity results in impact significance as moderate.
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	No change in impact significance rating for remaining construction activities.
Ambient Noise Level	
Context and receptor	• The foundation activities at transmission tower locations shall affect on the noise level due to operation of concrete mixer, DG set, vehicular movement for transportation of materials. • During erection of tower and stringing there can be some disturbance from noise due to vehicular movement for transportation of tower components, strings, and communications during erection and stringing. Also, during stringing there will be continuous operation of tractors carrying the strings from one tower to other. • As mentioned above, there are habitations present within 500 m distance from the Transmission line route. • No ecological sensitivities located in the RoW of transmission line route.
Mitigation measure	• Construction activities are to be carried out during the daytime (6:00 am- 6:00 pm); • Avoid unnecessary honking of horns.
Impact Significance	• In case of transmission line, the noise causing construction activities (drilling, rock breaking and material transportation) at any tower location will limit to 2-3 days. • The increase in traffic volumes during the erection of the transmission tower and stringing is expected to be occasional and negligible. • Hence, the magnitude of impact on ambient noise level is assessed as medium. • As mentioned above, there are habitations present within 500 m distance from the Transmission line route. • There are no ecological sensitivities located in the RoW of transmission line route. • Hence, the receptor sensitivity is considered as **medium**. • As per the impact significant assessment matrix (refer Table 6.3) a combination of small impact magnitude with high receptor sensitivity results in impact significance as moderate.
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	No change in impact significance rating for remaining construction activities.
Water Resources and Quality	
Context and receptor	• The transmission line generally requires about 50 m^3 of water for casting of foundations for each tower, which shall be sourced from local sources through

	tankers. • The transmission line passes through River and nallahs. Refer Table 2.3 for details.
Mitigation measure	• Location of storage area to be avoided on agricultural land and in close proximity to water bodies wherever possible. • Excess excavated material not to be dumped in Nallah / water course / drainages. • Proper arrangement for clean bathing / washing water to be made at labour camps; • Approved water supply resource to be used for water requirements for concreting and curing during foundation activities; • Wastewater generated at labour camp will have proper disposal arrangements such as septic tank and soak-pits.
Impact Significance	• The sensitivity of water resource in the area is considered as **low.** • The magnitude of impact is assessed as small considering the amount of water consumption at foundation activities at tower locations. • Tower erection and stringing activities does not have water requirement. Further, the direct negative impact on water resources due to construction activities is short term and limited mainly to construction phase of the project. The transmission lines will have insignificant impact on the surface water and ground water. • As per the impact significant assessment matrix (refer Table 6.3) a combination of small impact magnitude with medium receptor sensitivity results in impact significance as **negligible.**
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	The significance of residual impacts for remaining construction activities will be **negligible.**
Drainage	
Context and receptor	The study area has natural drainage pattern. The transmission line passes through River and nallahs. Refer **Table 2.3** for details.
Mitigation measure	Drainage system will not be blocked and polluted by the construction activity and shall be closely monitored at Site.
Impact Significance	• The alteration in surface drainage pattern of the area due to construction of transmission line will be insignificant as the natural flow of water will not be altered. • Considering this, magnitude of impact is assessed as small and resource sensitivity as **low.** • As per the impact significant assessment matrix (refer Table 6.3) a combination of small impact magnitude with low receptor sensitivity results in impact significance as **negligible.**
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	No change in impact significance rating for remaining construction activities.
Occupational Health and Safety	
Context and receptor	• The erection of transmission towers, stringing of line will require working at heights. The commissioning of the transmission line will also involve live power lines. • The working at height has the risks of falling from the height and working on live wires carrying power has dangers of electric shock and electrocution. • Besides this, there could be slip and trip hazards especially during monsoon season. • The area experiences heavy rainfall. Working during very heavy rain could cause health hazards; • During tower erection and stringing activities, about 40 workers will be engaged.

Mitigation measure	• Trained workers will be involved in the specific work activities such as tower erection and stringing; • Prior to start of work, workers will be informed about the related safety risks and precautions to be taken; • Stop work in monsoon season (wet season); • During summer and rainy days with high temperature, work shall be started early in morning with no work during peak temperature in afternoon and rainy days. • Construction areas to be marked and cordoned off; • Manual lifting by adult men to be less than 55kg and for women it should be less than 30kg; • Eye protection for welding, cutting or similar operations which may cause hazard to eyes; • All persons performing construction work to wear safety shoes and helmets confirming to national standard; • Every worker engaged in handling sharp objects which may cause injury to hand shall be provided with suitable hand gloves; • A construction worker handling cement and concrete to wear close fitting clothing, gloves, helmet / hard hat, proper footwear, masks etc. and will take all precaution to keep the cement and concrete away from his skin; • Moving parts of the hoists, grouting equipment used for concrete work are securely fenced to avoid any injury or unsafe condition; • The mixing of the concrete is done in such a way that minimum of dust escapes into the air; • Erection of steel structures should be carried out by experienced workers and they should use safety harness, lifelines, catchment etc.; • EPC contractor to ensure a First-aid Box is available at construction site; • EPC contractor to ensure that health and safety procedures are in place and training on same are provided to the workers prior to construction; • Once the stringing is complete, notices (danger sign boards) and anti-climbing devices to be put on all the faces of the tower; • Emergency contact numbers and route to nearest hospital shall be displayed at construction site. • The local / host community shall be kept at safe distance from construction site.
Impact Significance	• The foundation activities, i.e. tower footing, the erection of transmission towers and stringing will be done through experienced and trained workers. • Construction of foundation work at transmission towers shall involve local workers who were not having earlier experience. Hence, there will be greater vulnerability for accidents and therefore, receptor vulnerability is assessed as medium. • Depending on the severity of incident/accident, the magnitude of impact could small to **medium.** • As per the impact significant assessment matrix (refer Table 6.3) a combination of small to medium impact magnitude with medium receptor sensitivity results in impact significance as minor to moderate.
Additional mitigation measures	• Safety induction training will be conducted on the joining date of the workers. • Daily toolbox talks will be conducted for the workers before the commencement of any work. • Refresher safety training will be conducted every six months for the workers engaged in the project including workers working at heights.
Residual impact significance	The significance of the residual impact after implementation of the recommended mitigation measures will be **minor** for remaining construction activities.

Impact on Sensitive Receptors

Impact on Sensitive Receptors: There are no sensitive receptors located within the Right of Way (RoW) corridor of the proposed LILO (Line-In and Line-Out) transmission line. However, within a 500-meter

radius of the proposed LILO (Loop-In) of both circuits of the Rangia (Ext)–Amingaon 220kV line (using single zebra conductor) at the Rangia (Tamulpur) 400kV GIS with OPGW link, the following sensitive receptors have been identified: 10 schools, 17 places of worship, 3 public health centers, and 1 PHED water supply scheme. Similarly, within a 500-meter radius of the proposed LILO (Loop-Out) of both circuits of the same transmission line at Rangia (Tamulpur) 400kV GIS with OPGW link, the following are present: 14 schools, 21 places of worship, 1 public health center, 1 playground, and 1 post office.

During construction phase insignificant impact may occur to the above sensitive receptors, as most of the sensitive receptor locations are away from the center line of the transmission lines. Regular noise quality monitoring will be conducted during construction phase and will be compared with base line data. Appropriate measures will be taken if increase in noise level recorded.

6.3.2 Impacts during Operation Phase

The following sub-section provides details on the impacts during operation and maintenance phase. The project activities during operation phase include:

Power Transmission;

Preventive maintenance of Transmission line.

Table 6.5: Impacts on physical environment and mitigation measures during operation phase

Soil Environment	
Context and receptor	**Waste Generation** Any spillage of Aluminium oxide paint during operation and maintenance of the transmission line towers may impact soil quality.
Mitigation measure	Preventive maintenance plan will be prepared for transmission line.
Impact Significance	No impacts of any significance are predicted on vegetation and soil due to operation of the transmission line.
Additional mitigation measures	Low frequency of painting as well as involving experienced personnel with mitigations like prior spread of sheets underneath the tower structure while painting could be considered.
Residual impact significance	No change in impact significance rating.
Noise Level	
Context and receptor	The likely noise impacts from operation of the transmission line will be due to: • Maintenance and repair activities; • 'Corona discharge' from the overhead lines; • Once operational, noise from energised overhead lines along the transmission line route can be produced by a phenomenon known as 'Corona Discharge' (a limited electrical breakdown of the air). Conductors are designed and constructed to minimise corona effects, although, under certain conditions this can be audible as a 'hissing' sound, sometimes accompanied by a low frequency hum. Conductors designed and constructed to minimise corona effects will be chosen for transmission. It is highly unlikely that the corona discharge noise will exceed the normal background noise levels in the area and furthermore, such noises are mostly restricted to rainy weather conditions. • The nearest receptor for noise emissions located within 500 m distance from transmission line route. • No ecological sensitivities located in the RoW of transmission line route.

Mitigation measure	The project design specifications include the measures to reduce the noise generated along transmission line.
Impact Significance	• The magnitude of noise generation from operational phase will be small but consistent for the entire life of transmission line. • As mentioned above, there are habitations present within 500 m distance from the Transmission line route. • There are no ecological sensitivities located in the RoW of transmission line route. • Hence, the receptor sensitivity is considered as medium. • As per the impact significant assessment matrix (refer Table 6.3) a combination of small impact magnitude with High receptor sensitivity results in impact significance as minor.
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	No change in impact significance rating.
Visual Impacts	
Context and receptor	The footprint of the project comprise of about 236.420 hectares will experience permanent change in land use and 66.506 km long transmission line with 233 towers. The transmission line route passes through agriculture/trees/crops/vegetation, residential, water bodies and range land. The vertical forms of the transmission towers would be prominently visible from the road and nearby settlements. Besides this, the farmers in the field would have clear view of these towers. It is to be noted that the study area already had other existing transmission towers and the new transmission line will be easily absorb in the existing landscape. The visual impacts will be perceived by two types of receptors, namely: • Receptors located at a fix point, i.e. habitations within the project foot print and area of influence; and • Receptors who will temporarily come into contact with the transmission line such as passing motorists in the area.
Mitigation measure	The route of alignment had avoided settlement areas, forest areas during project planning.
Impact Significance	It is important to note that whether the visual impact is seen as positive or negative is highly subjective, and people's attitude towards and perception of the visual impacts associated with the transmission line may differ vastly. The study area already had other existing transmission line. Hence, the magnitude of impact is assessed as **small.** Also, the local community does not perceive the transmission line as a new element in the existing visual landscape of the area as interpreted from consultations. Therefore, receptor vulnerability is considered as **low**. As per the impact significant assessment matrix (refer Table 6.3)) a combination of small impact magnitude with low receptor sensitivity results in impact significance as **negligible.**
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	No change in impact significance rating.
Electro Magnetic Fields (EMPs)	

Context and receptor	The power evacuation through the transmission line during operation phase will result in development of electromagnetic fields. There have been some concerns about possible health risk from exposure to electromagnetic radiation from overhead transmission line. People working in the vicinity of transmission line are potentially prone to exposure to EMF. However, while the evidence of adverse health risks is low, it is still sufficient to warrant limited concern.
Mitigation measure	The minimum distance clearance of 7 m from ground to the lowest conductor shall be provided in the project as CEA Safety regulations, 2023 which is considered adequate to mitigate potential exposure to electromagnetic fields (EMF). Details provided in **Table 2.2**
Impact Significance	There are no specific standards or guidance on EMF in India however the Indian Electricity Act and Rules clearly stipulate the minimum clearances required. As per ICNIRP standards, the EMF generated by 220kV line is lesser than the suggested value.
Additional mitigation measures	The recommendations applicable to the management of EMF exposures (as per IFC) as given below shall be followed: • Evaluation of potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). • Average and peak exposure levels shall remain below the ICNIRP recommendation for General Public Exposure (1). • If EMF levels are confirmed or expected to be above the recommended exposure limits, application of engineering techniques will be considered to reduce the EMF produced by power lines, or transformers. Examples of these techniques include: • Shielding with specific metal alloys • Increasing height of transmission towers • Modifications to size, spacing, and configuration of conductors. During operational phaze, AEGCL will monitor the above measures as per requirements.
Residual impact significance	Not Applicable
Occupational Health and Safety	
Context and receptor	The project will have transmission of 220 kV through the transmission line during operation phase. AEGCL will be responsible for O&M of the Transmission line. • There is a possibility of lines or towers / tower members falling to the ground, and safety risks during maintenance activities at towers, during the operational phase, contact with the transmission line can result in electrocution. • Ignorant people trying to tap electricity from high tension wire can lead to fatal accidents.
Mitigation measure	• Risks to general public during operation will be reduced by public awareness and education and physical measures by attaching an appropriate warning sign on all faces of the tower; • Once the stringing work is complete, notices and permanent anti climbing devices will be installed on the tower. The operational start date for electricity transmission and safety implications will be publicized locally in advance. • The SOP for preventive maintenance and repairing of fault will be defined and followed.
Impact Significance	Based on above, overall impact significance is assessed as **minor**.
Additional mitigation measures	• The lock in-lock out system will be followed during maintenance/ repair activities at transmission line; • Records of incident / accidents shall be maintained;

	• Root cause analysis shall be carried out for any incident / accident
Residual impact significance	No change in impact significance rating.

6.4 Impacts on Biological Environment (Biodiversity Assessment, Critical Assessment Using Tools like Avistep etc.)

Impact Assessment Standards defines sensitivity of ecological receptors by determining the significance of effects on species and habitats separately. Impacts during construction and operation phases are presented below.

6.4.1 Impacts during Planning and Construction Phase

The source of impact to biological environment during the construction phase is associated with the clearing of vegetation and the construction activities. As the RoW of the transmission line primarily includes agricultural and crop land the impact from clearance of vegetation will be considerably minimum.

Table 6.6: Impacts on biological environment and mitigation measures during Planning and Construction Phase

Impacts due to Vegetation Clearance	
Context and receptor	Vegetation clearance is the first step in the establishment of access / internal roads and excavation for the erection of tower footing and transmission tower foundations and ancillary facilities. Impact of vegetation clearance could happen at the time of line stringing at few places. Most commonly found species within the transmission line corridor are Gmelina arborea, Bombax ceiba, Tectona grandis, Areca catechu, Musa sp., Bamboo sp. etc. Apart from the above crops like rice, jowar, arhar, tur, moong, til, groundnut, soyabean, chilly and, ginger, onion, chilly, brinjal, bhindi, wheat, gram, mustard, turmeric, potato, carrot, pea. Other than cereals, fruits like mango, pineapple, orange, jackfruit, banana, litchi, lemon, papaya, sapota and guava are also grown in large quantity. Ground clearance will be maintained from the lowest cable and any object that is grounded (tree etc.). Clearing of vegetation from agriculture / crops, trees / vegetation, built up area reduces options for nesting habitat for birds, shelter from predators, foraging resources, shade, perching habitat and breeding sites. The loss of vegetation can also have a negative effect on soil quality and hamper survival of neighbouring floral species, burrowing faunal species and foraging resources for herbivores in the area.
Mitigation measure	In tower foundation location and transmission line corridor 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.
Impact Significance	Construction of towers and stringing of transmission lines may lead to chopping / trimming or clearing of tree species. This may also happen (or already happened) during line stringing. In addition, vegetation clearance may remove few shrub and herb species. Vegetation clearance will lead to habitat disturbance for fauna. The clearance of vegetation in agriculture / crops, trees / vegetation, built up, water bodies, habitat is expected to occur at a scale to have an impact on habitat for species

	(birds, mammals and some reptiles) that utilize those resources. Vegetation is small enough and construction activities that will disrupt connectivity of habitats for species utilizing the area. However, there is substantial habitat for these species in the region and any impact that likely to happen is unlikely to cause loss of habitat viability and function in the region. The loss of habitat in the agricultural land pertains to any areas that provide connectivity to water bodies and vegetation patches. Once again agriculture / crops, trees / vegetation, built up, water bodies is widespread in the region and therefore impacts from vegetation clearance for construction of transmission line that expected to happen is not expected to cause any long-term disruption of habitat viability and function. Impact magnitude is thereby considered **small**. The sensitivity of these habitats is considered **low** as they may have some significance for IUCN Least Concern Species alone and are common. The species dependent on agriculture / crops, trees / vegetation, built up, water bodies, habitats are included within the Least Concern category. However, the site has bird species protected under IUCN conservation; therefore the site has been deemed to have **medium** sensitivity. The impacts described above are not expected to cause a significant change in the population of these species and therefore the impact magnitude has been deemed **small**. The overall impact significance has been assessed as **not significant** for habitats and **minor** for species.
Additional mitigation measures	The following mitigation measures will further reduce the impact significance on the habitat and species for the remaining construction works that require vegetation clearance: • Vegetation disturbance and clearance should be restricted to the project activity area; • Strict prohibition should be maintained on use of fuel wood and shrubs from nearby areas as kitchen fuel.
Residual impact significance	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 flora and fauna species.
Impacts due to Construction Activities	
Context and receptor	Construction activities include excavation, movement of machineries, increased anthropogenic movement (men and transport) in the project study area. These activities are assessed with respect to disturbance of habitats and species. Excavation for the construction of the foundations for transmission towers and ancillary facilities shall have direct impact on burrowing fauna, mammalian fauna and an indirect impact on flora / fauna through the changing of soil properties. This type of impact could happen for each tower footing that is yet to be constructed. Anthropogenic movement will result in increased stress placed on fauna in the area that remain alert for an extended period of time and may prevent proper breeding, nesting, mating, socializing and foraging. Noise from anthropogenic movement (men and transport) for the construction activities shall cause disturbance to fauna in the nearby areas. This type of impact could happen during the remaining footprint and tower foundation stringing activities of the transmission line.
Mitigation	In-house training provided to the labour force and supervisory staff for situations

measure	dealing with wildlife encounters.
Impact Significance	The significance of impacts from construction activities is being assessed for agriculture / crops, trees / vegetation, built up, water bodies for faunal species. Excavation activities have the potential to cause detrimental impact on the soil properties in the area and on burrowing species, neighbouring flora, herbivores and small carnivores. Burrowing animals including reptiles and ground-roosting bird species and lizard burrowing holes can be directly affected by excavation. Mammalian species could fall in the ditch constructed for the remaining tower footings and get injured. Anthropogenic movement could create increased stress on mammals, birds and reptiles in the project study area in proximity to the areas tower construction and stringing activities are proposed. Mammal species are also susceptible to higher noise levels from anthropogenic movement and construction due to their better auditory perception. Noise can affect mating and breeding behaviour in all species that utilize sound to communicate with one another and find suitable mates. Impact magnitude is considered **small.** The sensitivity of these habitats is considered **low** as they may have significance as per IUCN Least Concern Species alone and are common. The species dependent on agriculture / crops, trees / vegetation, built up, water bodies and range land habitats (reptiles, birds and mammals) are included within the Least Concern category. However, the site has bird species protected under IUCN Conservation Status and therefore the site has been deemed to have **medium** sensitivity. The impacts described above are not expected to cause a significant change in the population of these species and therefore the impact magnitude has been deemed **small**. The overall impact significance has been assessed as **not significant** for habitat and **minor** for flora and fauna species**.**
Additional mitigation measures	The following mitigation measures will further reduce the impact significance on the species for the remaining construction works: • Construction and transportation activities should be avoided at night (6:00 pm to 6:00 am); • Temporary barriers with wire mesh should be installed on excavated areas to prevent falling of mammalian species; • Good housekeeping should be followed for construction activities; • Anti-poaching, trapping and hunting policy among employees and contractors should be strictly enforced; and • General awareness regarding fauna should be enhanced through trainings, posters, etc. among the staff and labourers.
Residual impact significance	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. The residual impacts for species will remain **minor**. However, as impacts of construction activity will be reduced there will continue to be disturbance to fauna and flora will be reduced.
Habitats of Critically Endangered and Endangered species	

Context and receptor	**Key Biodiversity Areas within 10 km radius:** An analysis for Key Biodiversity Areas (KBA) within 10 Km buffer from the center line of LILO lines were assessed by obtaining data from the World Database of Key Biodiversity Areas and it is found that no critical wildlife habitat including KBA Sites are present within 10 KM buffer of the transmission lines. A map showing the project area vis-a-vis location of Critical Wildlife Habitat is shown in **Figure 4.7** of this report. The faunal habitat assessment of the project area reveals presence of common domesticated fauna only like Cow, buffalo, goat, pig, dog etc. Also, common species of birds and other mammals are found. As per the site assessment presence of wildlife species are very rare but chance finding of some wildlife species like monkey, deer, elephant, wild boar, wild buffalo, fox, leopard etc. in the vicinity of project area can not be ruled out.
Mitigation measure	Adoption of general mitigation measures like awareness program for the construction workers, planning of construction work, adoption of safety measures are envisaged and will be sufficient. In-house training is to be provided to the labour force and supervisory staff for situations dealing with wildlife encounters.
Impact Significance	Based on above, overall impact significance is assessed as Small.
Additional mitigation measures	-
Residual impact significance	No change in impact significance rating.

6.4.2 Impacts during Operation Phase

The source of ecological impacts in the operation phase is associated with electrical and collision hazards from transmission infrastructure. The impacts in the operation phase are considerably larger due to the presence of other transmission lines in the area that multiply the hazards for flying bird species.

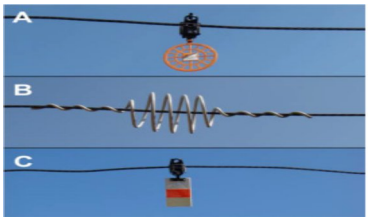
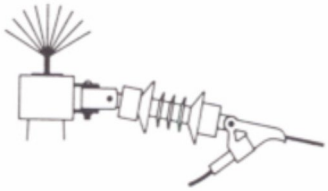
Impacts from the operation phase of the project on the local ecology have been assessed with respect to the following activities:

Perching on transmission lines and towers and flying in proximity to the conductors for avifauna.

Based on the facts that minimum clearance between conductor and trees ranges from 4 to 5.5 m; minimum ground clearance as per Electrical standard is 6.1 to 8.44 m and Spacing between the lines/cables is 3.05 to 5.49m, it can be assumed that, electrocution of primate/monkey and bird's wingspan has not been anticipated by touching two cables.

Table 6.7: Impacts on biological environment and mitigation measures during Operation Phase

Collision and Electrical hazards for avifaunal species	
Context and receptor	• During the ecological assessment bird species were found roosting on wires and poles in the area. Some birds also utilize the transmission towers for nesting by placing the nests across wires or using holes in the tower itself. Collision of birds can happen with transmission line due to specific behaviour like courtship displays, aerial hunting as they may distract the birds from the presence of the power lines. • 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
Mitigation measure	The following mitigation measures will reduce the impact significance on avifaunal species: • Installing perch rejecter (Upright "whisk brooms" - Picture 4) on the cross arms (Picture 1). • 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). These items are included in Sl. No. 34/63 of BOQ. ***Electrical Pole Modification***  Picture 1: Power line markers*  Picture 2: Perch Rejecter
Impact Significance	During the ecological assessment bird species were found roosting on wires and poles in the area. In addition, birds may collide when moving across water bodies in the study area. Some birds with large wing span may get electrocuted. As per AVISTEP analysis, certain avifauna species like Baer's pochard (CR), Bengal Florican (CR), Greater adjutant (EN), Sarus Crane (VU), Lesser adjutant (VU), Asian Woollyneck (NT), Painted stork (NT), Swamp francolin (VU), Black neck stork (NT), Manipur Bush-quail (EN) shows high collision sensitivity (above 50%) wrt to transmission line projects in the area but the likelihood of these species occurring within the project area (occurrence certainty) ranges from low to **medium**. The nearest Important Bird Area (IBA), Barnadi Wildlife Sanctuary (WLS), lies beyond the 10 km buffer zone from the LILO transmission lines and hence the occurrence of these species in the project area is assessed to be minimal. Nevertheless, the possibility of their occasional presence cannot be entirely ruled out. However, it is unlikely that mortality from collision/electrocution will cause any changes in the population regionally. Moreover, appropriate mitigation measures will be implemented to address any potential **negative** impacts on Avifauna. The impact magnitude has been assessed as small. Furthermore, impact significance to species is considered **moderate**.
Additional mitigation measures	No additional mitigation measures suggested.
Residual impact significance	After implementation of mitigation measures, the significance of residual impacts will be **moderate**. We retain this significance, as while the mitigation measures are likely to reduce the impact, the probability of electrocution/collision with wires still cannot be ruled out.
Critical habitats of Critically Endangered and Endangered species (AVIFAUNA)	
Context and receptor	AVISTEP as the Avian Sensitivity Tool for Energy Planning has been used for the project area to 1. Identify areas of high avian sensitivity across landscapes where power infrastructure like transmission lines is proposed. 2. Minimize impacts on bird habitats and migratory paths during planning and route alignment. 3. Support environmentally responsible decision-making in the energy sector. 4. Promote biodiversity conservation while allowing energy infrastructure development. The

	AVISTEP analysis is based on spatial data such as: Important Bird Areas (IBAs), Migratory corridors, Wetlands, forests, and other ecologically sensitive zones of the area. The details of Avifauna report as per AVISTEP analysis in the project area is enclosed at Appendix which provides summary of Critically Endangered and endangered species in the project area. A proximity analysis of IBA sites w.r.t project area also concludes that any IBA sites are not present in the buffer of 10 KM radious from the transmission lines. A detail of IBA sites of Assam is **enclosed for reference in Appendix- 12**.
Mitigation measure	In order to mitigate and minimize collision of birds, power line markers will be used at selected section of the transmission line in proximity to birds flying routs, water bodies as per site assessment, which will reduce the risk by increasing the visibility of overhead lines to birds. A specific monitoring requirement in the form of wildlife monitoring checklist for LILO operator to regularly monitor/observe and record bird collisions and deaths along the transmission line ROW. The bird/wildlife monitoring is to be regularly reported to the PMU and the AIIB. **Checklist provided in Appendix – 7**.
Impact Significance	Based on above, overall impact significance is assessed as Moderate
Additional mitigation measures	-
Residual impact significance	No change in impact significance rating.

6.4.3 Cumulative Impact for Avifauna

The cumulative impacts to the avifauna species are considered as **moderate** since there is a possibility of impact to the globally threatened migratory avifaunal species.

6.5 Impacts on Social Environment

6.5.1 Impacts during Planning and Construction Phase

Table 6.8: Impacts on social environment and mitigation measures during Planning and Construction Phase

Economic loss to private landowners in the tower base area and beneath the conductors due to crop damage during civil construction and stringing activities.	
Context and receptor	For LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT) transmission line is spread across 27 villages namely; Garka, Dipteswari, Hiragata, Deulkuchi, Natipara, Dhukbari, Bakbari, Barghuli, Gohangaon, Dongpara, Jokmari, Uttar Gandhibari, Baraliapar, Kachubari, Kachukata, Singibari, Simulbari, Dakhin Gandhibari, Shijiguri, Tangabari, Halonbari, Baghdoba, Bakhati, Lakra Bamagar, Gopalpur, Uttar Bardal, Gosai Solmari. No physical displacement or loss of residential structures is anticipated for any private landowner, as confirmed during the check survey. However, project activities may result in some crop loss due to foundation and tower erection works, temporary access road creation, and transmission line stringing. The exact impact on landholdings will be

	determined after completing the landowner identification process. This process is currently underway for the Right of Way (RoW) of the LILO of both circuits of the Rangia (Extension) – Amingaon 220kV transmission line at Rangia (Tamulpur) 400kV GIS. Compensation will be provided to affected landowners after the Land Scheduling Report is approved. Land is not acquired for the project, and ownership remains with the landowners. Agricultural activities may continue in the RoW area post-construction, except at tower base locations, where farming is discouraged due to electrical safety concern.
Embedded / in built measures	The crop compensation will be based on the crop damaged at the time of the tower foundation work and stringing activity. The compensation shall be paid based on the rate provided by the concerned department as determined by the agriculture, horticulture & forest department etc. based on the market value. The assessment for the loss of crops and trees shall be done jointly by concerned line department, Circle Offices, AEGCL, PMC and EPC contractor in presence of the affected land owners for payment of compensation.
Impact Significance	The impact of construction activities along the tower base has resulted in a one-time crop loss. Even though most of the construction activity has been planned during the dry season, there may be instances where the construction of the transmission tower foundation, erection of towers, and subsequent stringing of transmission lines involve movement of men, machinery, and equipment across agricultural fields leading to the tower locations. This movement could potentially damage standing crops, not only at the tower base and Right of Way (RoW) of the transmission line but also in adjacent agricultural plots. This damage would lead to temporary income loss for the cultivators. There will be no physical displacement or loss of residential structures for any private landowners, and no impact is expected on Protected Cultural Resources (PCRs), Common Property Resources (CPRs), or archaeological/historical sites, as assessed during the check survey. However, there are schools, Primary Health Center, an Anganwadi Centre (AWC), places of worship, and a hospital located beyond the RoW. The overall impact on land holdings in the RoW can be ascertained after conducting a socio-economic survey, which will be carried out after approval of the land scheduling report from the concerned Circle offices. Since most of the community members and villagers primarily depend on agriculture as a source of livelihood, the impact significance is considered **minor**.
Additional mitigation measures	Utmost care will be taken to avoid crop damage and the construction activity will be carried-out during lean season. In addition to this, an Abbreviated/ Resettlement Action Plan (A/RAP) shall be prepared for the transmission line route in keeping with applicable reference of Environmental and Social Management Planning Framework (ESMPF) requirements.
Residual impact significance	The residual impact significance of the impact on private land owners in Tower Base Area and below conductors during Stringing Exercise is anticipated as **Insignificant.**
Economic Loss to private land owners within RoW due to imposition of land use restrictions	
Context and receptor	The economic loss to private land owners within the RoW can be determine after conducting the socio-economic survey report, which will be carried out in due course of time after the approval of the land scheduling reports from concerned Circle Offices. In keeping with these that the MoP guidelines as well as Government of Assam Notification on land compensation for tower footing and RoW Corridor on 10th March 2017 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 for payment of compensation for land within the RoW and the base area have been introduced. These guidelines were formulated based on a report submitted by a committee headed by the special Secretary of the Union Power Ministry. This report noted the resistance being posed by land owners and farmers to the construction of transmission lines, demanding higher compensation owing to the diminution of land value below towers and under the corridor.
Embedded/ in built measures	Compensation for tower base and RoW area will be paid to the individual land owners as per compensation procedures. Further, in line with the MOP guidelines of October 2015 and subsequent notification by Govt. of Assam adopted the MOP guidelines of Oct.' 2015 on land compensation for tower footing and RoW Corridor on 10th March 2017 which provides for payment of 85% and 15% of land value towards compensation for land coming under tower base and line corridor respectively 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.
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 **minor.**
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 **Negligible**
Impact on Community Health and Safety	
Context and receptor	The receptors for impacts on community health and safety include 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 mentioned earlier in the report, the transmission line will pass through villages and will thus lead to significant impact on community health and safety during construction phase. Construction activities will involve the use of heavy machinery and live transmission power lines. Furthermore, the movement of material and personnel via the access roads may result in damage to human life or livestock due to accidents. The major community health and safety risks include structural failure of project infrastructure, life and fire safety, public accessibility and management of emergency situations. Based on the above analysis, the impact magnitude is assessed to be medium. Moreover, the potential for GBV/SEA/SH increases due to the presence of migrant male workers, especially in areas where there is close proximity between workers and local women and girls. Limited access to legal, health, and social services further heightens the vulnerability of affected populations. Additionally, social stigma and a lack of awareness regarding GBV-related issues contribute to underreporting and inadequate response mechanisms."

Mitigation measures implemented	The provisions for safety of the workers will be complied as per the provision of the EPC contractor agreement. The Contractor 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 format for CoC is appended at Appendix-11.**
Impact Significance	The impact to community health and safety during the construction phase is evaluated to be of minor to moderate significance due to proximity of the TL line passing through different villages. However, the significance of impact decreases because the project site consists of medium density of population and most of the unskilled labour will be engaged from the local habitation.
Additional mitigation measures	
Residual impact significance	After the implementation of the additional mitigation measures, the impact significance is expected to become negligible.
Impact on Economy and Employment in the Study Area	
Context and receptor	The construction phase of the project resulted in the creation of employment and economic opportunities for the local community. These economic opportunities comprised of the following: • Engagement of the local community as labourers in the project; • Contracting opportunities for locals possessing tractors, dumper trucks or other vehicles which would be needed to carry away excavated soil and other material. • Creation of indirect employment for local community through establishing small shops like tea stalls, supply of intermediate raw materials, repair outlets, hardware stores etc. However, these are likely to be temporary
Mitigation measures implemented/ observed on site	It is foreseen that the contractor would give preference for unskilled/semi-skilled workers from the local community. It is anticipated that a significant number i.e., around 90% of workers during the foundation activities would be hired from the local community.
Impact Significance	The overall impact significance of the impact on economy and employment during the construction phase is assessed as **positive.**
Impacts Due to Migrant Labour	
Context and receptor	As anticipated, the unskilled labourers may be recruited from the local villages, while the semi-skilled and skilled labourers may be hired from other districts of Assam. The labour camps shall be setup nearby the tower foundation work. These camps shall be set up by the contractors. The laborers shall be engaged from similar cultural background which reduces the chances of conflicting cultural values with host population and are benefiting the small business owners in the villages as customers.
Mitigation measures implemented	The EPC contractor engaged for the project is responsible for ensuring adequate accommodation facilities for the labourers. The key requirements of the ESMP in terms of the labour accommodation are as follows: Contractor shall provide necessary water supply, sanitation, drainage and medical health facilities at campsite. Contractor shall provide PPE such as safety goggles, helmets, safety belts, ear plugs, mask etc. to staff, workers and laborers.

	Reverse horn for all construction equipment and vehicles should be kept in working order. Required electrical safety measures such as double earthing for heavy electrical equipment, machinery, providing earth link circuit breaker (ELCB) for all electrical connections shall be undertaken by the contractor. The contractor shall comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. The contractor shall also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. Contractor shall provide facemasks to the workers when paint is applied in the form of spray or a surface having dry lead paint is rubbed and scrapped. The Contractor shall mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce non-compliance of use of PPE with zero tolerance. Maintaining first aid at construction sites. Maintaining emergency response system. Provision of waste collection and segregation with two bins systems (bio- degradable and non-bio degradable) and encourage labours to use the same; Waste disposal- identifies existing locations for waste disposal in the area or creates safe disposal pits for biodegradable waste. Non-biodegradable waste shall be stored and disposed to nearest Municipal waste disposal facility.
Impact Significance	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 **negligible**.
Additional mitigation measures	The following additional mitigation measures would be taken to mitigate the negative impacts due to migrant labour: The monitoring should be undertaken adequately to ensure the contractor's Compliance to the applicable rules and regulations and provisions as per the contractual agreement with EPC contractor. The implementation of the GBV CoC for all workers The health checkup for the migrant workers would be done before starting of construction activities, The grievance redressal mechanism for the project can be access by the local community and labourers and can receive GBV related cases.
Residual impact significance	The residual impact significance will remain **negligible**

6.5.2 Impacts during Operations Phase

Table 6.9: Impacts on social environment and mitigation measures during Operation Phase

Impacts of economic loss due to damage to standing crops during Maintenance work	
Context and receptor	During the operations phase, it is anticipated that there may be loss of crops and trees due to the following: • Due to movement of personnel and machinery for maintenance activities it may loss the crop. • Trimming of trees and vegetation in the RoW.

Planned/Implemented Mitigation Measures	The compensation for the impacts of crop loss will be paid in keeping with the Electricity act, 2003 and Government of Assam Notification on 10th March 2017. The assessment of loss will be done in the presence of the land owners.Further details regarding the application of this Act and the compensation amounts provided to the affected landowners will be included in the ARAP/RAP report.
Impact Significance	As the impact of maintenance activities along the RoW are expected to be limited and there is possibility of crop loss during emergencies or major repair. However, since the community is primarily dependent upon agriculture as a source of livelihood, the sensitivity is assessed as Medium. As per the impact a combination of small impact magnitude with medium receptor sensitivity results in impact significance as **moderate.**
Additional mitigation measures	-
Residual impact significance	-
Impact on Community Health and Safety	
Context and receptor	The impacts on community health and safety during the operations phase are likely to result from: • Movement of traffic and machinery for maintenance; • Tower falling; • Wire snapping; • Exposure to herbicide/pesticides used for maintenance of RoW; • Electro-Motive Force (EMF) generation and electromagnetic interference; • Electrocution The above-mentioned impacts are likely to be restricted to those using the land within the RoW.
Planned /Implemented Mitigation Measures	• By public awareness and education and physical measures the risks will be reduce during operation and also by attaching an appropriate warning sign on all faces of the tower; • Once the stringing work is complete, notices and permanent anti climbing devices will be installed on the tower. • The operational start date for electricity transmission and safety implications will be publicized locally in advance.
Impact Significance	• There may be impact which is anticipated in the receptors within the RoW.
Additional mitigation measures	The following additional mitigation measures have been identified for reducing the impacts on community health and safety: • Undertaking health awareness among the local community focused on aspects such as electrical safety, risks of climbing the towers, do's and don'tsin case of wire snapping or tower collapse etc. • Undertaken awareness campaigns in the school regarding the hazards fromthe Transmission lines and the do's and don'ts in case of any emergencies. • Access of the local community to the grievance redressal mechanism established by the project.
Residual impact significance	After the implementation of the additional mitigation measures, the impact significance is expected to be reduced to negligible.

6.6 Summary of Impact Assessment

Table 6.10: Summary of Impacts

Category	Impact Significance (Without mitigation measures)	Significance (post- mitigation)
Construction Phase Impact		
Land use and Land cover	Insignificant	Insignificant
Soil environment	Insignificant	Insignificant
Water resources and quality	Moderate	Minor
Drainage	Insignificant	Insignificant
Ambient air quality	Moderate	Minor
Ambient noise level	Moderate	Minor
Occupational health and safety	Moderate	Minor
Flora and fauna- vegetation Clearance	Minor	Minor
Flora and fauna- Construction Activities	Minor	Minor
Impact on critical wildlife habitat	Insignificant	Insignificant
Impact on Private Land owners in Tower Base Area and below conductors during Stringing Exercise	Minor	Insignificant
Impact on private land owners within RoW due to imposition of land use restrictions	Minor	Minor
Impact on local community due to loss of grazing land for Grid Sub-station	Negligible	Negligible
Impacts Due to Migrant Labour	Insignificant	Insignificant
Impact on Community Health and Safety	Minor	Insignificant
Impact on Economy and Employment in the Study Area	Optimistic	Optimistic
Operation Phase		
Soil Environment	Insignificant	Insignificant
Noise level	Minor	Minor
Visual Impacts	Insignificant	Insignificant
Electro-magnetic fields	No change in impact significance rating	
Health and safety	Minor	Minor
Flora and fauna- Collision and Electrical hazards for avifaunal species	Moderate	Moderate
Impacts of economic loss due to damage to standing crops during Maintenance work	Minor	Minor
Impact on Community Health and Safety	Insignificant	Insignificant

6.7 Overall cumulative and induced impacts of the project

Overall cumulative impacts are the effect on the environment that results from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects.

Power Line - 400kV DC Balipara-Bongaigaon Transmission Line from PGCIL can contribute to multiplying the impacts on the avifaunal species. Impacts to species are considered moderate as there

is a possibility of impact to resident faunal species as well as globally threatened migratory avifaunal species etc.

Induced impacts

Induced impacts refer to the broader effects that occur as a result of the transmission line project itself, which may not be immediately apparent but can unfold over time. These can include both positive and negative consequences that extend beyond the immediate scope of the project.

a. Environmental Induced Impacts

Land Use Changes: Establishment the transmission line may stimulate land use changes, including agricultural intensification, urban sprawl, or industrial development, which can increase pressure on local ecosystems.

Climate Change Effects: The transmission of electricity might enable greater reliance on energy-intensive industries or projects, leading to increased emissions over time, either directly or indirectly.

Pollution from Indirect Sources: As energy supply increases, it may attract more polluting industries (such as mining, manufacturing, or chemical production), leading to higher levels of industrial waste, air emissions, and water contamination.

b. Social and Economic Induced Impacts

Economic Growth and Job Creation: The project will likely induce economic activity, including the creation of new businesses, increased investment, and job opportunities in the area. However, the economic benefits may be unevenly distributed, leading to potential socio-economic disparities within the community.

Improved Access to Energy: The improved electricity infrastructure could indirectly promote local development, including better access to education, healthcare, and other services, enhancing overall quality of life.

Increased Traffic and Transportation Demands: The increased demand for goods, services, and workforce associated with the project may lead to higher traffic volumes, road wear, and congestion, impacting local transportation networks and road safety.

7. CLIMATE RISK AND ADAPTATION AT THE DESIGN STAGE

Following are the few climatic parameters along with remedial measures adapted for Transmission Line at design stage.

7.1 Temperature Rise

Climate Risk: Conductors elongate due to the increase in temperature which results in the reduction of ground clearance of transmission lines. This typically intensifies the risk of flashovers.

Adaption: By using higher rated conductors HTLS, this sagging affect of transmission lines can be reduced.

Conductors made of material that can operate at higher temperatures yet causes lower sag (high temperature low sag or HTLS) may need to be specified at the project design. Strengthening of the towers, tower footings, conductors for extreme heat events, protective coatings to reduce dust deposits on insulators.

ACSR / AAAC conductor for new proposed lines, it's economical than HTLS.

7.2 High Winds and Storms

Climate Risk: High winds and storms can cause mechanical damage to overhead lines, towers, and poles etc. directly and by blowing debris against exposed grid system components indirectly. In transmission lines, high winds may lead to flashovers caused by live cables galloping and thus touching or getting too close to each other. Strong winds can blow trees over overhead lines and short circuit lower lying distribution grid system cables.

Adaption: Designing transmission towers to withstand the highest projected wind loadings, more frequently inspecting and maintaining their integrity, rerouting lines alongside roads or across open fields, more frequently and drastically trimming trees, and more effectively forecasting storms and hurricanes are examples of a wide range of already established adaptation options that may need to be increasingly used in the future.

As per latest Indian standard IS802-2015 (part1/sec1) the following changes will resolve tower failure from old code design. Such as:

1. Drag co-efficient for evaluating wind load on towers have been stipulated for different sections & the change in Drag Co-efficient for different solidity ratios.
2. Load combination for sag tension of conductor and ground wire / optical ground wire (OPGW) and for climate loads have been modified.
3. Narrow Front wind to be considered for Suspension tower.
4. For suspension tower, the loading condition also updated as 75% EDT wind to consider for wire loading calculation.
5. In Addition, the Wire loading also included additional load cases with angle of wind direction in 0, 30, 45 Deg.
6. Material requirement for bolts and nuts have been modified.
7. Tower should be tested as per provisions of relevant Indian standard and observed until the specified waiting period is over.

However, the above changes will affect the design margin and objectives are to optimization in Tower design.

7.3 Thunder & Lightning Risk

Climate Risk: Thunder and lightning can cause transmission lines to trip and become temporarily unavailable for operation. The extremely high voltages of a lightning impulse can result in short circuits which can lead to permanent damage of conductors, insulators and the structures.

Lightning close to or directly on-line conductor's produces ionized gases that can cause a short circuit fault as the electrical protection disconnects the affected circuit. Such flashover faults may increase in many regions owing to greater lightning frequency.

Adaption: Vulnerability can be reduced by adding earth and fitting spark gaps and surge arresters.

A lightning arrester is placed where wires enter a structure, preventing damage to transmission lines within and ensuring the safety of individuals near them. Lightning arresters, also called surge protectors, are devices that are connected between each electrical conductor in a power system, and the Earth. They prevent the flow of the normal power or signal currents to ground, but provide a path over which high-voltage lightning current flows, by passing the connected equipment. Their purpose is to limit the rise in voltage when a communications or power line is struck by lightning or is near to a lightning strike.

7.4 High Temperatures

Climate Risk: Losses in transmission efficiency due to gradual warming are relatively small compared with the physical and monetary damage to power transmission networks that can be caused by hot weather conditions. Transmission losses increase far beyond the level caused by the higher average temperatures.

Expanding cables might trigger flashover to trees underneath, and extreme high temperatures can make lines and transformers overheat and trip off. Adaptation can include a mix of measures like enhancing system capacity, increasing the tension in the line to reduce sag and adding external coolers to transformer.

7.5 Flooding

Climate Risk: Flooding caused by heavy rains and storm, rerouting lines across less exposed regions is another option to consider. Increasing heavy rain may cause flashover faults across high voltage insulators and short circuits in high voltage circuit breakers. The intensity of the flash flood is enough to wash away the foundations of the collapsed tower.

Adaptation: Rerouting of line will increase line length and pile foundation cannot be avoided in the alternate route.

The improved design of insulators, careful siting and enhanced maintenance can mitigate vulnerability to these impacts. Surges would damage equipment at ground level. Improving insulator design, sitting ground installations outside hazard zones and reinforcing supporting elements can help reduce these impacts.

Pile type foundations may be considered for towers in flood prone areas based on soil investigation reports and latest high flood data.

By Providing Proper Revetment and use of geo-synthetic material in foundation, concrete encasing and painting of stub in water logging areas etc. may also be considered, wherever required.

Coping of chimneys of tower foundation, wherever required, should be taken up to avoid rusting of stubs.

The power transmission design of individual components has changed but the materials of construction remained virtually the same. Thus, by using steel and cast iron (bare, painted or galvanized), aluminum alloys and copper alloys. To enhance the corrosion resistance of these materials various treatments, coatings and inhibitors are applied which enhance the life of the transmission lines.

7.6 Drought

Climate Risk: Drought conditions are particularly risky when vegetation close to overhead lines dries out. The dry undergrowth can be ignited by flashover if it comes into contact with line conductors. Ionized air in the resulting smoke and combustion particles may turn into an electricity conductor that would cause multiple luminous electrical discharges (arcs) on the overhead line.

Forest or bush fire caused by drought can also damage overhead lines directly by damaging conductors and insulators and by burning wood poles.

Adaptation: Trimming back vegetation to a safe distance within and along the borders of transmission corridors is the most obvious way to reduce vulnerability to this type of weather hazard. Depending on regional circumstances, routing transmission lines to areas without high growing flora may also need to be considered.

7.7 Landslides

Climate Risk: The failure of towers might have been caused by the landslides triggered by continuous rain for few weeks. The landslide might have caused the complete sliding away of the supporting soil which might have caused the deformation in tower.

Adaptation: To explore the possibility of Proper Drainage and protection work / retaining wall for foundation of towers in hilly terrain to avoid such incidences.

7.8 Earthquakes

Based on international journal reference, the behaviour of steel transmission tower at the action of seismic load and wind load is studied by conducting large deformation and elasto-plastic analysis.

For the analysis, the earthquake parameters taken. Based on the analysis, it is reported that the maximum displacement of the tower in seismic analysis and there will be no buckling in the main leg members while compared to that of the wind response analysis.

Analysed the behaviour of transmission line towers through the non-linear time history analysis of transmission towers on sloped ground has been carried out for different height, bracing system and also with the provision of base isolators using SAP2000(software).

From this analysis report it has been found out that the ability of tower to withstand the earthquake forces could be increased with the provision of non-linear rubber isolator and the provision of eccentric bracing system has greater effect than other two X & V bracings.

However, concluded that this kind of transmission tower would be safer even in severe earthquake (zone 5) which satisfies both serviceability and collapse criteria.

Earthquake factor has been considered in Tower loading for foundation design.

8. STAKEHOLDER & PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Carry out meaningful consultation with Project-affected people and other stakeholders and facilitate their informed participation in the consultations. Meaningful consultation is an interactive process to provide information and facilitate informed decision-making that: (a) begins early in the preparation stage of the Project to provide accurate information on the proposed Project, minimize misinformation and unsupported expectations, and obtain initial views on the Project;
(b) Is carried out on an ongoing basis throughout the implementation and life cycle of the Project;
(c) Is designed so that all relevant parties have a voice in consultation, including national and subnational governments, the private sector, nongovernmental organizations and people affected by the Project, including, as applicable, Indigenous Peoples;
(d) Provides additional support as needed so that women, elderly, young, disabled, minorities and other vulnerable groups participate;
(e) provides timely disclosure of relevant and adequate information, including availability of the Project's GRMs and of the PPM or other Bank-approved IAM, which is understandable and readily accessible to the people affected by the Project and other relevant stakeholders; (f) is undertaken in an atmosphere free of intimidation or coercion; (g) is gender sensitive, inclusive, accessible, responsive and tailored to the needs of vulnerable groups; and (h) enables the consideration of relevant views of people affected by the Project and other concerned stakeholders in decision-making. Continue consultation with Project-affected people throughout Project implementation as necessary on issues related to environment.

8.1 Public Consultation

The community consultations are carried out in all the villages along the transmission line corridor with local habitants where one hundred forty one (141) participants were participated in the LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT) at Rangia/Kumarikata GIS S/s like economically weak communities, women, vulnerable groups and other local community leaders nearby the proposed transmission lines on 7th November 2024, 19th November 2024, 25th December 2024, 8th January 2025, 16th January 2025, 7th March 2025, 8th March 2025 and 10th March 2025 at Rangia (Extension) – Amingaon 220kV transmission line (on single zebra conductor) at Rangia (Tamulpur) 400kV GIS with OPGW link (Loop In & Loop Out) The detail of the same is provided in Table 8.3 below.
The transcript of these discussions will help AEGCL and EPC contractor for proper needs assessment to ensure the issues raised by people are addressed appropriately. Consultation will be carried out on an on-going basis throughout the sub-project cycle.
Community welcomed the construction of proposed Transmission Lines. No major environmental and social issues were raised during the consultation process. Most of the project affected families asked about the payment procedure and when payment can be expected to receive by the PAF. Further, the PAF has shown their interest on unskilled works on temporary basis when the civil works are initiated.
Local people are waiting eagerly for the implementation to start, so they could receive their compensation amount and hoped for some employment generation.
Attendance sheet of consultation with public and some photographs are provided in **Appendix -4A & 4B.**

Keeping in mind the nature of the project and its setting, the key stakeholders' groups have been identified and listed in the table given below.

Table 8.1: Stakeholder Group Categorization

Category	Primary Stakeholder	Secondary Stakeholder
Community	• Project Affected Families/Land Owners of the transmission line • Local Community • Vulnerable community	• Opinion holders & • Community Leaders
Government Bodies/ Institutional Stakeholders	• Local Gaon Panchayats • Regulatory Authority • District Administration	• State Administration
Other Groups	• Contractors and sub- • contractors • Labours/ Workers	

Table – 8.2: Summary of Public Consultation

Issues Discussed	People's views and perceptions
General Perception	Majority communities (including women) were aware of the construction of proposed LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN & LOOP OUT) at Rangia/Kumarikata GIS. Some have heard it but not sure about the details of the proposed Transmission lines work. All the people were positive and supportive towards the construction of proposed Transmission Lines to Rangia/Kumarikata S/s.
Support of local people for the construction of Transmission lines to Rangia/ Kumarikata S/s.	Most of the communities expressed their support during implementation of the construction of proposed Transmission lines to Rangia/ Kumarikata S/s. They are happy for contribution of Government of India's effort towards construction of proposed Transmission lines to Rangia/ Kumarikata substation. Most of the communities expressed that there should be no adverse impact due to the construction of proposed Transmission lines.
Critical issue and concern by the local people for the proposed Transmission Lines to Rangia/ Kumarikata substation locations.	Most of the communities expressed that there were no critical issues regarding the construction of proposed Transmission lines to Rangia/ Kumarikata substation.
Project site selection criteria (Proposed Transmission lines)	The community held the view that the project should avoid/minimize harm to vegetation's and places of community importance such as structure/CPR or community gathering places etc. Some of them suggested that necessary precautions must be taken to ensure safety of people during construction of construction of proposed Transmission lines to Rangia/ Kumarikata substation.
Employment potential in the construction of proposed Transmission lines to Rangia/ Kumarikata substation.	The community felt that, during construction/operation of the proposed Transmission lines to Rangia (Kumarikata) substation there may opportunities to local unemployed people for self-supporting business activity like establishment of small hotel/tea stall/ grocery shop etc. Some of them requested that they should be involved not only in unskilled labour job but also in the supervisory work. They complained that the construction work is generally handed over to contractors who would bring their own labour force from outside. Some others felt that construction

Issues Discussed	People's views and perceptions
	of Transmission lines under the project will ensure proper and better power connection/ households' electricity as a result small and medium scale business can be started in the area.
Socio economic standing: land use, cropping pattern	The major sources of livelihood for the communities are 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 main sources of drinking water are hand pump and tube well. The other sources of drinking water are ring well and tube well. Few people complained about the taste of the drinking water due to iron content in the water and thus they are using simple sand filter for portable use of water. Moreover, the availability of water is good as the water table remained high except in winter season.
Negative impact on food grain, availability /land use	In general, the communities did not see any adverse impact on food/grain availability, as the constructions of proposed Transmission lines to Rangia (Kumarikata) substation will be within the RoW of 35mts for 220 kV TL. The compensation for using the land in tower footing and RoW will be paid by AEGCL to private land owners.
Will project cause widespread imbalance by cutting fruit and commercial trees in the locality	The tress falling under the RoW of the Transmission lines will either cut or trim in the proposed Transmission lines to Rangia/ Kumarikata S/S, the communities will be paid for the same as per government approved rate.
Will project cause health and safety issues	Most of the communities did not foresee any health or safety issues from the construction of proposed Transmission lines to Rangia/ Kumarikata substation. Some of them suggested that necessary precautions must be taken to ensure safety of people during construction of proposed Transmission lines to Rangia/ Kumarikata substation.
Protected areas	No protected area envisaged in the vicinity of the proposed Transmission lines.
Will project setting change migration pattern of animals	The communities consulted were conscious of the presence of migrant birds or animals in their localities and nearby proposed Transmission lines. They therefore anticipated that no any major impacts on animals, birds or their habitats from the construction of proposed Transmission to Rangia/ Kumarikata substation.
Migration pattern	Majority of the communities reported outward migration of young generation especially the boys to big cities in search of work. The popular destinations of migration were Guwahati, Nagaon, and Sonitpur for job as well as for factory jobs. There are very few cases of migration to capital cities of north eastern states in search of work.
Perceived benefits from project	Majority of them viewed that the construction of proposed Transmission line to Rangia (Kumarikata) substation would contribute to minimize the prevailing energy crisis such as load shedding, and low voltage in the region. The people hoped that project will address the problems of low voltage, and irregular power supply to the households. For some it will increase the rate of rural electrification and provide impetus to open small and medium business units in the area. At community level,
Perceived loss	It will be temporary in nature due to loss of crops, trees and structure and can be compensated by AEGCL.

8.2 Continuous Consultation and Participation

AEGCL with PMC will carry out meaningful consultation as per requirement (Monthly consultation

with local people nearby the Transmission lines passing through different villages by PMU, PIU and PMC along with EPC Contractor) with project affected families and other concerned stakeholders, including civil society and facilitate their informed participation. Consultation process undertaken under the directions of the PMU (i) will begin in the sub-project preparation stage and will be carried out on an on-going basis throughout the sub-project cycle (ii) will provide timely disclosure of relevant information that is understandable and readily accessible to groups and individuals, and specially women; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) will be gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) shall enable the incorporation of all relevant views of affected people and other stakeholders into decision making, such as subproject design, mitigation measures, the sharing of development benefits and opportunities and implementation issues. Consultation will be carried out in a manner commensurate with the impacts on affected communities. The consultation process and its results will be documented and reflected in the environmental and social monitoring report. Feedback about project should be obtained time to time from PAFs during consultation. PAFs may approach GRC if any grievances arise.

8.3 Public Consultation Information Disclosure

AEGCL will submit to AIIB the following documents for disclosure on AIIB's website: (i) the final ESIA; (ii) a new or updated ESIA and corrective action plan prepared during sub-project implementation, if any; and (iii) the environmental monitoring reports.

AEGCL will provide relevant environmental information, including information from the above documents in a timely manner, in an accessible place and in a form and local language(s) understandable to affected people and other stakeholders in accordance with the AIIB's ESP 2019.

ESIA results will also be communicated to the local community before commencement of construction through posting on the website of AEGCL and other suitable means as well as providing a mechanism for the receipt of comments.

The information disclosure mechanisms adapted during consultation process are to identifying stakeholders who may be affected by the transmission line project. This includes:

- Local communities and residents along the transmission corridor.
- Landowners and people whose land or properties might be impacted.
- Indigenous groups or communities with specific land use and cultural practices in the area.
- Government agencies responsible for regulating environmental, land use, and energy sectors.
- Environmental and social organizations monitoring the impacts on natural resources and communities.
- General public in areas that might experience indirect impacts, such as noise or visual disruption.

The Public Consultation is organized at community level where the transmission lines are passing, typically at key point's area along the route. Public meetings allow the project team to present the project, answer questions, and gather feedback and Focus Group Discussions with smaller, targeted discussions with specific groups (e.g., women, indigenous groups, and farmers) are held to understand their unique concerns and needs.

ESIA - ESMP will be disclosed online on the website of AIIB and AEGCL. The executive summary of ESIA – ESMP shall be translated in local language (Assamese) and the same will be disclosed on the

website of AIIB and AEGCL. Their hardcopies in English and executive summary in Assamese language are shall be available at the following locations.

1. PMU: Project Director,
   Address: 1st Floor, AEGCL, Bijulee Bhawan,
   Contact No.: 0361-2739520
   Website: www.aegcl.coc.in

2. PIU: Project Manager
   Address: AGM, 220/132 kV Rangia GSS, AEGCL
   Contact No.: 94351-38347
   Email: agm.rangia@aegcl.co.in

ESMPF is disclosed in AEGCL website: https://www.aegcl.co.in/aiib-project-details/

Stakeholder Consultations undertaken as Part of the ESIA Process

As part of the ESIA for the project, the following consultations were undertaken.

Table 8.3: Consultations undertaken for the Project

Sl. No.	Date	Stakeholder Details	Location	No. of Participation	Issues discussed
1.	7th November, 2024	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Kachubari	7 nos.	• Discuss with the local community about details of the project and understanding the project, the construction of proposed Transmission lines works to Rangia substation. • Payment procedure of land compensation, Trees and crop compensation process to the landowners. • Other impacts associated with transmission lines and approach to minimizing the impact. • The documents required to be submitted from the landowners for disbursement of Compensation for tower footing, RoW and zirat
			Kachukata	5 nos.	
			Singibari	6 nos.	
			Simulbari	5 nos.	
			Dakhin Ganndhibari	4 nos.	
2.	19th November,2024	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Shijiguri	9 nos	
			Bakbari	4 nos.	
			Tangabari	4 nos.	
			Halonbari	4 nos.	
			Baghdoba,	7 nos.	
			Bakhati	6 nos	
3.	25th December, 2024	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Lakra Bamagar	4 nos.	
			Gopalpur	5 nos.	
			Deulkuchi	5nos.	
4.	8th January, 2025	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Uttar Bardal	5 nos.	
			Gosai Solmari	5 nos.	

5.	16th January, 2025	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Hiragata	6 nos.	compensation, etc. • Discuss regarding the common property resources such as cemetery, school, community hall, hospitals, Mandir, Masjid, habitation areas etc. shall be completely avoided while finalizing the route of lines/check survey. If any utilities is found during the check survey measures will be taken to avoid public utilities (diverting the lines). • Also informed the community that Grievance Redressal Committee is formed for the project, the local community may directly approach the Grievance Redressal Committee if any grievances arise at site.
			Depteswari	5 nos.	
			Garaka	6 nos.	
6.	7th March, 2025	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Natipara	5 nos	
			Dhukbari	7 nos	
			Barghuli	3 nos.	
7.	8th March, 2025	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Dongpara	6 nos.	
			Gohangaon	5 nos	
8.	10th March, 2025	Discussion with local community at 220kV Rangia- Amingaon (Loop out) & 220kV Rangia- Amingaon transmission line (Loop In)	Uttar Gandhibari	6 nos	
			Jokmari	4 nos.	
			Baraliapar	3 no.	

As part of these consultations an attempt was made to develop an understanding of the stakeholder group's key concerns and expectations from the project, the stakeholder group's perception of the project and to triangulate the secondary information available on the area.

9. GRIEVANCE REDRESS MECHANISM

General overview of the Grievance Redress Mechanism Assam Intra-State Transmission System Enhancement Project

9.1 Objectives

The Assam Intra-State Transmission System Enhancement Project (the Project) aims to strengthen Assam's electricity transmission system. As the Project is funded by the Asian Infrastructure Investment Bank (AIIB), it complies with the Environmental and Social Framework and the Policy on the Project affected People's Mechanism of the AIIB. The Environmental and Social Management and Planning Framework (ESMPF) of the Project provides for the establishment of a Grievance Redress Mechanism (GRM). The GRM is a free system that registers and attempts to resolve concerns or complaints by Project-affected people (PAPs) or construction workers. This process aims to quickly resolve disputes and avoid litigation, thus ensuring the smooth implementation of the project activities.

At all levels of the project Grievance Redress Mechanism, the Grievance Redress Committee members should uphold the objectives of the GRM and strive to achieve them. The primary objectives of GRM are:

Provide an accessible, transparent, efficient and predictable mechanism for resolution of grievances to all projects by:

- Popularizing the GRM and how it can be accessed for free.
- Receiving grievances in various possible forms (Written, Verbal, Electronic, Email, Social Media, Telephone, Fax, Suggestion Box)
- Establishing clear procedures for redress that covers:
- Registration in the GRM logs all grievances (including minor and verbal).
- Acknowledgement to the complainant, explaining expected duration for resolution.
- Investigation of the grievance, proposing a solution to the complainant and if acceptable closure of the complaint. OR
- Escalation of the grievance to Tier II which should be communicated to the complaint.
- Investigation of the grievance, proposing a solution to the complainant
- Provision of feedback and closure of the grievance in the GRM Log.
- Complaint should be made aware that:
- There is no retribution or intimidation for complainants.
- Access of the GRM is free for the complainants.
- The GRM does not replace the judicial system
- .Observe for any repeated complaints and inform PMU of such for their systemic resolution.
- Providing an environment that fosters free and honest exchange of information, views, and ideas.

9.2 Stakeholders with Grievances

It is likely the following categories of stakeholders may have grievances and file the grievances for redressal. They are

- Individuals, both men and women
- Communities/ Groups of individuals
- Project workers – local and migrant
- Community Based Organizations or Common Interest Groups
- Firms, Companies, Enterprises, Service Providers, and other businesses
- National/ International Non-Government Organization (NGOs)

Table 9.1: Roles and Responsibilities of GRC Member

PMU/ PIU GRC Members	Community GRC Member
• Receives grievance from complainant and record them in a logbook. • Acknowledge receipt of complaints with a written record. • Arrange for GRC meetings to consider the grievances. • Work closely with the GRC members to develop and implementing actions to resolve grievances. • Prepare minutes of GRC meetings and record solutions. • Provide feedback information on the status of resolution to the complainant within assigned timeline. • Review grievance response and submit to Contractor/PIU/PMU for approval or implementation. • Submit proposed solutions to the complainant within assigned timeline. • Ensure proper logging, escalation, tracking, reporting, and following up on all project specific grievances. • Swiftly escalate any grievances that cannot be resolved at the project level or may pose a big reputational risk to the project. This includes any complaints related to the health, safety, dignity, and wellbeing of any person (both men and women). • Notify PMU within 12 hours of any grievances that require investigation or intervention by the police or other relevant authorities. • Provide monthly update to a member of the PMU who will track grievances and always include a section on grievance management in the monthly progress report.	• Popularize the existence, functions, and accessibility of the GRM among all project affected people, both men and women. • Encourage key community members to facilitate submission of complaints, if needed. • Attend regularly and actively participate in GRM meetings to review and provide solutions to project related grievances. • Facilitate and immediate resolution of grievance. • Accept and record grievances from community members. • Facilitate the communication of the response of the GRC to complainants/ aggrieved. • Keep communicating project related matters to GRC/ PIU.

Table 9.2: Most Common Grievances and Redressal

Common Grievance Categories	Issues and Likely Solutions
Technical/ Engineering	• Design related – Suit the design to the site. Restrict the width according to the available land and modify the design accordingly; • Alignment related – Always use GPS coordinates. In case of problem contact Revenue department to correct the alignment; • Quality related – Get the materials and finished product tested at reputed laboratories and publicize the results.
Environmental	• Storm water – Do not obstruct or divert natural drainage. Provide for culverts or bridges where necessary ☔ Stone blasting – Take precautions as per law and inform the communities accordingly • Dust – Keep watering as required so that dust doesn't spread or rise. • Noise – Use barriers at sensitive receptors and take up work at appropriate timings. • Uncovered borrow areas – Dig barrow pits as per specifications. • Waste Disposal – Dispose of waste at designated places only.
Social	• Disruption of other existing public services e.g. hospitals, schools, Water and electricity supply – Consult communities and minimize the disruption of

Common Grievance Categories	Issues and Likely Solutions
	service. Provide alternative supplies. • Historical and Cultural sites – Follow the government guidelines on this. Do not deface any historical or cultural sites. • HIV/AIDS/ Covid-19 issues – Follow the government SoP for these. Conduct awareness campaigns among the communities and workers. • Child labour – Avoid child labour. No children below 14 years on work. No children below 18 years on hazardous work. • Sexual Exploitation and Abuse / sexual harassment and Gender-Based Violence – Conduct awareness camps among workers and community. Have a code of conduct. Set up Internal Complaints Committees to redress gender related grievances.
Land, Compensation and Resettlement	• Non-payment of compensation money – Do not take possession of land before paying full compensation. • Underpayment of compensation money – All compensation valuation has to be done as per the LA Act 2013 and verified before payments. • Disputes of land ownership – Refer to Revenue Department for measurement and survey to decide on the ownership. • Injurious affections such as cracks in buildings, damages to properties – Do take care not to cause damage to houses. Repair all damages and bring them back to original status. • Boundary queries between PAPs – Do not get involved in this. Leave these matters to PAPs to decide themselves.
Road Safety	• Accidents – Report immediately to PIU/ PMU. • Humps – Do not erect humps without the permission of PIU. The hump has to be as per the design. No private person can built humps. • Signage – All signage has to be fixed by PIU/ Contractor. • Cutting of pavement by utility companies – No utility company can cut the pavement without the permission • Overloaded vehicles/ Road littering – Such incidents to be reported to PIU for action.
Occupational Health and Safety	• Protective gear – The workers must wear protective gear at all times during the work. • HIV/AIDS / Covid-19 services – The workers and communities must be educated about these. They should follow the SoP.
Governance	• Procurement – To be transparent and all matters related to procurement to be disclosed. • Contractor highhandedness – All contractors to be instructed not to deal with the communities directly. Always involve PIU in dialogue with communities. • Corruption – Such cases to be sent to the respective agencies for enquiring and investigation.

Table 9.3: DOs and DON'Ts for GRC Members

DOs	DON'Ts
• 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	• 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

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.	complainants.

General overview of the Grievance Redress Mechanism
Assam Intra-State Transmission System Enhancement Project

Project Introduction: The Assam Intra-State Transmission System Enhancement Project (the Project) aims to strengthen Assam's electricity transmission system. The Project will facilitate connection of remote areas, enhance the capacity and reliability of the system, improve voltage profile, and reduce losses and ultimately enhance satisfaction for all categories of consumers. As the Project is funded by the Asian Infrastructure Investment Bank (AIIB), it complies with the Environmental and Social Framework and the Policy on the Project-affected People's Mechanism of the AIIB.

The construction activities under the Project may cause some minor disturbances to the physical environment and communities. These are typical of civil works, such as generating dust, noise, air pollution, and construction debris, influx of construction workers and limited need to acquire permanently or temporary land. Thus, a multi-tiered Grievance Redressal Committee (GRC) will be applicable to the project in its entirety. To honor the GRM, Assam Electrical Grid Corporation Limited (AEGCL) will adopt the practice to resolve any major/ minor grievances, where AEGCL shall accept, review and address issues or problems raised by Project Affected Persons (PAPs), local people and project workers related to project works. GRC will review grievances involving all resettlement benefits, compensation, relocation, replacement cost, other additional assistance for vulnerable groups including Indigenous Peoples (IPs) and grievances related to environmental issues (if any).

The Environmental and Social Management and Planning Framework (ESMPF) provide guidelines how to reduce potential risks and mitigate impacts. Site-specific Environmental and Social Management Plans (ESMP) gives specific measures for specific locations.

Overview of the Grievance Redress Mechanism

The Project provides for the establishment of a Grievance Redress Mechanism (GRM). **The GRM is a free system that registers and attempts to resolve concerns or complaints by Project-affected people (PAPs) or workers/employees arising from project activities.** This process aims to quick resolve of disputes and avoid litigation, thus ensuring the smooth implementation of the project activities. Every person, man, woman, or construction worker employed in Project activities, who feels that they have been adversely affected by the Project, can file their concerns for free to the GRM. **The Project guarantees that there will be no reprisals or retributions for raising grievances**. The GRM process does not prevent project affected people to seek their rights through the judicial system but provides an additional and free way to resolve problems. Anonymous grievances are acceptable, but it will be impossible to inform the complainant of the outcome. In this case, the grievance and the proposed resolution will be publicized on site.

Complaint which may be arises during the project implementation period (Pre-Construction, During Construction and Post Construction) will be handled according to the following procedure:

1. Project-affected person approaches a member of the CGRC (Tier-1) in person or via the phone/WhatsApp. (Dedicated phone number will be assigned).
2. The Circle level GRC (Tier 1) member receives the grievances and records the details in the GRM logbook.
3. The CGRC (Tier-1) acknowledges the receipt of the grievance and provides a dated proof (official slip, text or WhatsApp message).
4. The CGRC (Tier-1) gathers information, visits site and interviews people to evaluate if they can find a resolution of the grievance within 10 working days.

5. The CGRC (Tier-1) informs grieved party of the proposed resolution in writing. a. Grieved party can accept the proposed solution, which is duly recorded. b. Grieved party may not accept the proposed solution, which is duly recorded.
6. If the CGRC (Tier-1) is unable to find a solution, or if the grieved party does not accept the proposition, the CGRC can automatically escalate the issue to the Tier -2 GRC, if grieved party agrees.
7. The Tier-2 GRC acknowledges the receipt of the grievance and provides a dated proof (official slip, text or WhatsApp message).
8. The Tier 2 GRC gathers information, visits site and interviews people to evaluate if they can find a resolution of the grievance within 20 working days.
9. The Tier 2 GRC informs grieved party of the proposed resolution in writing. a. Grieved party can accept the proposed solution, which is duly recorded. b. Grieved party may not accept the proposed solution, which is duly recorded.
10. The grieved party may seek their rights in the court of law.

Table 9.4: The members of the Tier-1 GRC and their communication details in the project Districts

S.No.	Name and details	Designation	Status in the GRC (Convener/ Member)	Contact Details
1	Md. Wahidur Rahman	DGM Guwahati T &T Circle, AEGCL	Chairman	dgmttc.guwahati@aegcl.co.in
2	Mr. tridip Roy	Sub-Divisional Megistarre, Kamrup (M)	Deputy Chairman	8876628262
3	Mr. Angshuman Debroy	AGM, 220/132 kV Rangia GSS, AEGCL	Member	agm.rangia@aegcl.co.in
4	Mr. Gopal Saha	Project Manager	Member	9362796412
5	Mr. Pankaj Chutia	Health and Safety Specialist	Member	9957849923
6	E&S Team, PMU	E&S Safeguard Specialist, PMU, AEGCL	Member	es.aegcl.pmu@gmail.com
7	Mr. Khanin Baishya & Deepjyoti Baruah	Social & Enviromnetal Experts, PMC	Member	aegcl.pmc@feedbackinfra.com

Table 9.5: The members of the Tier-2 GRC and their communication details in the corporate level

Sl no.	Designation	Position in the Committee	Communication Address		Website & Email id
1.	Chief General Manager (PP&D), AEGCL cum Project Director (EAP) Projects, AEGCL.	Chairman	Assam Electricity Grid Corporation Ltd, (AEGCL) First Floor, Bijuli Bhawan Guwahati -781001	Contact No.: 0361-2739520	Website: www.aegcl.co.in Mail Id: eap.cell@aegcl.co.in
2.					
3.	Dy. General Manager (EAP), PMU, AEGCL	Deputy Chairman		Contact No.: 0361-2739520	

Sl no.	Designation	Position in the Committee	Communication Address		Website & Email id
4.	E & S Safeguard Specialist, PMU, AEGCL	Member		es.aegcl.pmu@gmail.com	
5.	Project Related AGMs (EAP), AEGCL	Member		eap.cell@aegcl.co.in	
6.	Joint Secretary (Power, Electricity), GoA	Member	GoA, Power (Electricity Dept.), Assam Secretariat, Dispur, Guwahati-781006 Contact No.: 0361-2237260		dy.secy.powe@gmail.com
7.	Team Leader, Environment Expert and Social Expert, PMC	Member	House No 1, Saniram Bora Road, Near Bora service Petrol Pump, Guwahati, Assam 781007		aegcl.pmc@feedbackinfra.com

If any unwanted situation like danger, sexual harassment and other life threatening, the victim person may reach to the concerned officials who belong to the Tier-1 and Tier-2 committee and may contact for further needful action or the matter should be informed to AIIB immediately.

Grievance Register

Grievance Register	
Date of Grievance Recorded	*** The mobilization of EPC is awaiting and once EPC starts their work in the S/S as well as in T/L, then the grievances may arise if any, the record will be maintained accordingly**
Grievance Recorder	
Grievance submitted through	
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	
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 (2nd Tier)	
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	

10. Environmental and Social Management Plan

10.1 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) WITH SPECIFIC POTENTIAL E&S IMPACTS

This chapter outlined the ESMP for identified impacts and the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored. The detailed Management Plan is outlined as under.

10.2 Physical Environment

Table 10.1: Detailed Management Plan (Physical Environment)

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
Planning and Construction Phase					
Land use and Land Cover	• No major anthropogenic activities are observed in the area except agricultural activities and crop. • The project will result in change of the land use within the land parcels where the transmission towers are located. Besides this the land falling under the RoW of transmission line will also have limited change in land use in terms of restriction of activities to be undertaken on this area.	The land requirement for the tower base has been considered as per the IS Codes.	Footprint tower foundation and RoW of transmission line	PMC / AEGCL	-
Soil Environment	• Digging of foundation pits for the towers may affect the soil quality. • Foundations shall be dug up to a depth of 3-3.5 m depending upon the tower type and soil characteristics. At the tower sites, all vegetation within the footprint of the tower base and additional surrounding area shall be cleared for ground vegetation. Foundation pits shall be backfilled by the excavated soils; • Compaction of soil during excavation, transportation of construction material & tower components, foundation work, backfilling, tower erection and stringing lead to	• Vegetation clearance and excavation to be done in the marked excavation and construction area only; • The excavated soil to be stored on site for back filling; • Any top soil that is to be removed for construction of tower footings / foundations to be temporarily stored /stack at least at a lead of 2 meters away from the edge of the pit and then be used as a (soil) top cover after construction activities are complete; • After completion of construction	Footprint tower foundation and RoW of transmission line	EPC Contractor / PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	temporary effects on natural infiltration of rainwater, but these impacts are temporary, localized and marginal; • Soil contamination at tower locations shall be from result of leaks and spills of oil, lubricants, or fuel from construction equipment. • General construction waste generated onsite comprised of waste concrete, wooden pallets, steel cuttings / filings, packaging paper or plastic, wood, metals etc. Municipal domestic wastes consisting of food waste, plastic, glass, aluminium cans and waste paper shall be generated by the construction workforce and labour camp site. A small proportion of the waste generated during construction phase shall be hazardous and include used oil, grease and waste oil containing rags. • During foundation activities at tower locations, excess excavated material shall be generated.	activities, site will be cleared for any excess excavated material and leftover construction material. Disposal areas for same will be identified in consultation with the concerned department; • Spill management kit will be provided and immediately clean-up of any spillages; • Provision of waste collection bin and disposal of domestic waste will be provided at labour camp site; • Tower components and materials shall be stored at an elevated level using wooden sleeper to raise the tower parts above the ground level near the construction site. It is to be noted that the tower parts are taken to erection site on daily basis for erection from the EPC store, thereby reducing disturbance to surrounding standing crop and vegetation; • The existing roads to be used for approaching tower locations.			
Ambient Air Quality	Ambient air quality will be largely impacted from the following sources during the construction phase: • Fugitive dust emissions from transportation of material, excavation, drilling, back filling, emission due to movements of vehicles, plying of heavy construction machinery etc.; • Emissions from diesel generator for construction activities. • The nearest receptor for dust emissions	• All vehicles shall be maintained as bi-annually and as per the Government procedure. It is mandatory that all vehicle to be check for pollution control in every six months. Excavation activities to be avoided during windy weather conditions; • The unpaved access roads shall be sprinkled with water as necessary to reduce dust, especially during April to September.	Construction site and its associated facility location	EPC Contractor / PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	located within 500 m distance from transmission line route. • No ecological sensitivities located in the RoW of transmission line route.				
Ambient Noise Level	• The foundation activities at transmission tower locations have effect on the noise level due to operation of concrete mixer, DG set, vehicular movement for transportation of materials. • During erection of tower and stringing there can be some disturbance from noise due to vehicular movement for transportation of tower components, strings, and communications during erection and stringing. Also, during stringing there will be continuous operation of tractors carrying the strings from one tower to other. • As mentioned above, there are habitations present within 500 m distance from the Transmission line route. • No ecological sensitivities located in the RoW of transmission line route.	• Construction activities are to be carried out during the daytime (6:00 am- 6:00 pm) on 6 days a week. One paid holiday is given to workers. • Avoid unnecessary honking of horns.	Construction site and its associated facility location	EPC Contractor / PMC / AEGCL	Monthly
Water Resources and Quality	• The transmission line generally requires about 50 m3 of water for casting of foundations for each tower, which shall be sourced from local sources through tankers. The transmission line passes through River and nallah. • Impact on local water resources.	• Location of storage area to be avoided on agricultural land and in close proximity to water bodies wherever possible. • Excess excavated material not to be dumped in Nallah / water course / drainages, • Clean water storage facility with PVC tank provided near the camp site for clean bathing / washing water to be made at labour camps; • Wash room, sanitary toilet with septic tank and soak pit provide to the	Construction site and its associated facility location	EPC Contractor / PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
		labours/camps to maintain hygiene of the areas. • Approved water supply resource to be used for water requirements for concreting and curing during foundation activities; • Wastewater generated at labour camp will have proper disposal arrangements such as septic tank and soak-pits.			
Drainage	• The study area has natural drainage pattern. • The transmission line passes through River and nallah. • Impact on local water resources.	Drainage system should not be blocked by the construction activity.	Construction site and its associated facility location	EPC Contractor / PMC / AEGCL	Monthly
Occupational Health and Safety	• The erection of transmission towers, stringing of line will require working at heights. The commissioning of the transmission line will also involve live power lines. • The working at height has the risks of falling from the height and working on live wires carrying power has dangers of electric shock and electrocution. • Besides this, there could be slip and trip hazards especially during monsoon season. • The area experiences heavy rainfall. Working during very heavy rain could cause health hazards; • During tower erection and stringing activities, about 60 workers will be engaged.	• Trained workers will be involved in the specific work activities such as tower erection and stringing; • Prior to start of work, workers will be informed about the related safety risks and precautions to be taken; • Stop work in monsoon season. The monsoon seasons star from April to September. • During summer and rainy days season with high temperature, work shall be started early in morning with no work during peak temperature in afternoon and rainy days. Generally, during hot days works start from 7 am to 11 am and in the afternoon 2.30 to 6.30 pm. • Construction areas to be marked and cordoned off; • Manual lifting by adult men to be less than 55kg and for women it should be less than 30kg;	Construction site and its associated facility location	EPC Contractor / PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
		• Eye protection for welding, cutting or similar operations which may cause hazard to eyes. • All persons performing construction work to wear safety shoes and helmets confirming to national standard; • Every worker engaged in handling sharp objects which may cause injury to hand shall be provided with suitable hand gloves; • A construction worker handling cement and concrete to wear close fitting clothing, gloves, helmet / hard hat, proper foot wear, masks etc. and will take all precaution to keep the cement and concrete away from his skin; • Moving parts of the hoists, grouting equipment used for concrete work are securely fenced to avoid any injury or unsafe condition; • The mixing of the concrete is done in such a way that minimum of dust escapes into the air; • Erection of steel structures should be carried out by experienced workers and they should use safety harness, lifelines, catchment etc.; • EPC contractor to ensure a First-aid Box is available at construction site; • EPC contractor to ensure that health and safety procedures under the CESMP are in place and training on same are provided to the workers prior to construction;			

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
		• Once the stringing is complete, notices (danger sign boards) and anti-climbing devices to be put on all the faces of the tower; • Emergency contact numbers and route to nearest hospital shall be displayed at construction site. • The local / host community shall be kept at safe distance from construction site. • Labour camps, tower foundation works, erection and stringing activities associated with the proposed transmission line construction will be carried out, along with the implementation of appropriate health and safety measures.			
Sensitive Receptors	• There are no sensitive receptors located within the Right of Way (RoW) corridor of the proposed LILO (Line-In and Line-Out) transmission line. However, within a 500-meter radius of the proposed LILO (Loop-In) of both circuits of the Rangia (Ext)–Amingaon 220kV line (using single zebra conductor) at the Rangia (Tamulpur) 400kV GIS with OPGW link, the following sensitive receptors have been identified: 10 schools, 17 places of worship, 3 public health centers, and 1 PHED water supply scheme. Similarly, within a 500-meter radius of the proposed LILO (Loop-Out) of both circuits of the same transmission line at Rangia (Tamulpur) 400kV GIS with OPGW link, the following are present: 14 schools, 21 places of worship, 1 public health center, 1 playground, and 1 post office. During construction phase	• Periodical EQMT for Noise Level at 6 locations for loop in and 2 locations for loop out (within 100 m from the center line of the T/L) will be carried out nearby these sensitive receptors during construction phase and all possible measures will be taken to minimize pollution level.	Sensitive Receptors (8 locations)	EPC Contractor / PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	insignificant impact may occur to the above sensitive receptors.				
Operation Phase					
Soil Environment	Any spillage of Aluminium oxide paint during operation and maintenance of the transmission line towers may impact soil quality.	Preventive maintenance plan will be prepared for transmission line.	Project foot print	AEGCL	Monthly
Noise Level	The likely noise impacts from operation of the transmission line will be due to: • Maintenance and repair activities; • 'Corona discharge' from the overhead lines; • Once operational, noise from energised overhead lines along the transmission line route can be produced by a phenomenon known as 'Corona Discharge' (a limited electrical breakdown of the air). Conductors are designed and constructed to minimise corona effects, although, under certain conditions this can be audible as a 'hissing' sound, sometimes accompanied by a low frequency hum. Conductors designed and constructed to minimise corona effects will be chosen for transmission. It is highly unlikely that the corona discharge noise will exceed the normal background noise levels in the area and furthermore, such noises are mostly restricted to rainy weather conditions. • The nearest receptor for noise emissions located within 500 m distance from transmission line route. • No ecological sensitivities located in the RoW of transmission line route.	The project design specifications include the measures to reduce the noise generated along transmission line.	Project foot print	AEGCL	Monthly
Visual Impacts	The footprint of the project comprise of about	The route alignment had avoided	Project foot print	PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	236.420 hectares will experience permanent change in land use and 66.506 km long transmission line with 233 towers. The transmission line route passes through agriculture / crops, trees / vegetation, built up, and water bodies. The vertical forms of the transmission towers would be prominently visible from the road and nearby settlements. Besides this, the farmers in the field would have clear view of these towers. It is to be noted that the study area already had other existing transmission towers and the new transmission line will be easily absorbed in the existing landscape. The visual impacts will be perceived by two types of receptors, namely: • Receptors located at a fix point, i.e. habitations within the project foot print and area of influence; and • Receptors who will temporarily come into contact with the transmission line such as passing motorists in the area.	settlement areas during project planning.			
Electro Magnetic Fields (EMFs)	The power evacuation through the transmission line during operation phase will result in development of electromagnetic fields. There have been some concerns about possible health risk from exposure to electromagnetic radiation from overhead transmission line. People working in the vicinity of transmission line are potentially prone to exposure to EMF. However, while the evidence of adverse health risks is low, it is still	The minimum distance clearance had been provided in the project as per Electricity Act, 2003.The electrical clearance to protect from electromagnetic affect minimum 7 m is maintained for EHV lines.	Project foot print	PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	sufficient to warrant limited concern.				
Occupational Health and Safety	The project will have transmission of 220 kV power through the transmission line during operation phase. AEGCL will be responsible for O&M of the Transmission line. • There is a possibility of line or towers / tower members falling to the ground, and safety risks during maintenance activities at towers, during the operational phase, contact with the transmission line can result in electrocution. • Unaware people trying to tap electricity from high tension wire can lead to fatal accidents.	• Risks to general public during operation will be reduced by public awareness and education and physical measures by attaching an appropriate warning sign on all faces of the tower; • Once the stringing work is complete, notices and permanent anti climbing devices will be installed on the tower. The operational start date for electricity transmission and safety implications will be publicised locally in advance. • The SOP for preventive maintenance and repairing of fault will be defined and followed.	Project foot print	PMC / AEGCL	Monthly

10.3 Biological Environment

Table 10.2: Detailed Management Plan (Biological Environment)

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
Planning and Construction Phase					
Impacts due to Vegetation Clearance	The RoW of transmission line required 48422 (both loop in & loop out) numbers of trees including fruit & non fruit bearing, bamboos etc. to be cut Vegetation clearance is the first step in the	In tower foundation location and transmission line corridor no mature fruiting tree or any other tree that is important for community will be felled.	Construction site and its associated facility location	EPC contractors /PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	establishment of access / internal roads and excavation for the erection of tower footing and transmission tower foundations and ancillary facilities. Impact of vegetation clearance could happen at the time of line stringing at few places. Within the transmission line corridor floral and faunal species are commonly found. Ground clearance will be maintained from the lowest cable and any object that is grounded (tree etc.). Clearing of vegetation from agriculture / crops, trees / vegetation, built up and range land reduces options for nesting habitat for birds, shelter from predators, foraging resources, shade, perching habitat and breeding sites. The loss of vegetation can also have a negative effect on soil quality and hamper survival of neighbouring floral species, burrowing faunal species and foraging resources for herbivores in the area.	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.			
Impacts due to Construction Activities	Construction activities include excavation, movement of machineries, increased anthropogenic movement (men and transport) in the project study area. These activities are assessed with respect to disturbance of habitats and species. Excavation for the construction of the foundations for transmission towers and ancillary facilities has direct impact on burrowing fauna, mammalian fauna and an indirect impact on flora / fauna through the changing of soil properties. This type of impact could happen for each tower footing area.	In-house training provided to the labour force and supervisory staff for situations dealing with wildlife encounters.	Construction site and its associated facility location	EPC contractors /PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	Anthropogenic movement will result in increased stress placed on fauna in the area that remain alert for an extended period of time and may prevent proper breeding, nesting, mating, socializing and foraging. Noise from anthropogenic movement (men and transport) from the construction activities shall cause disturbance to fauna in the nearby areas. This type of impact could happen during footprint and tower foundation, stringing activities of the transmission line.				
Operation Phase					
Collision and Electrical hazards for avifaunal species	Birds species identified during the ecological study were found roosting on wires and poles in the area. Some birds also utilize the transmission towers for nesting by placing the nests across wires or using holes in the tower itself. Collision of birds can happen with transmission line due to specific behaviours like courtship displays, aerial hunting as they may distract the birds from the presence of the power lines. Collision may happen for birds that make regular and repeated flights between roosting and feeding areas in proximity to power lines. Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C. Collision and electrocution hazard may happen at	The following mitigation measures will reduce the impact significance on avifaunal species: • Installing perch rejecter on the cross arms. • In order to mitigate and minimize collision of birds, power line markers should be used specifically areas that are more vulnerable to avifauna, which reduce the risk by increasing the visibility of overhead lines to birds (Sporer et al. 2013). • A specific monitoring requirement in the form of wildlife monitoring checklist for LILO operator to regularly monitor/observe and record bird collisions and deaths along the transmission line ROW. The bird/wildlife monitoring is to be	Project foot print	PMC / AEGCL	Monthly

Activity	Potential Impacts	Mitigation measures	Location or foot print applicable	Responsibility	Reporting
	the transmission line.	regularly reported to the PMU and the AIIB. **Checklist provided in Appendix – 7.**			

10.4 Social Environment

This section outlines the potential impacts, mitigation measures, monitoring and management responsibilities during construction and operation phases of the Transmission lines. In order to minimize adverse impacts during different phases of project lifecycle, mitigation measures, monitoring plan and responsibilities for its implementation.

Mitigation measures are provided for the construction activities and operation and maintenance activities.

In addition to the ESMP, an Abbreviated/Resettlement Action Plan report will be prepared before commencement of works. The purpose of the A/RAP is to ensure the restoration of livelihoods of the impacted PAFs. Grievance Redressal Mechanism has been formulated for the project. This GRM shall be applicable through the project lifecycle.

Table 10.3: Detailed Management Plan (Social Environment)

Activity	Potential Impacts	Mitigation Measures	Location or foot print applicable	Responsibility	Reporting to AEGCL
Construction phase					
Social	Health and safety risks	• EPC contractor should follow General Health and Safety measures as per contract agreement. Some of the key provisions relevant for the EPC contractor are mentioned below: • Adopt an H&S Policy for construction workers; • Eye protection for welding, cutting or similar operations which may cause hazard to eyes; • All persons performing construction work to wear safety shoes and helmets confirming to national standard; • Every worker engaged in handling sharp objects which may cause injury to hand shall be provided suitable hand gloves; • Erection of steel structure is considered as a hazardous work. Workers engaged in erection of transmission tower to follow safety measures. The work should be carried out by experienced workers and they should use safety harness, lifelines, catchment etc. • The First-aid Box will be available at construction site which shall be ensured by EPC contractor • EPC contractor shall ensure that health and safety procedures are in place and training on same will be provided to the workers prior to construction; • EPC contractor shall ensure that adequate PPEs and safety measures are used during stringing activity. Once the stringing is complete, notices (danger sign boards) and anti-climbing devices to be put on all the faces of the tower; • Emergency contact numbers and route to nearest hospital	All Tower locations and RoW of Transmission line	EPC Contractor	Monthly Report to AEGCL

Activity	Potential Impacts	Mitigation Measures	Location or foot print applicable	Responsibility	Reporting to AEGCL
		shall be displayed at construction site. • The local / host community shall be kept at safe distance from construction site.			
	Impact on land and livelihood due to transmission line	• Entitlement in keeping with the Abbreviated/Resettlement Action Plan for the transmission line. • Payment of compensation for tower base area and RoW of transmission line in keeping with the Ministry of Power 2015 notification and Assam Government notification, 2017 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. • Ensure access of the local community to a Grievance Redressal Mechanism	Transmission Lines	PMU / PMC	Reporting to AEGCL after payment of compensation.
Operation Phase					
Occupational Health and Safety	Health and Safety Risks; Electrical hazards	• The Lock Out-Tag Out system will be followed during maintenance/ repair activities at transmissionline; • Records of incident/ accidents shall be maintained; • Root cause analysis shall be carried out for any incident/ accident.	All Tower Locations of transmission lines	AEGCL	Annual Report to AEGCL
Social	Loss of any crop or agricultural field during stringing or maintenance- Economic impact due to loss of crop/ agricultural field	• Have provision to compensate adequately any kind of damage to the assets/crops/other properties of the local incurred due toproject maintenance. • Ensure access of the local community to the GRM formulated for the project.	All Tower Locations of transmission lines	AEGCL	Regular reporting at time of maintenance Activities.
	Economic Displacement-	• Provide priority to the local community for any contractual opportunities during the operations phase;	All Tower locations of	AEGCL	Monthly progress reports

Activity	Potential Impacts	Mitigation Measures	Location or foot print applicable	Responsibility	Reporting to AEGCL
	Loss of income sources	• Undertake skill training activities as part of the Abbreviated RAP for the project which would allow the community to undertake income generation activities outside the project as well.	transmission lines		
	Risk to Community health and Safety	• Undertake health awareness programmes among the local community, • Implement GBV code of conduct for workers . • Ensure access to the local community to the GRM for the project and that GRM can receive gender-based violence related grievances.	All Tower locations transmission lines	AEGCL	Annual reports

10.5 ENVIRONMENTAL AND SOCIAL MONITORING PLAN (ESMOP)

This chapter outlined the Environmental and Social Monitoring program for the project.

Table 10.4: Environmental and Social Monitoring Plan

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
Regulatory Compliance	Pre-construction, Construction and operation Stage	Availability of required regulatory permissions, Compliance to applicable environmental and labour laws.	-	Monthly	-	EPC Contractor	AEGCL / PMC
Labour Camp Monitoring	Construction Stage	Location of labour accommodation in relation to local village settlement, Availability of adequate potable water in labour camp and at construction site, Appropriate toilet and bathing facilities and their maintenance, Appropriate waste water disposal system, Source of cooking fuel, Appropriate lighting and ventilation in labour camp, Emergency response plan with emergency contact details displayed in the camp, Adequacy of first aid kit with required first aid medicine filled, Key Health (Malaria / dengue / fever / any other) issues reported during the last	Labour Camp	Weekly/ As per requireemnt.	IFC benchmark standards for workers accommodation	EPC Contractor	AEGCL / PMC

[4]Here the frequency means the frequency for the monitoring report. The ground data collection frequency should refer to those in the ESMP.

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
		month. Refer IFC Benchmark Standards for Workers Accommodation as Appendix 5					
Tower foundation, erection and stringing	Construction Stage	Use of PPEs at site, Toolbox talks prior to start of work, Availability of emergency contact numbers, Disposal of waste materials, Preparation and Implementation of Site Emergency Response Plan, Water consumption.	Transmission line	Monthly	As per specification and norms	EPC Contractor	AEGCL / PMC
Air Quality Monitoring	A. Pre-Construction Stage	PM10, PM2.5, along with Meteorological data- temperature Humidity, wind speed, wind direction.	Near sensitive receptor sites (8 locations within 100 m from the center line of the T/L)	One time	National Air quality standards of CPCB	EPC contractor by CPCB approved laboratory	AEGCL / PMC
	B. Construction Stage	PM10, PM2.5, along with Meteorological data- temperature Humidity, wind speed, wind direction.	Same location as selected during pre-construction period	Twice a year	National Air quality standards of CPCB	EPC contractor by CPCB approved laboratory	AEGCL / PMC
	C. Operation Stage	PM10, PM2.5, along with Meteorological data- temperature Humidity, wind speed, wind direction.	Same location as selected during pre-construction period	One time	National Air quality standards of CPCB	EPC contractor by CPCB approved laboratory (Defect Liability Stage)	AEGCL / PMC
Noise Level Monitoring	A. Pre-Construction Stage	Noise level (dB level) On hourly basis for 24 hours	Near sensitive receptor site (8	One Time	CPCB standards for Noise and vibrations	EPC contractor by CPCB approved	AEGCL / PMC

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
			locations within 100 m from the center line of the T/L)			laboratory	
	B. Construction Stage	Noise level (dB level) On hourly basis for 24 hours	Same location as selected during pre-construction period	Twice a year/ noise assessments by demand	CPCB standards for Noise and vibrations	EPC contractor by CPCB approved laboratory	AEGCL / PMC
	C. Operation Stage	Noise level (dB level) On hourly basis for 24 hours	Same location as selected during pre-construction period	One Time	CPCB standards for Noise and vibrations	EPC contractor by CPCB approved laboratory (Defect Liability Stage)	AEGCL / PMC
Water Quality Monitoring	A. Pre-Construction Stage	As per IS: 10500 (PH, Colour, TSS, Conductivity, Odour, Nitrate, Fluoride, Sulphates, Chloride, DO, BOD, T. coliform, E. coliform, Dissolved Iron, total pesticides, Floating materials- wood, plastic, rubber etc. Oil and grease, TDS Turbidity, Total hardness, (as CaCO3), corrosivity, Taste).	Near sensitive receptor site (8 locations within 100 m from the center line of the T/L)	One time	National water quality standards of CPCB	EPC contractor by CPCB approved laboratory	AEGCL / PMC
	B. Construction Stage	As per IS:10500 {pH, Colour, TSS, Conductivity, Odour, Nitrate, Fluoride, Sulphates, Chloride, DO, BOD, T. coliform, E. coliform, Dissolved Iron, total pesticides, Floating	Same location as selected during pre-construction period	Twice a year	National water quality standards of CPCB	EP EPC contractor C by CPCB approved laboratory	AEGCL / PMC

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
		materials- wood, plastic, rubber etc. Oil and grease, TDS, Turbidity, Total hardness, (as CaCO3), corrosivity, Taste}.					
	C. Operation Stage	As per IS: 10500 (PH, Colour, TSS, Conductivity, Odour, Nitrate, Fluoride, Sulphates, Chloride, DO, BOD, T. coliform, E. coliform, Dissolved Iron, total pesticides, Floating materials- wood, plastic, rubber etc. Oil and grease, TDS, Turbidity, Total hardness, (as CaCO3), corrosivity, Taste).	Same location as selected during pre-construction period	One Time	National water quality standards of CPCB	EPC contractor by CPCB approved laboratory (Defect Liability Stage)	AEGCL / PMC
Soil Quality Monitoring	A. Pre-Construction Stage	PH, Sulphate (SO3), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Content.	Near sensitive receptor site (8 locations within 100 m from the center line of the T/L)	One time	Technical specifications	EPC contractor by CPCB approved laboratory	AEGCL / PMC
	B. Construction Stage	PH, Sulphate (SO3), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Content.	Same location as selected during pre-construction period	Twice a year	Technical specifications	EPC contractor by CPCB approved laboratory	AEGCL / PMC
	C. Operation Stage	PH, Sulphate (SO3), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Conten.t	Same location as selected during pre-construction period	One Time	Technical specifications	EPC contractor by CPCB approved laboratory (Defect Liability Stage)	AEGCL / PMC

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
EMF	A. Pre-Construction Stage	Design specification	-	Once during final design approval	National Electrical Safety Code, American National Standard Institute, C2	Contractor (designing), PMC and PMU (design review)	AEGCL / PMC
	B. Construction Stage	Adherence to Design specification during construction work.	Transmission line routes	Continuous activity	National Electrical Safety Code, American National Standard Institute, C2	Contractor	AEGCL / PMC
	C. Operation Stage	Maintenance of conductor to ground, phase to phase and circuit to circuit clearances.	Transmission line routes	Continuous activity	National Electrical Safety Code, American National Standard Institute, C2	AEGCL – Field Staff	AEGCL / PMC
Carcass	A. Pre-Construction Stage	Visual inspection for transmission line locations	Transmission line routes	Continuous activity	Identification of carcass (animals/birds) to be reported to concerned forest/wildlife authority for identification of species. Record to be maintained for number of carcasses	Surveyor	AEGCL / PMC
	B. Construction Stage	Visual Physical Inspection for transmission line locations.	Transmission line routes	Continuous activity		Contractor	AEGCL / PMC
	C. Operation Stage	Visual Physical Inspection for transmission line locations	Transmission line routes	Continuous activity		AEGCL – Field Staff	AEGCL / PMC
Traffic	A. Pre-Construction Stage	Number & type of vehicles being used to access substation site.	Transmission line routes	Continuous activity	Record maintenance for being used for survey and increased traffic load in localities	Surveyor	AEGCL / PMC
	B. Construction Stage	Number & type of vehicle being used for material transportation by EPC contractor.	Transmission line routes	Continuous activity	Maintenance of Logbook for in-out time of vehicle on site (substation).	Contractor	AEGCL / PMC
	C. Operation Stage	Number & Type of vehicles being used for maintenance activity.	Transmission line routes	Continuous activity	Maintenance of Logbook for in-out time of vehicle on site (substation)	AEGCL – O&M staff	AEGCL / PMC
Tree cutting	A. Pre-Construction Stage	Enumeration of trees after finalization of layout plan of selected transmission line route.	Transmission line routes	Once during detailed survey and layout design development	Documentary evidence to be maintained by surveyor for counting of trees.	Surveyor	AEGCL / PMC

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
	B. Construction Stage	Development of inventory of tress before initiating the transmission line construction.	Transmission line routes	During the construction phase	Marking of tress by revenue authority in presence of Contractor and AEGCL officials Obtaining applicable clearance from forest department.	Contractor / Revenue Department / AEGCL	AEGCL / PMC
	C. Operation Stage	Pruning/cutting of tress after getting prior permission from the competent authority for maintenance activity.	Transmission line routes	During the operation phase	Maintenance of record	AEGCL	AEGCL / PMC
Stakeholder Engagement	A. Pre-Construction Stage	Mapping of stakeholders	Transmission line routes	Continuous activity	Keep record of the Consultation with mapped stakeholders (Keep minutes of Consultation and attendance sheet)	Survey Consultant/ Concerned revenue circle	AEGCL / PMC
	B. Construction Stage	Listing of identified stakeholders (administrative and project affected people)	Transmission line routes	Continuous activity	Keep record of the Consultation with mapped stakeholders and PAPs (Keep the record MOM of Consultation and attendance sheet)	Contractor/PMC /AEGCL/ Concerned revenue circle	AEGCL / PMC
	C. Operation Stage	Identification of stakeholders	Transmission line routes	Continuous activity	Consultation with identified stakeholders has to be kept and the copy of minutes of Consultation and attendance sheet also to be kept.	Contractor (Defect Liability Stage)/ AEGCL – Field Officers	AEGCL / PMC
Grievance Mechanism	A. Pre-Construction Stage	Identification of officials, NGO, stakeholders to be part Grievance redressal	Transmission line routes	Continuous activity	Development of Grievance redresses mechanism as per provisions	AEGCL - PMU	AEGCL / PMC

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
		committee.			Notification of formulation of GRM and GRC.		
	B. Construction Stage	Working files of GRC and GRM records.	Transmission line routes	Continuous activity	Notification of formulation of GRM and GRC and display of GRM procedure in project locations (in local language) keep records for GRM (if any)	Contractor, PMC, AEGCL – PMU, Concerned PIU, AEGCL – Field staff	GRC
	C. Operation Stage	Working files of GRC and GRM records.	Transmission line routes	Continuous	Notification of formulation of GRM and GRC and display of GRM procedure in project locations. Working records for GRM.	Concerned field staff, concerned PIU	AEGCL / PMC
Compensation	A. Pre-Construction Stage	Identification of project affected people	Transmission line routes	During identification of land parcel for tower base area and ROW of TL	Compensation is to be paid as per new guideline of Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) MoP new guideline March 2025 & Government of Assam Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024	-	-
	B. Construction Stage	Mapping and listing of projects affected people (crop damage (if any area m^2), zirat damage (marking of trees & development of inventory), Restricted use of land (area m^2) –if applicable.	Transmission line routes			-	-
	C. Operation Stage	Marking of trees (enumeration) to where pruning/cutting is required to maintain clearance between trees and conductor after obtaining prior permission from the competent authority Damage to crop	Transmission line routes	-		-	-

Activity / Issue	Project stage	Parameters to be monitored	Location	Frequency[4]	Standards	Implementation	Supervision
		(area m^2 and Listing of the types of crop during Stringing of line.					
Livelihood	A. Pre-Construction Stage	Identification of any impact on livelihood due to Restricted use of land, crop damage and zirat damage.	Transmission line routes	Once during identification of land parcel for tower base area and ROW of TL	Compensation is to be paid as per new guideline of Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) MoP new guideline March 2025 & Government of Assam Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024	Revenue Department & AEGCL - concerned divisional officer, PMC, EPC Contractor	AEGCL / PMC
	B. Construction Stage	Identification of any impact on livelihood due to loss of land (area m^2) – land utilization pattern, crop damage (area m^2 and type of crop) and zirat damage (inventory development).	Transmission line routes	Once – before commencing construction work		Revenue Department & AEGCL - concerned divisional officer, PMC, EPC Contractor	AEGCL / PMC
	C. Operation Stage	Identification of any impact on livelihood due to Restricted use of land, crop damage and zirat damage (inventory development).	Transmission line routes	Continuous activity		Revenue Department & AEGCL - concerned divisional officer, EPC Contractor (Defect Liability Stage)	AEGCL / PMC
Restoration	A. Pre-Construction Stage	Identification of any damage to public utilities and public/private property to be envisaged	Transmission line routes	Once during identification of land Parcel for tower base area and ROW of TL	Compensation is to be paid as per new guideline of Ministry of Power, Govt. of India (Ref No. 3/4/2016-Trans-Part (4) dated 14.06.2024) MoP new guideline March 2025 & Government of Assam Power Department Dispur, Guwahati-6 Notification dated Dispur the 04-11-2024	Revenue Department & AEGCL - concerned divisional officer, PMC, EPC Contractor	AEGCL / PMC
	B. Construction Stage	Marking and listing of damage to public utilities / shifting of public utilities and public / private property.	Transmission line routes	Continuous activity		Revenue Department & AEGCL - concerned divisional officer, PMC	AEGCL / PMC
	C. Operation Stage (Defect Liability Stage)	Marking and listing of damage to public utilities / shifting of public utilities and public / private property.	Transmission line routes	Continuous activity		Revenue Department & AEGCL - concerned divisional officer	AEGCL / PMC

External Reporting and Communication

Project head is responsible for ensuring that communication with government agencies and stakeholders are maintained as per the requirement for obtaining various permission from different line departments like-

- Power Line Crossing location at LILO of 400 KV D/C Bangaigaon – Balipara T/L (Loop In) - 1 location, 132kV D/C Rangia - Kamalpur T/L - 1 location, 132kV S/C Rangia - Rowta T/L - 1 location, 132kV S/C Rangia - Sipajhar T/L - 1 location, 132kV S/C D - R T/L - 1 locationfrom PGCIL.
- Railway Line crossing location at tower no AP 20/0 – AP 21/0 and at tower no AP 39/0 – AP 40/0 from Railway Department.
- River crossing at three locations (1-time Baralia River, 2 times Puthimari River) from Water Resource Department.
- Communication to all concern Circle Office for approval of land scheduling report/compensation details of Tower footing and RoW.

10.6 BUDGET FOR IMPLEMENTATION OF ESMP SPECIFIC FOR ACTIVITIES COVERED BY THE ESIA – ESMP

The project will have its own budget for implementation of ESMP and RAP. As mentioned earlier, currently some construction activities are going on for tower foundation, hence budget heads for planning and construction stage are provided for remaining construction activities.

The budget heads for Construction and O&M stage will include cost towards

- Wastewater treatment;
- Personal protective equipment;
- Health & Safety; and
- Hazardous material transportation & disposal

ESMP cost to implement the key environmental & social measures and environmental & social monitoring plan which a part of Engineering Procurement Construction (EPC) Contractor's good Engineering practice. An indicative budgetary allocation of **INR 29.50 Lakhs** for ESMP implementation during Construction and O& M stage is provided in table below.

Table 10.5: Indicative Budgetary allocation for EMP Implementation

Sl. No.	Particulars	Capital Cost (Lump sum INR in Lakhs)	Recurring Cost (Lump sum INR in Lakhs) per Annum	Remarks
A. Construction Phase				
1.	Waste Management	**1.5**	**0.40**	Considered as part of EPC contractor work under Good Engineering Practice
2.	Environment, health and safety and Contractor's Environmental and Social Management Plan (CESMP) Implementation	**15.0**	**0.80**	
3.	EQMT	**3.0**	**1.0**	EQMT will be done for Air, water, Noise Level and soil by EPC Contractor.
4.	Management Plan (Biological environment) and Perch rejecter	**7.00** Lakhs	-	Considered as part of EPC contractor work under Good Engineering Practice for

Sl. No.	Particulars	Capital Cost (Lump sum INR in Lakhs)	Recurring Cost (Lump sum INR in Lakhs) per Annum	Remarks
	and power line markers	Lump sum		construction period under supervision of PMC and monitoring by AEGCL. AEGCL will take necessary measures during Operation period
6.	Compensatory afforestation	The cost for compensatory plantation, as determined during the process, will be deposited into the account of the competent authority upon their demand		During the assessment of zirat (immovable asset) value along the Right of Way (RoW) for transmission lines (T/Ls), the competent authority will conduct tree enumeration.
7.	**Resources**			
	PMU Two numbers Environmental Safeguard Specialist Two numbers Social Safeguard Specialist	-	-	Experts are on board from AEGCL fund.
	PMC One number Senior Environmental Safeguard Expert One number Senior Social Safeguard Expert Three numbers Environmental Investigation Officers Three numbers Social Investigation Officers	-	-	Experts are on board as part of PMC contract.
	EPC One Environment, Health, Safety and Social Officer One Community Consultation Officer	-	-	Experts are on board as part of EPC contract.
	Sub – Total A	**26.50**	**2.20**	
B. Operation and Maintenance Phase				
1.	Waste Management	1.0	0.30	
2.	Environment, health and safety and EMP Implementation	1.0	0.50	

Sl. No.	Particulars	Capital Cost (Lump sum INR in Lakhs)	Recurring Cost (Lump sum INR in Lakhs) per Annum	Remarks
3.	Facility Management for Housekeeping	1.0	1.00	
	Sub – Total B	**3.00**	**1.80**	
	Total (Sub – Total A + Sub – Total B)	**29.50**	**3.00**	
	Social			
	Livelihood restoration and CSR	As per RAP for the project		

Note: The above cost does not include cost of manpower needed for the EMP implementation.

10.7 INSTITUTIONAL ARRANGEMENT FOR MONITORING AND REPORTING

The Assam Intra-State Transmission System Enhancement Project (AISTSEP) is implemented by Assam Electricity Grid Corporation Limited (AEGCL) under the financial assistance from the Asian Infrastructure Investment Bank (AIIB). A Project Management Unit (PMU), established within the AEGCL, headed by a Project Director cum CGM (PP&D). The Project Director is accountable for overall supervision, coordination and responsibility of the project planning, implementation of the ESMP. The PMU will be supported by Project Implementation Units (PIUs) established at all divisional level. The PMC for the project will monitor the environmental and social aspects with the supervision of PMU's E&S special staff. The PMU's E&S staff and Divisional official at divisional level will supervise the contractor. Other environmental good practices include sanitary waste management, noise abatement, maintaining hygienic conditions, maintenance of fire and safety equipment.

10.8 Monitoring of ESMP compliance

The proposed mitigation measures comprise of conducting environmental monitoring for Air Quality, Noise Level, Soil Quality and Water Quality during Pre-construction, construction and operational phases of the project. The Environment and Social staff of AEGCL shall ensure the monitoring of the environmental and social aspects. During the construction phase, the contractor should ensure that activities like handling of earth works, disposal of debris, storage of materials, labour camps, putting proper traffic signals is done properly to have minimum impact on the environment and affected communities. The PMC for the project will monitor these parameters with the supervision of PMU's E & S officers. The PMU's E&S officers and Divisional official at divisional level will supervise the contractor. Other environmental good practices include sanitary waste management, noise abatement, maintaining hygienic conditions, maintenance of fire and safety equipment.

The Environmental and Social staff of PMU will ensure that site engineers and contractors adhere and comply with all measures and procedures identified in the ESMP. Activities to be monitored should include, but are not limited to:

- All planning, coordination and management activities related to the implementation of E&S safeguard issues;
- The identification of corrective and preventive actions;

- Records of health and safety matters and training activities;
- Consultations with project affected people (as and when needed, particularly during the implementation);
- Feedback, troubles hooting and project related grievances;
- Ensuring that livelihoods, where negatively impacted, are restored to pre-Project levels;
- Preparation of progress and monitoring reports as required by the funding agency, and
- Verifying the projects overall compliance with safeguard measures and its progress towards achieving the intended loan outcomes.

10.9 Monitoring of ESMoP Compliance

Environmental Parameters to Be Monitored: To ensure that project would not generate negative impacts to the environment and affected communities, monitoring of environmental and social parameters has to be performed by PMU- AEGCL and PMC as per contract provisions. The monitoring activities of the project include site supervision, verification of permits, monitoring of water quality, soil, noise and air, traffic disruptions, livelihood restorations, Occupational, Health and Safety, etc. Monitoring of the quality of water, soil, air and noise during the construction stage is the responsibility of the PMC. The ESMoP compliance will be monitored by E&S staff of PMU.

10.10 Reporting Line (from contractor to AIIB), report type and templates

The Environmental and Social (E&S) staff is dedicated for projects funded by the Asian Infrastructure Investment Bank (AIIB) to streamline decision-making and provide more autonomy for project execution and delivery. The E&S staff of AIIB project is part of PMU which is headed by Project Director. At divisional level, the charge of E&S Officer is given to the concern's AGM. The AGM's will also act as project Manager for individual subprojects. The AGM's will work under the supervision of DGM at circle level.

Mitigation measures related to construction as specified in the ESMP to be incorporated into civil works contracts, and their implementation will be primarily the responsibility of the contractors. Contractors are required to submit monthly progress report **(template in Appendix 6A)** on the implementation of ESMP measures to PMC/PMU. ESMP implementation will be evaluated internally by the PMU/PIU itself and the PMC E&S Expert and through field level officials, who will be regularly monitoring ESMP implementation.

Project Management Consultant (PMC) to keep everything on track and carryout evaluation on the ESMP implementation. The PMC will submit monthly progress report **(template in Appendix 6B)** to update the Project Management Unit (PMU) on the ESMP implementation activities. The E&S Experts of PMC will submit semi-annual environmental and social monitoring report **(template in Appendix 6C)** on progress and compliance issues of ESMP implementation. Progress reports will include a description of implementable activities and their status; identify the responsible parties involved in their implementation; and provide project management schedules and time frames for doing so, along with their associated costs.

The E&S Experts of PMU, AEGCL will ensure that the semi-annual monitoring report submitted by PMC is in the line with the requirement of AIIB and submit the environmental and social monitoring to AIIB.

The illustration of reporting line is provided in figure below.

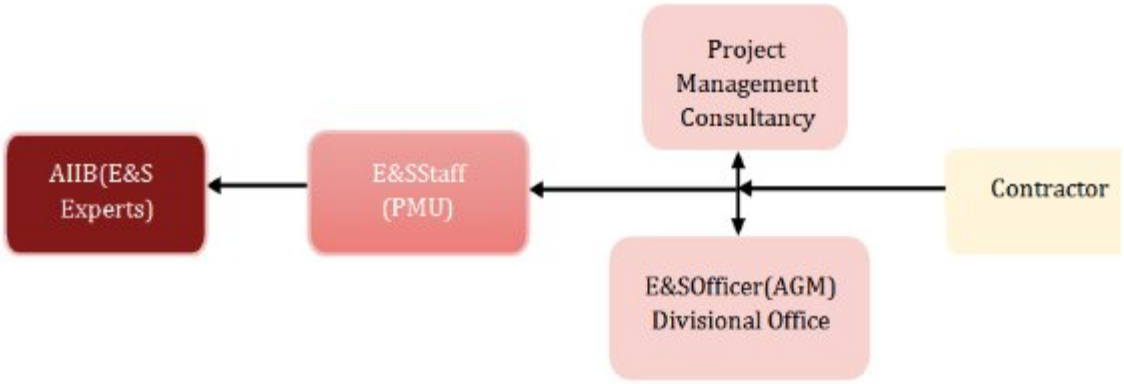


Figure-10.1: Illustration of Reporting Line

The environmental monitoring report will be submitted by the PMC - E&S staff to the PMU, which will include the result of environmental monitoring into its environmental report. The Environment and Social Staff of PMU after interaction with PMC E&S staff will ensure the adequacy of submitted monitoring reports and PMU will further submit these reports to AIIB twice in a year. This report will demonstrate that sound environmental management practices are applied, and the set environments targets are achieved.

In case the implementation of ESMP measures is not satisfactory, AEGCL may engage external qualified experts to verify monitoring reports and assess the significant impacts and risks. These external monitoring experts shall recommend actions for AEGCL to enhance environmental compliance. Funding agency will continue to monitor project compliance with safeguard plans and requirements on an on-going basis throughout the duration of the contract.

10.11 Capacity building needs for this project

The AEGCL has Environmental & Social project staffs, who have knowledge of environmental safeguards, and experience of AIIB environmental safeguard policies and their implementation of AISTSEP. It is hence understood that they have required familiarity with AIIB environmental safeguard policies and its implementation. Designated PMU officials, and PIUs staffs and engineers will be trained by PMC safeguards experts on safeguards issues related to the project. The capacity building program which included modules on: (i) introduction and sensitization to AIIB environmental and social policy and requirements; (ii) project related requirements as provided in the ESMP; (iii) improved coordination within line departments; (iv) monitoring and reporting system; and (v) project GRM. Briefings on safeguards principles, GRM etc. will also be conducted to the contractors and PIU safeguard officers supported by PMC.

Training and capacity building programme are being conducted by PMC as per the requirement and PMC contract provision.

Apart from these, training and capacity building programme are being conducted by E&S team of AIIB to ensure implementation of E&S requirement.

11. SUMMARY, RECOMMENDATIONS AND CONCLUSION

Power transmission projects including the construction of substation and associated transmission line have not been listed in the list of environmentally sensitive projects and hence, no environmental clearance is required, as per the Environmental Impact Assessment (EIA) notification of 2006 and its subsequent amendments by the Ministry of Environment, Forest and Climate Change (MoEF&CC). However, project associated activity like quarry operation (if any) for the project may require prior Environmental Clearance. Clearance from the Forest Department is required only in cases where a project is constructed on forest land or requires cutting of forest trees. Clearance from the State Wildlife Board (SBWL) / National Wildlife Board (NWBL) is required only in cases where a project is constructed on Notified Wildlife area or within the Eco-sensitive Zone of Wildlife area. Clearance from the Wetland authority is required only in cases where a project is constructed on Notified Wetland or within the Eco-sensitive Zone of Wetland. Based on the screening, forest, wildlife and wetland clearances are not applicable for Transmission Lines.

As the Project is funded through the AIIB, the Bank's Environmental and Social Policy (ESP) applies. The Project has been assigned to "Category B" as per the ESP, as the Transmission lines are not located in sensitive areas.

ESS 1 is applicable to the project as civil works may cause a limited number of potentially adverse environmental and social impacts. These impacts are not unprecedented and are limited to the project area

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 and accordingly ARAP report will be prepared.

ESS 3 will be evaluated after finalization of land scheduling report and accordingly finding of Indigenous People will be incorporated in the ARAP report.

The various environmental and social attributes were idenfied through primary field study and secondary information's.

Various alternatives have been considered for selection of most optimal route of transmission lines.

The Environmental and Social Impact Assessment (ESIA) for the transmission line system has evaluated the likely environmental and social impacts during both construction and operation phases. The assessment concludes that the impacts are generally limited in nature, few in number, site-specific, and largely reversible. Furthermore, these impacts can be effectively mitigated with appropriate measures.

Importantly, the ESIA emphasizes that forested and ecologically sensitive areas, such as National Parks and Wildlife Sanctuaries, have been avoided through careful route selection, adhering to the principle of minimizing harm. The check survey for the Transmission line is completed; however approval of the land scheduling report from concerned Revenue Circle is awaited.

Remedial measures for climate risks have been adapted for Transmission Line at design stage.

The community consultations are carried out in all the villages along the transmission line corridor with local habitants where fifty-four participants were participated in the LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT) such as economically weak communities, women, vulnerable groups and other local community leaders nearby the proposed transmission line. Consultation will be continued during implementation of the project.

For unwanted situation like danger, sexual harassment and other life threatening, the victim person may reach to the concerned officials who belong to the Tier-1 and Tier-2 committee and may contact for further needful action or the matter should be informed to AIIB immediately.

ESMP for identified impacts and the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored and Environmental and Social Monitoring program has been detailed in the main report.

ESMP cost to implement the key environmental & social measures and environmental & social monitoring plan which a part of Engineering Procurement Construction (EPC) Contractor's good Engineering practice. An amount of **INR 29.50 Lakhs** is estimated to be required for implementation of ESMP.

Institutional Arrangement for Monitoring and Reporting Assam Intra-State Transmission System Enhancement Project (AISTSEP) including Reporting Line (from contractor to AIIB) is in place and detailed in the main report.

Capacity building programmes are being conducted by PMC as per the requirement and PMC contract provision. Apart from these, training and capacity building programme are being conducted by E&S team of AIIB to ensure implementation of E&S requirement.

In summary, the ESMP provides a structured approach to ensuring 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 potential impacts identified in the ESIA study are manageable and can be mitigated effectively through compensation, preventive measures and careful planning during the construction phase. The ESIA and ESMP will be updated for remaining 2 nos transmission lines of Pkg-G and also in case of any change in scope or design of the project.

SOME SITE PHOTOGRAPHS OF THE TRANSMISSION LINE ROUTES DURING SITE VISIT

LILO of both circuit of Rangia (Ext) Amingaon 220kV line (on single zebra) at Rangia (Tamulpur) 400kV GIS with OPGW link (LOOP IN/LOOP OUT)

AP-16

AP-20

AP- 25

AP-28

AP- 33

AP- 47

AP- 34/1

AP- 36

AP- 37

AP- 40/1

AP-41/1

AP-47

Source: Site Visit

APPENDIX 1- TECHNICAL DETAILS

ASSAM ELECTRICITY GRID CORPORATION LIMITED
OFFICE OF THE MANAGING DIRECTOR
Regd. Office:(1st FLOOR), BIJULEE BHAWAN, PALTANBAZAR, GUWAHATI - 781001
CIN: U40101AS2003SGC007238 GSTIN: 18AAFCA4973J9Z3
PHONE: 0361-2739520 Web: www.aegcl.co.in

No.: AEGCL/MD/AIIB/PKG G/Trans. Line/2024/85 Date:

To,

M/s. Shyama Power India Limited,
JV with M/s Stelmec Ltd
Regd. Office: PLOT NO 49, Sector -44, Gurgaon-122002, Haryana
Project Office: H/No. 21, P.B. Road, P.O. Rehabari, Ghy-781008, Assam

Sub: Conveying approval subject to comments of tower spotting, design criteria, tower design calculation of DA type tower upto 9Mtr BE and SLD of DA type Tower of 220kV D/C Transmission Line against Construction of 400/220/132/33 kV Rangia GIS under Package G of AIIB funded AISTSEP.

Ref: 1. Tender Identification NO: AEGCL/MD/AIIB/PACKAGE-G (R)/2022/01-G(R)
2. Your Letter No: SPIL/GUW/AEGCL/PKG G (R)/01/569 dated:19.12.2024
3. Letter from P&D, AEGCL: AEGCL/GM(P&D)/AIIB/220kV TL/Part-3/1179 dated: 21.12.2024
4. Letter from P&D, AEGCL: AEGCL/GM(P&D)/AIIB/220kV TL/Part-3/1181 dated: 23.12.2024

Sir,

With reference to the above, enclosed please find herewith the comments on the following:

Sl. No	Description	Comments
1	Tower spotting 220kV D/C transmission line.	Generally found to be in order and hence approved.
2	Design criteria 220kV D/C transmission line.	Generally found to be in order and hence approved. However, for scrutiny/approval from Sl. No. E6 to E10 and from Sl. No. M to X, the Civil Wing, AEGCL will scrutinize the same. Please coordinate with the Civil Wing, AEGCL for clearance
3	Tower design Calculation of DA Type Tower upto 9 Mtr	Forwarded to the Civil Wing for necessary approval from P&D, Wing AEGCL. Please coordinate with the Civil Wing, AEGCL for clearance.
4	SLD of DA Type Tower	Generally found to be in order and approved from electrical clearance perspective. Moreover, 02 copies of the same have been forwarded to the Civil Wing, AEGCL for scrutiny. Please coordinate with the Civil Wing, AEGCL for clearance.

This is for your kind information and further necessary action please. Please provide the scanned copy on receipt of the same.

Enclosed: One approved set of Sl. No 1,2 & 4 subject to comments.
Thanking you;

Chief General Manager, PP&D, AEGCL
Memo No.: AEGCL/MD/AIIB/PKG G/Trans. Line/2024/85a Date: 03.01.25

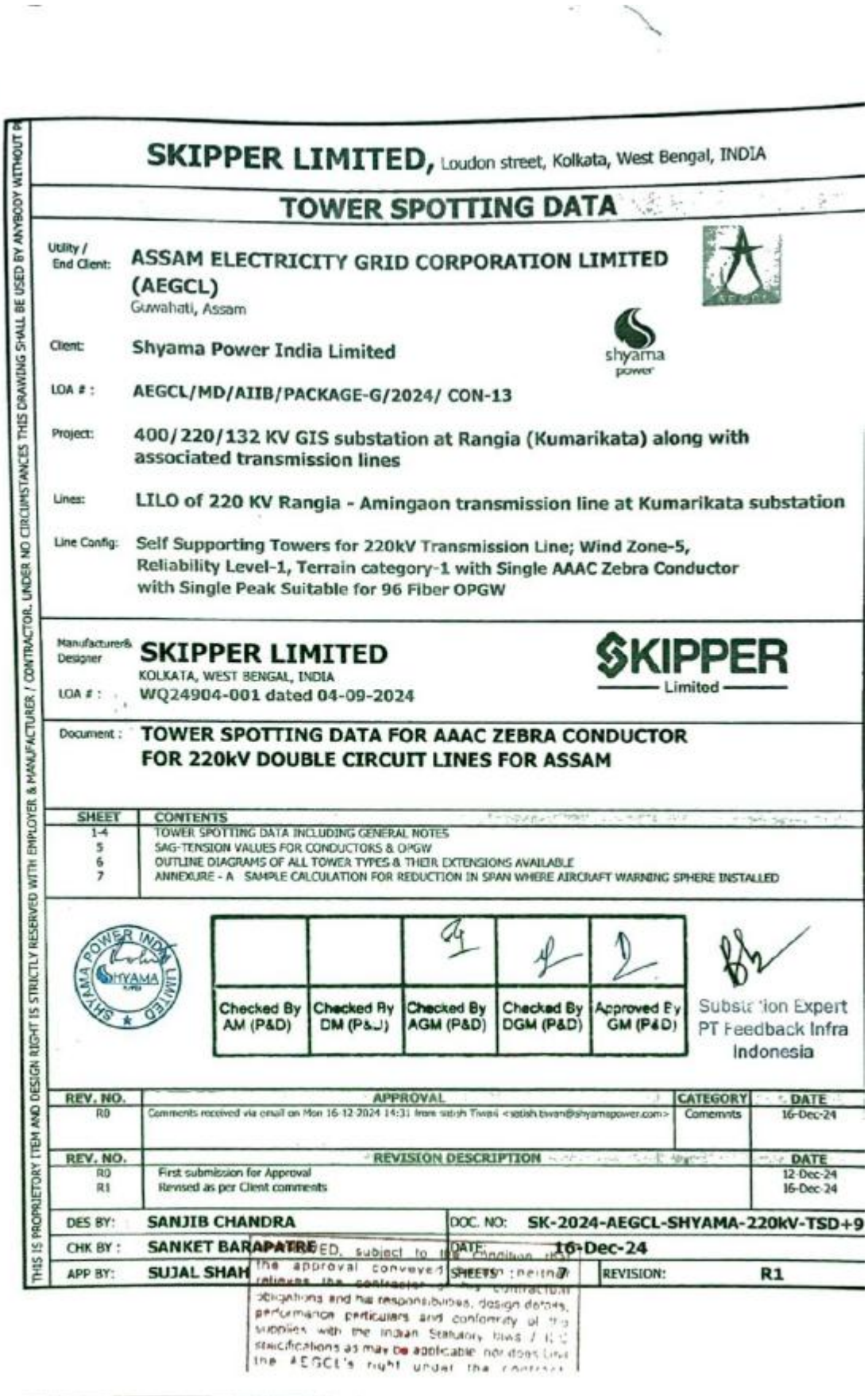
Copy to:

1. PS to the Hon'ble MD AEGCL for his kind apprisal of the Hon'ble MD AEGCL.
2. The General Manager (P&D), Bijulee Bhawan Campus, AEGCL for kind information.
3. The Deputy General Manager, LA T&T Circle, AEGCL, Ghy-26 for kind information.
4. The Assistant General Manager, 220kV GSS, Rangia, AEGCL, 781354 for information.
5. The Team Leader, PT feedback Infra Ltd. Indonesia, Local Head Office, Guwahati for kind information.

3/1/25

Chief General Manager, PP&D, AEGCL

APPENDIX 2A- TECHNICAL DETAILS



THIS IS PROPRIETORY ITEM AND DESIGN RIGHT IS STRICTLY RESERVED WITH EMPLOYER & MANUFACTURER / CONTRACTOR. UNDER NO CIRCUMSTANCES THIS DRAWING SHALL BE USED BY ANYBODY WITHOUT P

SKIPPER LIMITED, Loudon street, Kolkata, West Bengal, INDIA

TOWER SPOTTING DATA

Utility / End Client: **ASSAM ELECTRICITY GRID CORPORATION LIMITED (AEGCL)**
Guwahati, Assam

Client: **Shyama Power India Limited**

LOA # : **AEGCL/MD/AIIB/PACKAGE-G/2024/ CON-13**

Project: **400/220/132 KV GIS substation at Rangia (Kumarikata) along with associated transmission lines**

Lines: **LILO of 220 KV Rangia - Amingaon transmission line at Kumarikata substation**

Line Config: **Self Supporting Towers for 220kV Transmission Line; Wind Zone-5, Reliability Level-1, Terrain category-1 with Single AAAC Zebra Conductor with Single Peak Suitable for 96 Fiber OPGW**

Manufacturer& Designer: **SKIPPER LIMITED**
KOLKATA, WEST BENGAL, INDIA
LOA # : WQ24904-001 dated 04-09-2024

Document : **TOWER SPOTTING DATA FOR AAAC ZEBRA CONDUCTOR FOR 220kV DOUBLE CIRCUIT LINES FOR ASSAM**

SHEET	CONTENTS
1-4	TOWER SPOTTING DATA INCLUDING GENERAL NOTES
5	SAG-TENSION VALUES FOR CONDUCTORS & OPGW
6	OUTLINE DIAGRAMS OF ALL TOWER TYPES & THEIR EXTENSIONS AVAILABLE
7	ANNEXURE - A SAMPLE CALCULATION FOR REDUCTION IN SPAN WHERE AIRCRAFT WARNING SPHERE INSTALLED

SHYAMA POWER INDIA LIMITED

Checked By AM (P&D)	Checked By DM (P&D)	Checked By AGM (P&D)	Checked By DGM (P&D)	Approved By GM (P&D)

Substation Expert
PT Feedback Infra Indonesia

REV. NO.	APPROVAL	CATEGORY	DATE
R0	Comments received via email on Mon 16-12-2024 14:31 from satish Tiwari <satish.tiwari@shyamapower.com>	Comemnts	16-Dec-24

REV. NO.	REVISION DESCRIPTION	DATE
R0	First submission for Approval	12-Dec-24
R1	Revised as per Client comments	16-Dec-24

DES BY: SANJIB CHANDRA
CHK BY : SANKET BARAPATRE
APP BY: SUJAL SHAH

DOC. NO: SK-2024-AEGCL-SHYAMA-220kV-TSD+9
DATE: 16-Dec-24
SHEETS : being 7
REVISION: R1

ED, subject to ... the approval conveyed ... relieves the contractor ... obligations and his responsibilities, design details, performance particulars and conformity of the supplies with the Indian Statutory laws / IE specifications as may be applicable nor does limit the AEGCL's right under the contract

Checked By AM (P&D)	Checked By DM (P&D)	Checked By AGM (P&D)	Checked By DGM (P&D)	Approved By GM (P&D)

SKIPPER LIMITED — 220kV-TSD+9 — R1

TOWER SPOTTING DATA

• 220 kV Double-Circuit • WZ- 5 • **Single AAAC Zebra Conductor** • 95°C Max. Conductor Temperature •

Sr. No.		DA (0°-2°)		DB (0°-15°)		DC (15°-30°)		DD (30°-60°)	
	Tower >>>	SUSPENSION		TENSION		TENSION		TENSION	
	marked as	DA		DB		DC		DD	
A.	FOR SECTIONS **WITHOUT** AVIATION WARNING SPHERE								
1A	**Vertical Load limitation on weight span (For both OPGW & conductor)**								
		Downward	Upward	Downward	Upward	Downward	Upward	Downward	Upward
a)	On both spans(m) OPGW/Conductor	525	200	525	0	525	0	525	0
b)	On One Span (m) OPGW/Conductor	315	100	315	-200	315	-200	315	-200
2A	Tower Checked for							DEAD END	
	Line / Slack Side							Line	Slack
	Angle of Deviation							0°-15°	0°-30°
	Wind Span Limits							150 m	30 m
	Total Wind Span							180 m	
3A	Permissible sum of adjacent spans in meters for various deviation angles. (subject to availability of minimum specified live metal clearances available) Permissible one span for various deviation angles should not exceed 60% of the value shown for sum of	Devi. Angle	Span	Devi. Angle	Span	Devi. Angle	Span	Devi. Angle	Span
		2°	700 m	15°	700 m	30°	700 m	60°	700 m
		1°	725 m	14°	743 m	29°	742 m	59°	737 m
		0°	750 m	13°	786 m	28°	784 m	58°	775 m
				12°	829 m	27°	826 m	57°	813 m
				11°	872 m	26°	868 m	56°	851 m
				10°	916 m	25°	911 m	55°	890 m
				9° & below	927 m	24° & below	927 m	54°	928 m
								53° & below	967 m
4A	Normal Span	350 M							
	Wind span		DA	DB	DC	DD			
		Normal	350	350	350	350			
		BWC	210	210	210	210			
B.	FOR SECTIONS **WITH** AVIATION WARNING SPHERE								
	For Sections where Aviation Warning Spheres are installed, All spans (Normal/Basic Span, Wind Span and Max. Weight Spans) shall be reduced as mentioned in this table. Refer sample calculation in Annexure - A included in this document.								
1B	**Vertical Load limitation on weight span (For both OPGW & conductor)**								
		Downward	Upward	Downward	Upward	Downward	Upward	Downward	Upward
a)	On both spans(m) OPGW/Conductor	475	181	475	0	475	0	475	0
b)	On One Span (m) OPGW/Conductor	285	90	285	-181	285	-181	285	-181
2B	Tower Checked for							DEAD END	
	Line / Slack Side							Line	Slack
	Angle of Deviation							0°-15°	0°-30°
	Wind Span Limits							143 m	28 m
	Total Wind Span							171 m	
3B	Permissible sum of adjacent spans in meters for various deviation angles. (subject to availability of minimum specified live metal clearances available) Permissible one span for various deviation angles should not exceed 60% of the value shown for sum of	Devi. Angle	Span	Devi. Angle	Span	Devi. Angle	Span	Devi. Angle	Span
		2°	660 m	15°	660 m	30°	660 m	60°	660 m
		1°	683 m	14°	700 m	29°	699 m	59°	695 m
		0°	707 m	13°	741 m	28°	739 m	58°	730 m
				12°	781 m	27°	779 m	57°	766 m
				11°	822 m	26°	818 m	56°	802 m
				10°	863 m	25°	859 m	55°	839 m
				9° & below	874 m	24° & below	874 m	54°	875 m
								53° & below	911 m
4B	Normal Span	330 M							
	Wind span		DA	DB	DC	DD			
		Normal	330	330	330	330			
		BWC	198	198	198	198			
5	Permissible sum of adjacent spans in m. for various deviation angles furnished in 3A & 3B above are applicable for conductor & OPGW								
6	**Tower Type**	**To be used as**							
	DA	0°- 2° Suspension Tower							
	DB	0° - 15° Angle Tower with tension string / 0° Section Tower							
	DC	15° - 30° Angle Tower with tension string / 0° Section Tower							
	DD / DD-DE	30° - 60° Angle tower with tension string / 0° to 15° Compact Semi End / Dead end with 0° to 15° deviation on line side and 0° to 30° deviation on substation side							
7	For Electrical Clearances and Statutory requirements please refer Next Sheet.								

Submission Expert
PTI Feedback Infra
Indonesia

Checked By AM (P&D)	Checked By DM (P&D)	Checked By AGM (P&D)	Checked By DGM (P&D)	Approved By GM (P&D)

SKIPPER LIMITED

Doc No : SK-2024-AEGCL-SHYAMA-220kV-TSD+9 R1

TOWER SPOTTING DATA

GENERAL DETAILS:

A) ELECTRICAL CLEARANCE FOR RAILWAY CROSSING

- Prior approval of Railway Authority is to be obtained.
- Minimum Clearance between lowest point of line Conductor and Rail level shall be as per **Column-2 of Table-1** below under maximum sag condition.. However approval of railway crossing from railway authority has to be obtained in each case.
- Minimum Clearance to be maintained between highest traction conductor and lowest transmission line crossing Conductor should be...
  - ** As per **Column-3 of Table-1** At structure as per clause 61 CEA, if nearest OHE structure /fixed structure is within 6000 mm from overhead conductor under maximum sag condition, else it should be as per **column-4 of table-1**.
  - ** As per **Column-4,** At Mid Span as per clause 69 CEA.

Table-1

Voltage Level	Minimum Clearance between lowest point of line Conductor and Rail level	Minimum clearance to be maintained between lowest transmission line crossing conductor and railway structure as per clause 61 CEA (At structure)	Minimum clearance to be maintained between highest traction conductor and lowest transmission line crossing conductor as per clause 69 CEA (At Mid Span)
(1)	(2)	(3)	(4)
66 KV	16960	4000	2440
132 KV	17560	4600	3050
220 KV	**18460**	**5500**	**4580**
400 KV	20260	7300	5490
500 KV HVDC	21160	8200	7940
765 KV	23860	10900	7940
800 KV HVDC	23860	10900	7940

- The crossing span shall be limited to 300 M.
- The crossing shall normally be at right angle to the railway track.
- Crossing should be done with "D" type tower.
- The minimum distance of crossing tower shall be at least equal to the height of tower plus 6.0 m away measured from center of the nearest railway track.

B) MINIMUM CLEARANCE FOR POWER LINE CROSSING EACH OTHER

Substation Expert
PT Feedback Infra
Indonesia

Table-2

Voltage Level	66 KV (mm)	132 KV (mm)	220 KV (mm)	400 KV (mm)	765 KV (mm)	500 KV HVDC (mm)
66 KV	2440	3050	4580	5490	7940	6790
132 KV	3050	3050	4580	5490	7940	6790
220 KV	**4580**	**4580**	**4580**	**5490**	**7940**	**6790**
400 KV	5490	5490	5490	5490	7940	6790
500 KV HVDC	6790	6790	6790	6790	7940	6790
765 KV	7940	7940	7940	7940	7940	7940
800 KV HVDC	9040	9040	9040	9040	9040	9040
1200 KV	10440	10440	10440	10440	10440	10440

APPROVED, subject to the condition that the approval conveyed herein neither relieves the contractor of his contractual obligations and his responsibilities design details performance particulars and conformity of the supplies with the Indian Standard, [illegible] specifications as may be applicable [illegible]

Checked By AM (P&D)	Checked By DM (P...)	Checked By AGM (P&D)	Checked By DGM (P&D)	Approved By CM (P&D)

SKIPPER LIMITED DOC NO : SK-2024-AEGCL-SHYAMA-220kV-TSD-F9 R1

TOWER SPOTTING DATA

GENERAL DETAILS:

C) TELE-COMMUNICATION LINE CROSSING

- Minimum clearance between Power conductor & telecommunication lines with respect to Voltage Level shall be as per **Table-3** with maximum conductor sag.

Table-3

Voltage Level	66 KV	132 KV	**220 KV**	400 KV	765 KV
Minimum clearance between Power conductor crossing (mm)	2440	2750	**3050**	4480	7900

- The angle of tele-communication line crossing shall be as near to 90° as possible. However, deviation to the extent of 60° may be permitted under exceptionally difficult situations.
- When, the angle of crossing has to be below 60°; the matter will be referred to the authority in charge of the telecommunication system. On a request from the contractor the permission of the telecommunication authority may be obtained by the Owner.
- In the crossing span, power line support will be as near the telecommunication line as possible, to obtain increased vertical clearance between the wires.

D) The number of consecutive spans between the section points shall not exceed 15 or 5 km. In plain terrain and 10 spans or 3 km. in hilly terrain.

E) A section point shall comprise of tension point with "B" type or "C" type or "D" type towers as applicable.

F) Minimum ground clearance required for respective voltage level shall be as per **Table-4.**

Table-4

Voltage Level	66 KV	132 KV	**220 KV**	400 KV	765 KV	500 KV HVDC	800 KV HVDC
Minimum Ground Clearance (mm)	6100	6100	**7015**	8840	18000	12500	18000

G) Sag Error : 150 mm. Add Sag Error to Ground Clearance.

H) At all important road crossings, tension tower to be used.

For all national highway crossing, tension tower is to be used and the crossing span is not to exceed 250 meters.

I) Maximum span of adjacent spans for various angles of deviation are subject to the condition that minimum specified live Metal Clearance & minimum Ground Clearance are available.

J) Maximum deviation of line for dead end tower (D) shall be 15° on line side and 30° sub-station side (slack span side)

Substation Expert
PT Feedback Infra
Indonesia

APPROVED, subject to the condition that the approval conveyed herein neither relieves the contractor of his contractual obligations and his responsibilities, design details, performance particulars, and conformity of the supplies with the Indian Statutory Rules / Indian specifications as may be applicable, nor deprives the AEGCL's right under the contract

SKIPPER LIMITED Doc No : SK-2024-AEGCL-SHYAMA-220kV-TSD+9 R1

TOWER SPOTTING DATA

GENERAL DETAILS:

K) The clearances from building, trees, Power line crossings should be made in accordance with latest version of Indian Electricity Rules and IS:5613.

L) Vertical load of individual spans are acting downwards for suspension towers.

M) Corridor requirement and Way leave clearance either side from the C.L. of the Transmission Line shall be as per the **Table-5.**

Table-5

Voltage Level	Corridor requirement (m)	Way leave clearance on either side of C.L. of the TL (m)
66 KV	18	9
132 KV	27	13.5
220 KV	**35**	**17.5**
400 KV Single Circuit (Horizontal Configuration)	52	26
400 KV Double Circuit / Single Circuit (Vertical Configuration)	46	23
765 KV Single Circuit (Horizontal Configuration)	85	42.5
765 KV Single Circuit (Delta Vertical Configuration)	64	32
765 KV Double Circuit	67	33.5
1200 KV	89	44.5
500 KV HVDC	52	26
800 KV HVDC	69	34.5

N) Minimum clearance for power conductor of respective Voltage level over the highest flood level (HFL) in case of non navigable rivers and navigable rivers is as per **Table-6.**

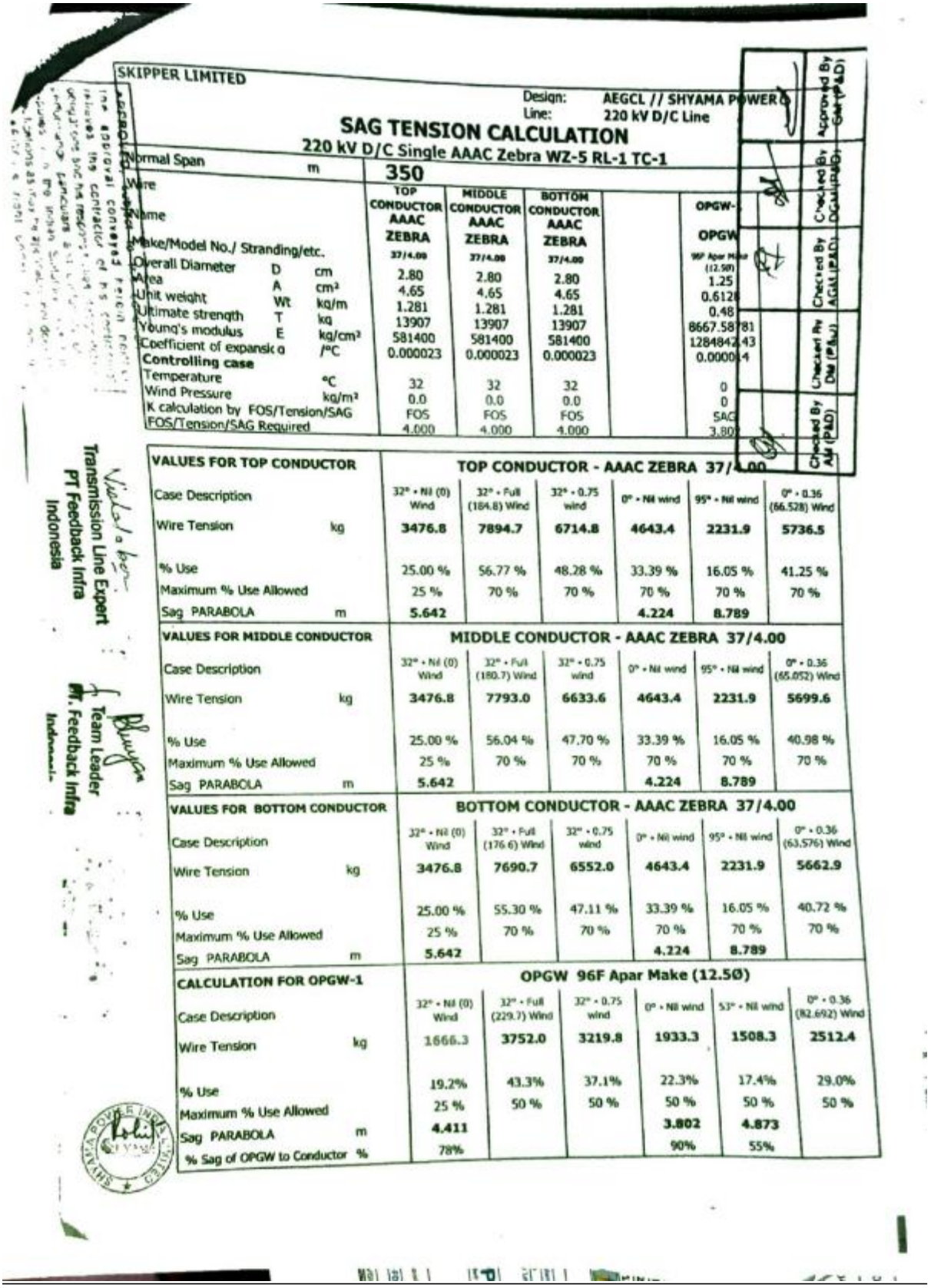
Table-6

Voltage Level	Minimum clearance above HFL (mm)	
	Navigable Rivers (mm)	Non-navigable Rivers (mm)
66 KV	19000	3650
132 KV	19220	4300
220 KV	**20100**	**5100**
400 KV	21900	6400
765 KV	25550	9400
1200 KV	29900	11000
500 KV HVDC	24030	6750
800 KV HVDC	27700	11000

Checked By AM (P&D)	Checked By DM (P&D)	Checked By AGM (P&D)	Checked By DGM (P&D)	Approved By GM (P&D)

Substation Expert
PT Feedback Infra
Indonesia

APPROVED, subject to the condition that the approval conveyed herein neither relieves the contractor of his contractual obligations and his responsibilities design details, performance particulars and conformity of the supplies with the Indian Statutory laws / IEC specifications as may be applicable nor does limit the AEGCL's right under the contract.



SKIPPER LIMITED

Design: AEGCL // SHYAMA POWER
Line: 220 kV D/C Line

SAG TENSION CALCULATION

220 kV D/C Single AAAC Zebra WZ-5 RL-1 TC-1

			TOP CONDUCTOR AAAC ZEBRA 37/4.00	MIDDLE CONDUCTOR AAAC ZEBRA 37/4.00	BOTTOM CONDUCTOR AAAC ZEBRA 37/4.00		OPGW-1 OPGW 96F Apar Make (12.5Ø)
Normal Span	m		350				
Wire Name							
Make/Model No./ Stranding/etc.							
Overall Diameter	D	cm	2.80	2.80	2.80		1.25
Area	A	cm²	4.65	4.65	4.65		0.612
Unit weight	Wt	kg/m	1.281	1.281	1.281		0.48
Ultimate strength	T	kg	13907	13907	13907		8667.58781
Young's modulus	E	kg/cm²	581400	581400	581400		1284842.43
Coefficient of expansion		/°C	0.000023	0.000023	0.000023		0.000014
Controlling case							
Temperature		°C	32	32	32		0
Wind Pressure		kg/m²	0.0	0.0	0.0		0
K calculation by FOS/Tension/SAG			FOS	FOS	FOS		SAG
FOS/Tension/SAG Required			4.000	4.000	4.000		3.800

VALUES FOR TOP CONDUCTOR		TOP CONDUCTOR - AAAC ZEBRA 37/4.00					
Case Description		32° + Nil (0) Wind	32° + Full (184.8) Wind	32° + 0.75 wind	0° + Nil wind	95° + Nil wind	0° + 0.36 (66.528) Wind
Wire Tension	kg	**3476.8**	**7894.7**	**6714.8**	**4643.4**	**2231.9**	**5736.5**
% Use		25.00 %	56.77 %	48.28 %	33.39 %	16.05 %	41.25 %
Maximum % Use Allowed		25 %	70 %	70 %	70 %	70 %	70 %
Sag PARABOLA	m	**5.642**			**4.224**	**8.789**	

VALUES FOR MIDDLE CONDUCTOR		MIDDLE CONDUCTOR - AAAC ZEBRA 37/4.00					
Case Description		32° + Nil (0) Wind	32° + Full (180.7) Wind	32° + 0.75 wind	0° + Nil wind	95° + Nil wind	0° + 0.36 (65.052) Wind
Wire Tension	kg	**3476.8**	**7793.0**	**6633.6**	**4643.4**	**2231.9**	**5699.6**
% Use		25.00 %	56.04 %	47.70 %	33.39 %	16.05 %	40.98 %
Maximum % Use Allowed		25 %	70 %	70 %	70 %	70 %	70 %
Sag PARABOLA	m	**5.642**			**4.224**	**8.789**	

VALUES FOR BOTTOM CONDUCTOR		BOTTOM CONDUCTOR - AAAC ZEBRA 37/4.00					
Case Description		32° + Nil (0) Wind	32° + Full (176.6) Wind	32° + 0.75 wind	0° + Nil wind	95° + Nil wind	0° + 0.36 (63.576) Wind
Wire Tension	kg	**3476.8**	**7690.7**	**6552.0**	**4643.4**	**2231.9**	**5662.9**
% Use		25.00 %	55.30 %	47.11 %	33.39 %	16.05 %	40.72 %
Maximum % Use Allowed		25 %	70 %	70 %	70 %	70 %	70 %
Sag PARABOLA	m	**5.642**			**4.224**	**8.789**	

CALCULATION FOR OPGW-1		OPGW 96F Apar Make (12.5Ø)					
Case Description		32° + Nil (0) Wind	32° + Full (229.7) Wind	32° + 0.75 wind	0° + Nil wind	53° + Nil wind	0° + 0.36 (82.692) Wind
Wire Tension	kg	1666.3	**3752.0**	**3219.8**	**1933.3**	**1508.3**	**2512.4**
% Use		19.2%	43.3%	37.1%	22.3%	17.4%	29.0%
Maximum % Use Allowed		25 %	50 %	50 %	50 %	50 %	50 %
Sag PARABOLA	m	**4.411**			**3.802**	**4.873**	
% Sag of OPGW to Conductor	%	78%			90%	55%	

Approved By GM (P&D)
Checked By DGM (P&D)
Checked By AGM (P&D)
Checked By DM (P&D)
Checked By AM (P&D)

Vishal Jain
Transmission Line Expert
PT Feedback Infra
Indonesia

Team Leader
PT. Feedback Infra
Indonesia

ANNEXURE - A
220 kV D/C Single AAAC Zebra WZ-5 RL-1 TC-1

Design: AEGCL - SHYAMA POWER
Line: 220 kV D/C Line

Effective Weight & Diameter of OPGW

Calculation of Effective Weight of OPGW	**OPGW**		
Unit Weight of OPGW	0.48	kg/m	
Span	150		Minimum span assumed
No of earth wire	1		
No of Aircraft Warning Spheres / Span	1		
Unit Weight of Sphere	7.000	kg	As per GTP
Total Weight of Sphere / Span	7.000	kg	
Total Weight of Sphere / m	0.047	kg/m	
Weight of Sphere / m / Earthwire	0.047	kg/m	
Effective Unit Weight of Earthwire/OPGW	0.527	kg/m	
say	**0.530**	kg/m	
Sample,			
Weight Span without AWS	525	m	
Weight Span Reduction while AWS	475	m	
ROUNDDOWN(525*0.48/0.53,0)			

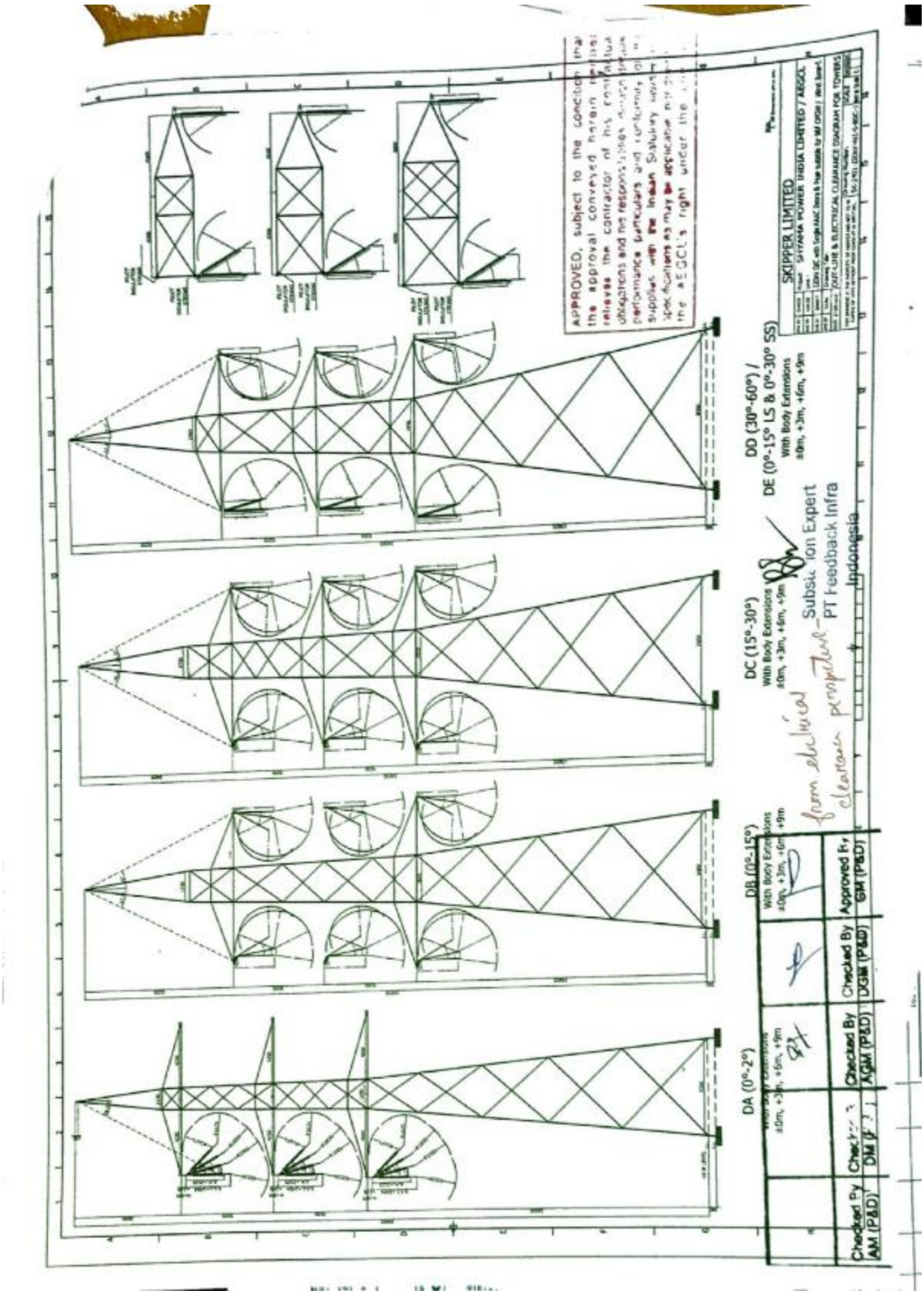
Calculation of Effective Diameter of EW / OPGW	**OPGW**		
Diameter of Earthwire/Groundwire/OPGW	12.500	mm	
Span	150	m	
No of Earthwire/Groundwire	1		
Aerodynamic Drag coefficient of Earthwire/OPGW	1.000		
No of Aircraft Warning Spheres / Span	1		
Diameter of Aircraft Warning Sphere	600	mm	As per GTP
Projected Area of One Sphere	282743	mm²	
Aerodynamic Drag co-efficient of Sphere	0.4		
Effective Projected Area of One Sphere	113097	mm²	
Total Effective Area of Sphere / Span	113097	mm²	
Additional Diameter due to Sphere	0.754	mm	
Effective Diameter of Earthwire/Groundwire/OPGW	13.254	mm	
Sample,			
Wind Span without AWS	350	m	
Wind Span Reduction while AWS	330	m	
ROUNDDOWN(350*12.5/13.254,0)			

Checked By AM (P&D)	Checked By DM (P&D)	Checked By AGM (P&D)	Checked By DGM (P&D)	Approved By GM (P&D)

Substation Expert
PT Feedback Infra
Indonesia

APPROVED, subject to the condition the approval conveyed herein neit relieves the contractor of his contrac obligations and his responsibilities, design de performance particulars and conformity of supplies with the Indian Statutory leva specifications as may be applicable, nor does the AEGCL's right under the cont

APPENDIX 2B- DRAWING OF DA, DB, DC and DD TOWER TYPE



APPENDIX 3A- STANDARD OPERATING (WORK) PROCEDURE TOWER ERECTION

PURPOSE:

This document describes the step wise work procedure to carry out the Erection work of 11-132 / 220 / 400 / 765 kV D/C, 800 kV HVDC or other kind of Transmission Line work in planned and controlled manner with reference to the drawings, technical specification and standards.

SCOPE:

This includes Tower Erection for all Types of Towers substructure works as indicated on Technical Specification / Drawing. The work shall be carried out in accordance with the specification and corresponding approved drawings.

EQUIPMENT:

- Derrick Pole
- Poly Propylene Ropes - 12 to 32 mm dia. (Depending on the requirement)
- Winch and Tirfor
- Chain blocks, Single way Pulley, Hammer, Ring Spanner, D Spanner, Box Spanner, Drift Pins
- Safety Belts
- Helmets
- Crow Bar
- Portable Welding Machine
- Mobile Crane

CONSTRUCTION SEQUENCE:

The later stated construction sequence is followed for the complete erection of tower, for which certain checks are necessary which are as under stated.

- Material is to be sent to the sites of erection (as per tower schedule) from store with proper indent.
- Indent shall contain the following information –
- Type of tower
- No. of towers.
- Extension, if any
- Type of tower to be erected shall be identified from the Foundation check report / Tower schedule & the same to be sent to the required location.
- Site to be visited for checking the condition (accessibility of vehicles, water level, ROW issue, etc.)
- Forecast for weather conditions to be checked.
- Checking of foundation oldness with respect to the foundation report.
- Towers shall be erected after the concrete is at least 14 days old, but a gap of 28 days shall be preferred. (IS5613-3-2 14.1). Unless special procedures or technique are followed for early erection.

METHODS FOR ERECTION

Towers shall be erected by any suitable method in the sequence best adapted to the equipment, workers' experience and site conditions which will not overstress structure members.

Generally, there are three main methods of erection of steel transmission towers which are described as below:

1) Air Erection (Erection by Helicopter / Drone)
2) Erection thru Mobile Crane
3) Manual Erection with Gin pole / Derrick.

Manual Erection by Gin Pole

This method contains erection of tower by using a gin pole & then lifting the parts or panels accordingly.

A gin pole is a boom of steel or aluminium pipe, wood pole or latticed truss secured at its base and usually inclined at a slight angle to the vertical. Generally, the lifting is done in any or combination of the two ways.

1) Built Up or Piece Meal Method

This method is most commonly used for the erection of 132 kV, 220 kV and 400 kV transmission line towers due to the following advantages:

- Tower materials can be supplied to site in knocked down condition, i.e., in pieces which facilitates easier and cheaper transportation.
- It does not require any heavy machinery such as cranes, etc.
- Tower erection activity can be done in any kind of terrain and throughout most of the year.
- Availability of workmen at cheaper rates.

This method consists of erecting the tower member by member.

The tower members are first set out and kept on the ground serially according to erection sequence to avoid time loss due to searching for them as and when required. In order to maintain speed and efficiency, a small assembly party can be sent ahead of the main erection gang for sorting out the tower members, keeping the members in correct position on the ground and assembling those panels on the ground which can be erected as a complete unit. The main corner leg members are prepared by fitting all cleats / plates for joints & bracings and step bolts.

The erection progresses from the bottom upwards. More than one leg section of each corner leg may be bolted together at the ground and erected in case they are short in length and light in weight. The main legs of the tower to be attached to the stub would be lifted by individual pieces and fixed with the stubs using the cleats, plates and bolts as per the drawing.

Since the legs are not self-supported at this stage, they would be anchored individually using guyed ropes diagonally. After erections of each leg ensure that the guy must be supported by 32mm crowbar & the angle of guy must be 30°-45° degree from horizontal. After this the lattices & bracings are lifted and joint with each other. This completes erection of base structure (leg extension or body extension).

Then the gin pole is to be attached to a suitable corner. With the help of hook provided on gin pole's base the leg & pole are fixed together on a support strut. Proper care shall be taken to provide soft/cushioning material between the pole & leg member to avoid abrading of galvanizing due to friction & pressure.

The top of a single gin pole is kept in the centre of the structure by suspending it from the leg members at any elevation using guys & temporary ground anchors. Two wire-guys about 60° to 90° apart in the plan view are attached to the top of the gin pole to resist or support the load to be lifted.

For safety, a third, and preferably a fourth guy, is installed in front to prevent the pole from falling over backward in the event of an unexpected impact or the sudden release of load. It is recommended to use 10t capacity turn buckle at the guying support. For smaller base towers / vertical configuration towers, one derrick / gin pole is used. For wide based towers and if one

assembled section / panel of the tower is to be erected, then two derricks / gin poles are placed, one each on the top of diagonally opposite corner legs.

A rope is passed thru the pulley block attached to the top end of the gin pole & other end from the pulley block affixed to the bottom of stub. The free end at bottom of stub is tied to the winch for pulling & the other end is left free for clamping to the members to be lifted.

First, the leg members of the second section are hoisted and assembled. The temporary rope guys are shifted to the legs of the second section when they are being raised for erection. The legs of the second section / storey are kept in position by fixing the temporary rope guys. The bracings of the second section are then hoisted and assembled.

The derrick is then shifted to the corner leg member on the top of the second section to raise the parts of third section of the tower in position for assembly. Derrick(s) / Gin pole(s) and the temporary rope guys for the leg members are thus moved up as the tower is built up. This process is continued till the complete tower is erected.

Cross - arms are assembled on the ground. The bird guards and hangers for suspension towers are fitted on the cross - arms. A rope is passed through a pulley fixed on the tower peak. The cross - arms are raised up with this rope and fixed to the main body of the tower.

For heavier towers, a small boom is rigged on one of the tower legs for hoisting purposes, the members / sections can be hoisted either manually or by pulling with a winch machine operated from the ground

2) SECTION METHOD

The major sections of the tower are assembled on the ground and the same are erected as units. The derrick / gin pole used is approximately 10m long and is held in place by means of guys on the side of the tower to be erected.

The two opposite sides of the tower section of the tower are assembled on the ground. Each assembled side is then lifted clear of the ground with the derrick / gin pole and is lowered into position on bolts to stubs or anchor bolts. One side is held in place with props or rope guys while the other side is being erected. The two opposite sides are then laced together with cross members and bracings / diagonals, and the assembled section is lined up and made square to the line.

After completing the first section, the derrick / gin pole is set on the top of the first section. The derrick / gin pole is made to rest on a strut of the tower immediately below the leg joint. The derrick / gin pole has then to be properly guyed into position.

The first face of the second section is raised. To raise the second face of this section, it is necessary to shift the foot of the derrick / gin pole on the strut of the opposite side of the tower. After the two opposite faces are raised, the bracings on the other two sides are fitted and bolted up. The last lift raises the top of the towers. After the tower top is placed and all side bracings have been bolted up, all the guy are removed except the one which is to be used to lower the derrick / gin pole.

Sometimes, one whole face of the tower is assembled on the ground, hoisted and supported in position. The opposite face is similarly assembled and hoisted and then the bracing angles connecting these two faces are fitted.

The cross - arms are assembled and erected in the manner given above.

TIGHTENING AND PUNCHING OF BOLTS AND NUTS:

Once the entire tower is installed, the next would be to set out a team for the tightening of all the bolts and also, to ensure that all the members are in place.

All empty holes are to be filled in with nut and bolt of appropriate size and a spring washer.

All nuts shall be tightened properly using correct size spanners.

Before tightening it should be seen that filler washers and plates are placed in relevant gaps between members, bolts of proper size and length are inserted, and one spring washer has been inserted under each nut. In case of step bolts, spring washer shall be placed under the outer nut.

The tightening shall progressively be carried on from the top downwards, care being taken that all bolts at every level are tightened simultaneously.

It may be better to employ four persons, each covering one leg and the face to his left.

The threads of bolts projecting outside nuts shall be punched at three positions on the diameter to ensure that the nuts are not loosened in course of time & on the treads of the bolts deep enough not to give room of loosening under any circumstances.

Suitable punches to create three impressions must be used. This will be implemented till the bottom belt level.

If during tightening a nut is found to be slipping or running over the bolt threads, the bolt together with the nuts shall be changed outright.

FINAL INSPECTION

Even after the full completion of the erection of tower, implement a process of checking the same, section wise before the tacking welding works to ensure that the tower is in perfect condition for taking the loads during the stringing operations.

APPENDIX 3B- STANDARD OPERATING (WORK) PROCEDURE STRINGING

PURPOSE:

This document describes the step wise work procedure to carry out the stringing work of 132 / 220 / 400 / 765 kV D/C, 800 kV HVDC or other kind of Transmission Line work in planned and controlled manner with reference to the drawings, technical specification and standards.

SCOPE:

This includes Tower Erection for all Types of Towers substructure works as indicated on Technical Specification / Drawing. The work shall be carried out in accordance with the specification and corresponding approved drawings.

EQUIPMENT:

- Tensioner & Puller
- Rollers
- Traveler
- Reel Stand
- Pilot Line Winder
- Swivel
- Running Board
- Theodolite
- Crimper
- Discharge rods
- And any other equipment / accessories required for safe handling & work purpose

PROCEDURE:

INSULATOR HOISTING:

- Ensure complete and apposite assembly of insulator with accessories as per the approved drawing on the ground before lifting.
- Ensure that the assembly is done on clean and dry surface
- Ensure that no damaged insulator is taken for assembly.
- Ensure insulator handling as per recommended by the OEM (Original Equipment Manufacturer)
- Clean each insulator before hoisting, in such a manner that it will not scratch damage or spoil the surface of the insulator, but in no case, oil should be used for cleaning.
- The corona rings shall be fully installed on their respective hardware before such hardware or insulator assembly is installed on the structure as per requirement.
- The insulator assembly shall be attached to the structure as indicated on the applicable drawing.
- Once it reaches its position it should be firmly fitted as per drawing.
- An insulator consisting of multiple insulator units, which shall be supported and protected during installation to prevent damage.

PRE-REQUISITE ACTIVITIES

Site Selection –

- Sites are to be selected keeping in view the accessibility of site for pullers, tensioners etc.
- Choose equipment location such that the sub structures shall not be overloaded.
- Drum length for conductor/OPGW/Earth wire should be considered before selection of the stringing section.
- Splicing position is to be considered depending up on the drum length, position of tower & tower access.
- A detailed patrolling of the site is to be done to know the condition of soil especially during

rainy season.
- Clear all the area from obstacles.

Government Clearance–

- Ensure that a proper application is given to the section in-charge of electricity distribution division to obtain
- A shutdown where stringing work encounters live lines.
- After obtaining this, it should be sent to the corresponding substation for obtaining the shutdown.

Route Clearing–

- Trees and tall scrubs shall be cleared on either side of the center line of the route as per ROW clearance based on the voltage level.
- In addition, tall trees outside the area, of such height that they could fall within three meters of conductors shall be cut down after obtaining necessary permission. Before commencement of any tree cutting operation proper approval from authorized department has to be taken.

Resources Accumulation–

- Ensure that every tool and tackle that is required to carry out the work is available and in good working condition.
- Ensure the equipment (puller, tensioner etc.) are in good condition and with a valid test certificate.
- Ensure skilled manpower is available.
- Ensuring the proper drum schedule so that unnecessary mobilization of conductor drums / earth wire drums may be avoided to minimize the damage risk factor.
- Ensure availability of stringing material (conductor, crimper, traveler etc.)

Reinforcement of End Support–

- Double stays are provided on all cross arms and single stay is provided on the peak(s) of the angle / section towers.
- Anchor spikes/blocks have to be positioned adequately away from tower base, so that it is not exceeding 45° with horizontal (ground) as far as the topography permits the same.
- Earth anchors of sufficient capacity to be used for providing back stay for the towers.
- Steel stay wires are fixed on the cross arms / peaks using D – shackles and pulled up to the stay pit. They are connected to the stay lead from the pit through a turnbuckle using bulldog clamps.
- The turnbuckle is then tightened to a tension sufficient to balance the load which will be imposed on the cross arms / peak(s) when stringing is carried out on the other side of the tower.

INSTALLATION OF TRAVELER/ROLLER/RUNNING BLOCKS

- Install rollers (single/triple sheave) directly to the insulator in case of suspension tower for single conductor.
- Rollers are to be connected directly to yoke plate for V Strings.
- For bundle conductors travelers must be installed to the end of the insulator (suspension).
- For angle towers travelers are to be installed with a string attached to the cross arm. If substantial line angles are involved, two rollers in tandem may be required to reduce the bending radius of the conductor or the load on each traveler, or both. The running blocks shall be suspended in a manner to suit the design of the cross-arm.
- All running blocks especially those eat the tensioning and, will be fitted on the cross-arms with jute cloth wrapped over the steel work and under the slings to avoid damage to the

slings as well as to the protective surface finish of the steel work. The rollers/travelers shall be having a groove to accommodate a semicircular section of conductor and larger than the diameter of the conductor/earth wire with enough space for free movement of the conductor wire inside it, so that it does not slip over or rub against the sides.

- The rollers/traveler's groove shall be lined with hard rubber or neoprene to avoid damage to conductor and shall be mounted on properly lubricated bearings.

STRINGING OF CONDUCTOR

Usually there are 2 methods used for stringing the conductors and ground wires as stated below.

a) Slack or Layout Stringing (Installation by Pulling Lines).

b) Tension Stringing.

Slack or Layout Stringing (Installation by Pulling Lines)–

In this method, the conductor reel is carried along the line on a vehicle and the conductor is deposited on the ground. The conductor reels are positioned on reel stands mounted on a transporting vehicle at the start of stringing section.

The conductor is unreeled from the shipping reel & dragged along the ground by means of a vehicle or pulling device. Braking device is normally provided to prevent overrunning and backlash. When the conductor reel is carried past a supporting structure, pulling is stopped and the conductor is placed in the travelers attached to the structure before proceeding to the next structure.

The conductor is then reattached to the pulling equipment and pull is continued till the next structure. This method is generally not recommended due to the damage to the conductor surface from dragging over ground, though it can be used where pulling equipment (tensioner, puller etc.) can't be moved on the site with permission from the customer.

Tension Stringing–

This method is generally used preferred for all type of transmission line stringing work. Using this method, the conductor is kept off the ground thus minimizing the damage caused by friction. The following steps are to be considered for this type of stringing.

Equipment/Material Transportation & Storage:

- The material along with the equipment (like conductor drums, conductor bits, pullet, tensioner, pulling ropes, pilot wire etc.) shall be transported & stored with care.
- Planning to be done in advance so that the material & equipment are available at site before starting the work.
- For handling and installation of equipment the handling or user manual from manufacturer must be referred.
- Once the pull sections are identified the placement of the puller, tensioner, reel stand etc. can be done. The drum is placed at the selected site (with the space required for its location) so that the cable outlet is on the upper part and aligned with the planned laying direction.
- The drum must be located at a suitable distance from the tensioner to allow enough fleet angles for the conductor leaving the reel and entering the bull wheel of the tensioner, so that no damage or scuffing of the conductor can occur.
- The lifting components usually used are hydraulic jacks and a bar with the suitable dimensions inserted in the central opening of the drum. The drum must be located at a sufficient height from the ground for free rolling movement. Level of the surface should be such that while rolling movement of the drum due to conductor pull is done it should not be unbalanced. Care shall be taken to insure that the conductors from the reels carry no dirt.

Reels shall be properly cleaned before starting stringing operations for any line section. Before placing the drum reconfirm the length.

- Either the puller & the tensioner must be placed at a minimum distance from the tower equal to or more than twice the tower's height at respective positions. The tensioner as well as the puller should be placed aligned with the conductors. Tensioner machine will be anchored using spikes driven in the ground to counter the pull force. Care will be taken to ensure the Tensioner is positioned on almost level ground level and also at minimum off-set from center line as far as possible.
- Care has to be taken to minimize the angle of pull line with a maximum limitation of thirty degree from center line axis of stringing section.
- All the tools & tackles i.e. Pulleys, Anti-Twisting devices, swivel, pulling grip, clamps & suitable pulling ropes used must be placed near to the working area.
- Temporary electrical grounds shall be placed at both ends of the section and at intervals along the line, which is under construction. The grounding sets installed at both ends of the section shall remain in place until the completion of the work and shall be removed as the last phase of the clean-up. Hot stick shall be used for installing and removing the grounding sets.
- All temporary grounds installed for protection shall be clearly visible for inspection and shall be flagged by use of a red cloth placed at the point of grounding.
- All pulling and tensioning equipment shall be bonded and effectively grounded with approved type driven grounds securely attached to the equipment. At least two driven grounds shall be used at both the pulling and tensioning setup. All conductive parts of the tensioning setup and equipment shall be operated from grounded or insulated platform.
- All existing lines, which are de-energized for crossing, shall be short circuited and grounded at each side of the crossing. Use of discharge rod is necessary at both the ends of a line crossing.
- All grounds, except those placed at both ends of the section, and red flags shall be removed when they are no longer needed for protection. Guy wire or temporary guy wire shall not be used for grounding.
- The pulley block on each tower must be earthed and grounding roller to be used on drum side to ensure grounding of any induction current developed during installation.
- Communication will be established between winch and tensioner area and at designated points along pulling section by walkie-talkies. It is recommended to provide Green / Red flag in each & every tower of the stringing section.
- For stringing of bundled conductors with running board, it will be desirable to observe the running board as it passes through each traveler so in case of any blockage the observer can communicate to the puller & tensioner end. A back up communication system must be available during actual stringing, in case if one of it fails during the work.

Paving Out of Conductor

A pilot wire is first paved out by passing through the rollers / travelers fixed on the cross arms. The Supervisor will confirm if all pilot wires are positioned in the rollers and that the connector is properly secured. Pilot wires are pulled in under tension. The pilot wire is connected to a single conductor through swivel link, or to bundle conductors through swivel links thru woven grip and a running board, sometimes pilot lines are used to pull a heavier pulling line which in turn is used to pull the conductors.

The conductors shall be run out of the drums from the top in order to avoid any damage due to chafing. On confirmation of above, pulling will be started, slowly but steadily by synchronizing the

operation of Puller and Tensioner, through radio communication. Conductor and earth wire will be kept off the ground and other obstructions by controlled tension at any time of the operation.

The spinning of the conductors and ground wires shall be prevented during stringing. The conductor shall be continuously observed for loose or broken strands or any other damage. The maximum tension imposed on a conductor during stringing operations shall not exceed than that necessary to clear obstructions on the ground.

In general stringing tension of about one-half of sagging tension is a good criterion. The sequence of running out shall be from top to downwards, that is, the earth wire shall be run out first, followed by the conductors in succession. Unbalances of loads on towers shall be avoided as far as possible.

Outer phases of line conductor-shall be strung before the stringing of the middle phase is taken up. Adequate steps shall be taken to prevent clashing of sub-conductors from paving out to the installations of the spacers/spacer dampers.

Care shall be taken that both sub-conductors of a bundle are from the same conductor supplier and-preferably from the same batch. When approaching end of a drum length at least three coils shall be left then the stringing operations are to be stopped. These coils are to be removed carefully, and, if another length is required to be run out, a joint shall be made as per the recommendations of the conductor manufacturers. It is recommended that the pulling to be continued until the conductor end is approximately 5 meters through winch tower, in order to facilitate sagging and tying in with tower cross arm.

It is recommended that the speeds of 3 – 4 km / hour should be maintained so as to provide a smooth passage of the running board or connecting hardware, or both, over the travelers. Slower speeds may cause significant swinging of the traveler and insulator hardware assemblies. Higher speeds may create a potential hazard of greater damage in case of a malfunction.

Hold-down blocks or similar devices will be used to uplift locations. Full tension joints shall be pressed during paying our and covered with joint protectors which will be removed at the end of the pull before sagging.

Splicing/Joints

All the joints on the conductor and earth wire shall be of compression type, in accordance with the recommendations of the manufacturer for which all necessary tools and equipment like compressors dies process, etc., shall have to be arranged in advance.

Each part of the joint shall be cleaned by wire brush to make it free of rust or dirt, etc. and properly greased with anticorrosive compound before the final compression is done with the compressors. All joints or splices shall be made at least 30 meters away from the structures.

No joints or splices shall be made in spans crossing over main roads, railways, small rivers in tension spans. Not more than one joint per sub-conductor shall be allowed in one span. The compression type fitting used shall be of self-centering type or care shall be taken to mark the conductors to indicate when the fitting is centered properly.

During compression or splicing operation, the conductor shall be handled in such a manner as to prevent lateral or vertical bearing against the dies. After pressing the joint the aluminium sleeve shall have all corners rounded, burrs and sharp edges removed and smoothened.

Considerations on Crossings

Scaffoldings are to be used wherever there is road crossing, line crossing, railway lines etc. are to be crossed during the stringing operations. It is to be ensured that the other work (viz. road traffic flow, etc.) isn't affected due to stringing of the tower.

It is to be ensured that the scaffolding provided for the crossing is of adequate strength so as to bear the loads of stringing operation.

Ensure that the shutdown permission is obtained from the concerned authority in case of electric line crossing. The shutdown procedure as stated below shall be followed.

- Ensure that the DB is switched off with a person present at DB all time possessing communication equipment (two-way radios/mobile).
- Ensure that for each line conductor there are 2 discharge rods available for shutdown.
- Electrical rubber hand gloves with rod for discharging cable fitting should be present at the site/location.
- First grounding/earthing of the mild steel (MS) rod should be done as shown overleaf. Then the cable to be earthed to the earthing rod. Then one by one discharge cables to be tightened to the electrical lines/phases with the help of discharge rods.

All the shutdown procedure form/ Permit to work form should be submitted by the supervisor/Engineer.

Sagging

Sagging processes consist of sag matching with the sag details mentioned in sag chart. The following considerations are to be made before sagging.

- Regulating spans or sag sighting spans identified.
- Sag Section.

Sagging is generally carried out by Sagging winch and a 4 way + 4-way pulley arrangement.

One steel wire rope lead is passed through an equalizing pulley, of diameter equal to the sub-conductor spacing, and its ends are connected to both the come along clamps on the conductors. This is done so that the tension on both the conductors remains the same. The equalizing pulley is connected to one end of the pulley system. The other end of the pulley system is connected to the dynamometer. The double tension hardware is hoisted and anchored on the cross arm. The dynamometer is connected to the yoke plate of the double tension hardware.

The running blocks, when suspended from the transmission structure for sagging shall be so adjusted that the conductors on running blocks will be at the same height as the suspension clamp to which it is to be secured.

Two leads and two pulley systems, one for each conductor, can be used in place of equalizing pulley. Both the pulley systems are connected to the yoke plate of the double tension hardware and tensioned together one by one as shown in following figures. However, dynamometer is used only on one conductor and the sag on the other conductor is matched with the sag of the first conductor.

A come along clamp is fitted on each rough sagged conductor at a distance from the tower on which the final sagging is being carried out. The come along clamp is then connected to the pulley arrangement which is being used for final sagging through a steel wire rope which is generally referred to as "lead".

The length of this lead is such that, after final sag, the come along clamp remains far enough from the tower so that the loose portion of the conductor on the tower side can be pulled up to the cross arm for the purpose of measurement.

Now the tensioning is done in the wires so as to provide final sag, which is measured to complete the sagging of conductor/earth wire/OPGW. The conductors shall be pulled up to the desired sag and left in running blocks for at least one hour after which the sag shall be rechecked and adjusted. If necessary, before transferring the conductors from the running blocks to be suspension clamps.
The conductors shall be clamped within 56 hours of sagging in. The sag will be checked in the first and the last span of the section in case of sections up to eight spans and in one intermediate span also for sections with more than eight spans. The sag shall also be checked when the conductors have been drawn up and transferred from running blocks to the insulator clamps.

Clipping In

Clipping of the conductors in position shall be done in accordance with the recommendations of the manufacturer. Conductor shall be fitted with armour rods where it is made to pass through suspension clamps.
The jumpers at the section and angle towers shall be formed to parabolic shape to ensure maximum clearance requirements. Pilot suspension insulator string shall be used, if found necessary, to restrict the jumper swings to the design values. The security clip shall be properly opened and sprung into position.

Fittings/Accessories Installation

Spacers, spacer dampers, vibration dampers and other conductor and earth wire accessories shall be installed as per the design requirements and respective manufacturer's instructions. Spacers shall be fitted within 24 hours of the conductor clamping.
While installing the conductor and earth wire accessories proper care shall be taken to ensure that the surfaces are clean and smooth and no damage shall occur to any part of the accessories. Fasteners in all fittings and accessories shall be secured in position using torque wrench. Spacing bicycle/ trolley may also be used for fixing conductor accessories.

Recommendations for Sagging of the OPGW Cables:

The specific recommendations for OPGW are as follows
At the time of sagging, the attachment fittings must also be installed to prevent damage to the OPGW cable. While holding of OPGW wire, exact size groove type clamp should be used for holding the rough sag load of the OPGW wire. Over sagging for OPGW wire should not be done, as per sag chart only load should be taken to avoid damage to the fibre inside & earth peak bend.
After completion of sagging and clipping, the surplus OPGW is to be laid temporary on the tower body in coil (Diameter of coil is approximately 1.0 - 1.5 m) and fixed on the tower. It is important that precautions must be taken to prevent any damage to OPGW.
While connecting the OPGW to down lead clamp bending radius should be maintained as mentioned above otherwise fibers inside OPGW may get damage. Sealing of both ends to be done properly of OPGW cable, if Splicing / jointing work is not under progress.
Ensure that the 15–20-meter extra cable should be kept at both ends in addition to the tower height. Surplus length of OPGW is necessary to lead down from the strain clamp on the top of tower to the joint box along with the arm and tower structures. The position of joint box is near the

bottom cross-arm and excess OPGW shall be coiled in such a way that the OPGW remains above the bottom cross- arm of the tower.

After splicing, each joint is to be optically verified using OTDR in order to ensure that the attenuation values are within the required margins.

Post Installation Tests/Checks

The conductor & OPGW is required to be tested for continuity, attenuation values etc. tests as required by client after completion of final sagging.

Conductor

- Continuity test are carried as per the client's requirement for ensuring that there is proper continuity and there is no breakage in the conductor.

OPGW

- The OPGW is verified optically using OTDR in order to ensure that the attenuation values are within the required margin. Also, the values are matched with the values obtained before installation & after installation.

TRANSPORT, LOADING, UNLOADING AND STORAGE:

The drums should always be transported in vertical position with the cable ends fixed to prevent cable from slackening. All of the staves and safe guards should be maintained until the drums are situated for immediate installation.

After the transport, the drums should be inspected to verify that they have not been damaged and that none of the staves and / or safeguards is broken.

The drums should never, in any case, be thrown from the lorry during unloading, or moved by uncontrolled rolling. Loading and unloading are performed so that the drum remains in vertical position and the sides of the drum are not damaged by using suitable method.

The direction of the drum turns should follow the instruction of the mark on the drum. In any case the drum should not be stored horizontally. The ends of the cable should be sealed to prevent water penetration.

The drums can be moved by rolling a short distance ensuring that there are no objects that may damage the staves. The direction in which the drum turns should be the same as that in which the cable is wound during manufacture. If available the handling and storage should be done as per the recommendations of the OEM.

The drum should not be stored on its side under any circumstances whatsoever. The ends of the cable should be sealed to prevent water penetration. The drums should be stored on flooring that is strong enough to prevent sinking. The drums should be stored to facilitate handling and loading. They should be located far from any activity that may damage them.

APPENDIX 4A: SAMPLE ATTENDANCE SHEET OF PUBLIC CONSULTATION

ASSAM INTRA-STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT

Attendance Sheet of Public Consultation

Venue: Kachubari Village. Date: 7/11/2024

SL. No.	Name	Sex	Occupation	Signature
1	Ranjan Das	M	Business	
2	Nayan Das	M	Farmer	
3	Suresh Mandal	M	Farmer	Suresh Mandal.
4	Nitu Rava	M	Farmer	
5	Kamal Das	M	Business	
6	Himanshu Das	M	Business	Himanshu Das.
7	Amal Das	M	Business	

ASSAM INTRA-STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT

Attendance Sheet of Public Consultation

Venue: Shijguri Village Date: 19/11/2024

SL. No.	Name	Sex	Occupation	Signature
1	Niranjan Rava	M	Farmer	Niranjan Rava
2	Rinta Rava	M	Govt. Service	
3	Sachin Boro	M	Business	Sachin Boro
4	Sintu Boro	M	Business	Sintu Boro
5	Kulen Boro	M	Pvt Service	
6	Hriday Rava	M	Farmer	HIRDOY RAVA

ASSAM INTRA-STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT

Attendance Sheet of Public Consultation

Venue: Gopalpur Village

Date: 25/12/2024

SL. No.	Name	Sex	Occupation	Signature
1	Samir Boro	M	Business	সমির বোড়ো
2	Goutam Boro	M	Business	গৌতম বোড়ো
3	Bhupen Boro	M	Business	ভূপেন বোড়ো
4	Hakimohan Boro	M	Farmer	হাকিমোহন বোড়ো
5	Fulen Boro	M	Business	ফুলেন বোড়ো

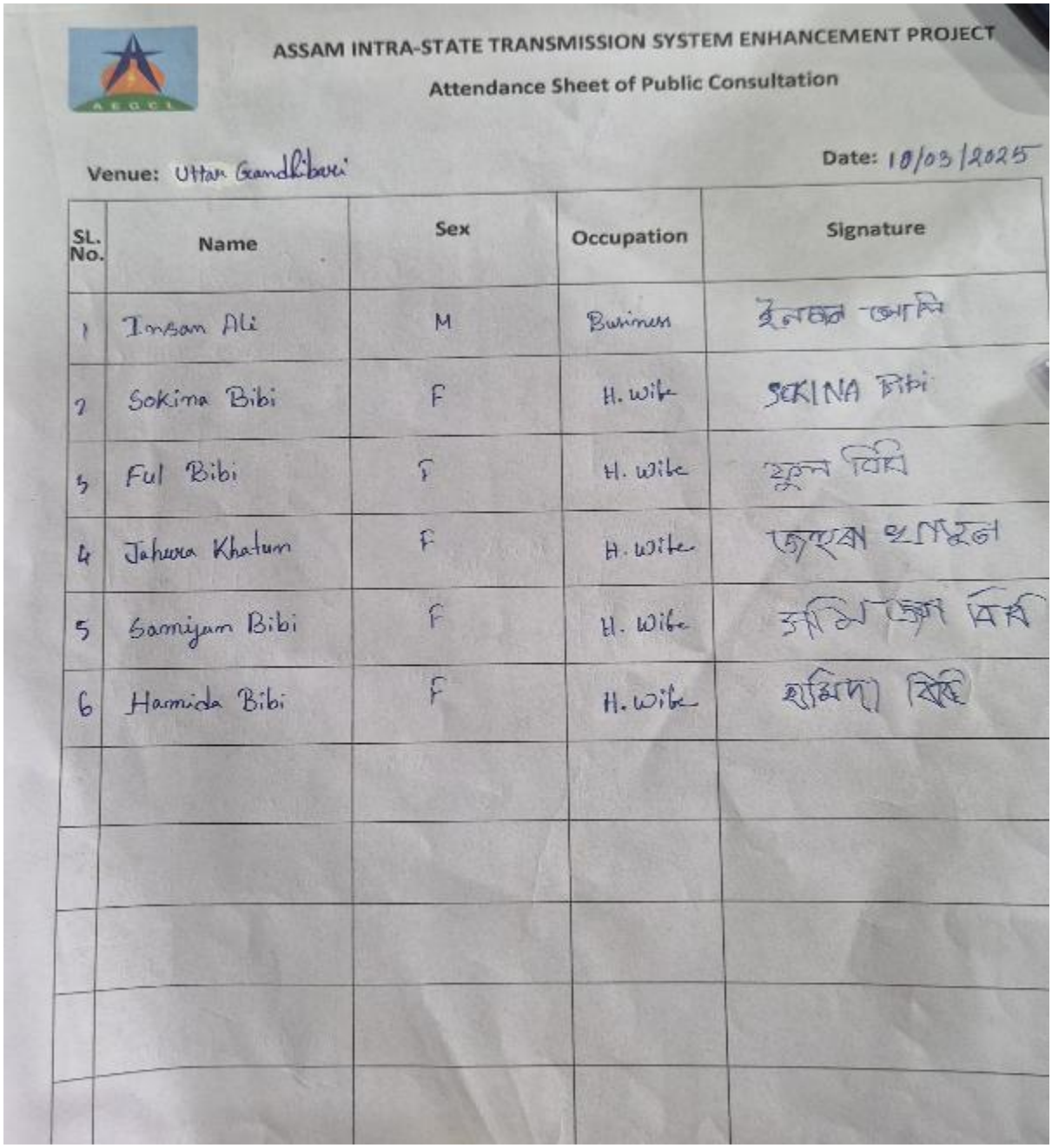
ASSAM INTRA-STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT

Attendance Sheet of Public Consultation

Venue: Hirayta Village

Date: 16/01/2025

SL. No.	Name	Sex	Occupation	Signature
1	Bobi Basumatari	F	Daily wage Labour	ববী বসুমতারী
2	Sushila Boro	F	Daily wage Labour	সুশীলা বরো
3	Nikala Rabha	F	"	নিকলা রাভা
4	Bijoya Rabha	F	"	বিজয়া রাভা
5	Sarada Rabha	F	"	সারদা রাভা
6	Sumati Rabha	F	"	SUMATI RABHA



ASSAM INTRA-STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT

Attendance Sheet of Public Consultation

Venue: Uttar Gandhibari

Date: 10/03/2025

SL. No.	Name	Sex	Occupation	Signature
1	Insan Ali	M	Business	ইনছান আলি
2	Sokina Bibi	F	H. Wife	SEKINA Bibi
3	Ful Bibi	F	H. Wife	ফুল বিবি
4	Jahura Khatun	F	H. Wife	জাহেরা খাতুন
5	Samijan Bibi	F	H. Wife	সমিজন বিবি
6	Hamida Bibi	F	H. Wife	হামিদা বিবি

APPENDIX 4B: SOME PHOTOGRAPHS OF PUBLIC CONSULTATION

At 220kV Rangia- Amingaon transmission line (Loop In/Loop out

Photo Plate 1: Public consultation at Kachubari village

Photo Plate 2: Public consultation at Kachukata Village

Photo Plate 3: Public consultation at Singibari village

Photo Plate 4: Public consultation at Simulbari village

Photo Plate 5: Public consultation at Dakhin Gandhibari

Photo Plate 6: Public consultation at Shijuguri village

Photo Plate 7: Public consultation at Kamarpara village

Photo Plate 8: Public consultation at Uttarbardal village

Photo Plate 9: Public consultation at Uttar Gandhibari village

Photo Plate 10: Public consultation at Nijbaruajhar village

Photo Plate 11: Public consultation at Halonbari village

Photo Plate 12: Public consultation at Gopalpur village

Photo Plate 13: Public consultation at Bhakati village

Photo Plate 14: Public consultation at Deulkuchi village

Photo Plate 15: Public consultation at Barghuli village

Photo Plate 16: Public consultation at Nijbaruajhar village

Photo Plate 17: Public consultation at Hiragata village

Photo Plate 18: Public consultation at Ghongaon village

Photo Plate 19: Public consultation at Dhukabari village

Photo Plate 20: Public consultation at jokmari village

APPENDIX 5: IFC BENCHMARK STANDARDS FOR WORKERS ACCOMMODATION

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 standards[7] 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.

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 standards[9] 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.

8. Ibid

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 to 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 accomodation 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. Hunter (2003), "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. Staff are trained on relevant rules and 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 6A: CONTRACTOR'S MONTHLY PROGRESS REPORT TEMPLATE

Monthly Progress Report for EPC
Assam Intra State Transmission System Enhancement Project
AIIB funded under AEGCL.
Govt. of Assam
Name of Month and Year

1. Project Details:

Sl. No.	Package	EPC Agency	Substations
Sl. No.	**Package**	**EPC**	**Transmission Lines**

2. Status of land details of GSS:

Sl. No.	GSS	Type of Land	Area (Hectare)	Status	References

3. Status of ESIA-ESMP

Sl. No.	GSS	ESIA-ESMP	CESMP

4. Legal Compliances Checklist:

Sl. No.	Indicators	Sub-station/Transmission Line Name-
1	Labour License	
2	BOCW License	
3	Water quality Testing from NABL Lab as per Standards	
4	Air Quality Testing from NABL Lab as per Standards	
5	Noise level testing from NABL Lab as per Standards	
6	Soil testing from NABL Lab as per Standards	
7	Ground water consent from CGBB, Assam	
8	DG Consent from PCB, Assam	
9	EHS Plan approval	
10	Grievance Redressed Register	
11	Labour camp facilities at site with signage	
12	Drinking water facilities at site and labour camp with signage	
13	Sanitation Facilities at sites and labour camp with signage	
14	Hygiene Facilities (Hand washing with Soap) at sites & labour Camp	
15	Safety Signage at the site	
16	Covid behaviour change communication signage	
17	Signage at main entry gate	
18	Use of PPE by the labour	
19	First aid kit for preliminary prevention & treatment	
20	Lightening Arrestor	
21	Chemical soak pit associated with Transformer for hazardous waste Management	
22	Rainwater Harvesting	

Sl. No.	Indicators	Sub-station/Transmission Line Name-
23	Solid Waste Management	

5. Detailed status of CTO/CTE, PUC etc.

Name of the documents	Site Name-
ESIA-ESMP approval	
CESMP approval	
Labour Licence	
Workmen Compensation Policy	
Erection all Risk policy	
Tree Cutting permission	
Ground water Extraction	
Borrow earth permission (EC)	
Permission for bricks (EC)	
Permission for sand (EC)	
Permission for Stone / Boulder (EC)	
CTE – Crusher	
CTO – Crusher	
Challan – Borrow Earth	

6. Present Status of Transmission Line of Package-

Present Status of Joint verification of landowner identification for Transmission Line under Assam Intra State Transmission System Enhancement Project (AIIB)									
Sl.No	Name of the proposed substation under AIIB project	Name of the proposed Associated Transmission lines under AIIB project	Name of the Circle & Division	Name of the Revenue Circle	Name of the Deputy Commissioner Office/District	Letter communicated to Circle Office for Joint verification of landowner identification with date	Reasons of delay for joint verification of landowner identification	Row Status	Remarks
1									
2									

7. Status of CPTD

Sr. No.	Line Name	Line Length As per LOA	Anticipated line length	Location as per LOA	Anticipated locations	Check Survey Approved	Total Locations As per Check survey	Location as per LSD Approval	Locations Hold up Due to forest	GM	Actual Locations for CPTD	Clear Front Locations for CPTD	Document collected till date	Document verified by C.O till date	Demand Note Submitted at JUSNL LOC	Locations Payment till date	Locations Payment Pending at JUSNL	Document pending till date	Locations pending for CPTD
1																			
2																			
Total for Pkg-																			

8. Accident Monitoring

Name of the Substation	No. of Injury	Description of the Injury	Treatment Given

9. Status of Grievance Received and their Redressal (Public)

Sl. No.	Complain/s	Location/s and Date/s of Complain	Description of Grievance /Complain	Timeline*	Remarks
1					
2					
3					

10. Status of Grievance Received and their Redressal (Labour)

Sl. No.	Complain/s	Location/s and Date/s of Complain	Description of Grievance /Complain	Timeline*	Remarks
1					
2					
3					
4					

11. Training–

12. Conclusion

Appendix (Photograph & Checklist)

APPENDIX 6B: PMC MONTHLY PROGRESS REPORT TEMPLATE

1. INTRODUCTION

2. DETAILS OF SUB-PROJECT

Circle	
Divisions	
Location (names of areas with GPS Coordinates)	
Total Geographical area	
Components of the package (detail all components)	
Contract start date	
Contract completion date	
Other details specific to the package	

3. COMPREHENSIVE DETAILS OF SITE VISITS CARRIED OUT IN PACKAGE- XX

Sl. No.	Sub-projects	No. of visits till date	Date of visits carried out in the month of XX	Total no of visit in the month of XX	Remarks
1					
2					

4. OBJECTIVE

5. MAJOR OBSERVATIONS AND RECOMMENDATIONS

Sl. No.	Date of site visit	Details of Officials Name	OBSERVATIONS	RECOMMENDATIONS
			•	•

6. COMMUNITY CONSULTATION

Date	Total No. of Participants	Total No. of Female Participants	Issues raised by the community	Suggestions and Recommendations provided
---	---	---	---	---

7. GRIEVANCE REDRESSAL MECHANISM

8. GRIEVANCE REDRESSAL COMMITTEE

Sl. No.	Name and details	Designation	Status in the GRC (Convener/ Member)	Contact Details
1				
2				

9. DETAILS OF PUBLIC GRIEVANCES

Details of Grievance	Grievance raised by and	Date of Grievance	Date of Grievance	Steps taken to resolve the grievance	Remarks

	medium	received	resolved		
---	---	---	---	---	---

10. DETAILS OF LABOUR GRIEVANCES

Details of Grievance	Grievance raised by and medium	Date of Grievance received	Date of Grievance resolved	Steps taken to resolve the grievance	Remarks
---	---	---	---	---	---

11. TRAININGS

Appendix-

APPENDIX 6C: SEMI ANNUAL MONITORING REPORT TEMPLATE

SEMI ANNUAL ENVIRONMENTAL AND SOCIAL MONITORING REPORT

ASSAM INTRA-STATE TRANSMISSION SYSTEM ENHANCEMENT PROJECT

SUBMITTED TO

ASIAN INFRASTRUCTURE INVESTMENT BANK

SUBMITTED BY

ASSAM ELECTRICITY GRID CORPORATION LIMITED

TABLE OF CONTENTS

List of Tables

List of Figures

Figure Number	Particulars	Page Number

List of Appendices

Appendix Number	Particulars	Page Number

LIST OF ABBREVIATIONS

WEIGHTS AND MEASURES

EXECUTIVE SUMMARY

Following are the Key issue / gaps observed and suggested corrective action

Sl. No.	Key issue/ gaps observed	Suggested corrective action	Responsibility	Timeframe

1. INTRODUCTION

1.1 BRIEF PROJECT DESCRIPTION

Assam Intra-State Transmission System Enhancement Project

Figure –: Location map of Project

1.1.1 Details of Substations and Transmission Lines

Table –1: Details of Packages (Substations and Transmission Lines)

Package	Name of EPC Contractor	Scope of Work		Contract Award	Contract Effective Date	Location / Village / Town / Tehsil / District	Consignee / Concerned Division Official	Area as per Appendix-11 of ESMPF (in Hectare)	Area at present (In Hectare)	Slope/ Plain	Type of Land	Ownership
		S/S Details	Transmission line details in (km)									

1.1.2 Details of Transmission Lines

Table 2: Details of Transmission Lines

Line length (in km) as per ESMPF	Line length (in km) as per Survey Report	No. of Towers	Right of Way (ROW in mts)	No. of Affected Villages	Names of the Affected Village

1.2 PROJECT PROGRESS STATUS AND IMPLEMENTATION SCHEDULE

Table 3: Physical and Financial Progress Status of Project during the reporting period

Sl. No.	Pkg No.	Effective/ Schedule Completion date	Agency	Order Value (INR Cr.)	Sub Station/ Transmission Line Name	Overall Physical Progress till XX in %	Financial Progress till XX in %	Ongoing work status

1.3 BRIEF PROGRESS SATUS OF THE PROJECT

Table: Brief Progress status of the project

Project Component Stage	Progress Status {not yet started; on-going; completed}	Percent Completed	Remarks

2. COMPLIANCE WITH APPLICABLE REGULATIONS/STANDARDS

2.1 ESIA - ESMP documentation status of each package as per approved ESMPF

Table: ESIA - ESMP documentation status of each package as per approved ESMPF

Pkg. No	Location	Name of the EPC contractor	Status of ESIA-ESMP	Status of CESMP report package wise

Table: Status of E&S Semi Annual Monitoring Report

Sl. No.	Name of the report	Status of SAMR
		•

2.2 Mobilisation of E&S resources at each level i.e. PMU, PMC, and contractors

Table: Mobilisation of E&S resources at each level i.e. PMU, PMC, and contractors

Sl. No.	Name	Designation	Qualifications	Experience	Contact Details	Email ID
E&S staff of Project Management Unit (PMU)						
E&S staffs of Project Management Consultant (PMC)						
E&S staff of Engineering Procurement and Construction Contractors (as per CESMP)						
Package Name						

2.3 Compliance with Applicable Regulations/Standards

Table: Compliance with Applicable Regulations/Standards

Sl. No.	Regulations / Standards	Compliance Requirements under the Regulation	Compliance Status {complied; not complied; Not Arises (N/A) at the current stage of the project}	Remarks {provide details to show how compliance was achieved; or explain the corrective action done if there was non-compliance}

3. COMPLIANCE WITH ENVIRONMENTAL AND SOCIAL COVENANTS FROM THE AIIB LOAN AGREEMENT

Table: Compliance with Environmental and Social Covenants from the AIIB Loan Agreement

Schedule #, Para. #	Covenant	Compliance Status	Remarks

4. COMPLIANCE WITH THE CIVIL WORK CONTRACT AGREEMENT

Table: Compliance with the Civil Work Contract Agreement

Schedule #, Para. #	Relevant EHS Clauses	Compliance Status	Remarks

5. COMPLIANCE WITH ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Following are the Key issue/ gaps observed and suggested corrective action

Table: Key issue/ gaps observed and suggested corrective action

Sl. No.	Key issue/ gaps observed	Suggested corrective action	Responsibility	Timeframe
•				

Following are the key findings noted during the reporting period

Pkg	Location	Name of Contractor	Status of ESMP / CESMP implementation	Non-Compliance	Corrective Action Proposed	Photographs	Compliance against Corrective action Proposed

6. COMPLIANCE TO RESETTLEMENT ACTION PLAN AND TRIBAL PEOPLE'S PLAN (IF ANY)

Table: Compliance with Resettlement Action Plan and Tribal People's Plan

Sl. No.	Abbreviated Resettlement Action Plan (ARAP) and Tribal people's plan	Compliance Status {complied; not complied; n/a at current stage of the project}	Remarks {provide details to show how compliance was achieved; or explain the corrective action done if there was non-compliance}

7. SUMMARY OF MONITORING RESULTS

7.1 ENVIRONMENTAL AND SOCIAL MONITORING

Table: Package-wise Ambient Noise Level Monitoring Results

Name of Package	Name of Monitoring Station	Sound Parameters (dBA)				CPCB Ambient Noise Standards [Limit in dB (A) Leq]		Remarks
		Results (Baseline data) Limits in dB(A)		Limits in dB(A) / (Data generated for pre- monsoon season 2024)				
		Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	

7.2 Capacity Building Monitoring

Table: Details of Capacity building program

Sl. No.	Date	Topic of Training	Participant/ Organization	No. of Participant

7.3 Capacity Building on the safety inductions and meetings, including safety toolbox talks conducted during the reporting period

Table: Summary of the Capacity Building on the safety inductions and meeting including TBT

Sl. No.	Packages	Name of Substation	Numbers of Induction	Numbers of Toolbox Talk	Numbers of Training	Numbers of Mock Drill

7.4 Accident monitoring during the period of XXX

Table: Summary of the accident monitoring during the reporting period

Sl. No.	Packages	Name of Substation	Total numbers of accident occurred during XXX

7.5 Highlighted Actions

8. IMPLEENMTATION OF GRIEVANCE REDRESSAL MECHANISM AND COMPLAINTS RECEIVED

Table: Status of Grievance Received and their Redressal

Public Grievances

Sl. No.	Complain/s	Location/s and Date/s of Complain	Description of Grievance / Complain	Timeline*	Remarks	Sample Photographs

Labour Grievance

Sl. No.	Complain/s	Location/s and Date/s of Complain	Description of Grievance / Complain	Timeline*	Remarks	Sample Photographs

Summary table showing type and level of complaints (Labour Grievance)

• Sl. No	• Type of Grievance	• Package wise grievance received	Total No	• Level of Grievance

9. CORRECTIVE ACTION PLAN

Table: Key issues and Corrective Action Plan

Sl. No.	Key issues	Action Required	Responsibility	Target Date	Indicator of Compliance /Corrective actions plan

10. STATUS OF NON-COMPLIANCES FROM PREVIOUS MONITORING REPORT

Table --Status of the non-compliances and corrective actions proposed in the previous (XX) monitoring report.

Sl. No.	Key issues	Action Required	Responsibility	Compliance status on corrective actions of previous (x) monitoring report during the present reporting period.	Present Status

11. CONCLUSION AND RECOMMENDATIONS

Conclusion
Recommendations

Appendix

ESIA-ESMP implementation monitoring for Sub-station component

A. Site visit details for Substation

Package	Location	No. of Site visit	Date of Site Visit	Remarks

B. Site visit details for Transmission lines

Package	Location	No. of Site visit	Date of Site Visit	Purpose

C. Photographs of the Site visit

APPENDIX 7: WILDLIFE MONITORING CHECKLIST – OPERATIONAL PHASE (220 kV TRANSMISSION LINE) TEMPLATE

1. Bird Electrocution & Collision

- Regular inspection of towers and conductors for evidence of bird electrocution (scorch marks, carcasses).
- Monitoring for bird flight paths, especially during migratory seasons.
- Check effectiveness of bird diverters or flight diverters (visibility enhancers).
- Inspection of nesting activity on towers or poles.
- Maintain a log of species affected, location, and dates of incidents.

2. Elephant Movement and Corridor Interaction

- Mapping and regular verification of elephant corridors intersected by the transmission line.
- Observation and recording of elephant crossings near line towers and RoW.
- Monitor tower stability in areas prone to elephant movement (elephant rubbing or pushing).
- Ensure barrier-free movement through elevated sections or alternative passages.
- Engagement with forest department and local communities for real-time elephant movement alerts.

3. Mammal and Reptile Interference

- Regular patrols along the RoW to observe signs of mammal and reptile activity.
- Report and document wildlife mortality incidents (due to electrocution, entanglement, etc.).
- Inspect fence lines (if any) to ensure they do not restrict wildlife movement.

4. Vegetation and Habitat Monitoring

- Periodic assessment of vegetation regrowth in RoW to avoid trimming that may disrupt habitats.
- Monitor for spread of invasive species after RoW clearing.
- Ensure that habitat restoration (if applicable) near towers is progressing as per plan.

5. Community and Stakeholder Feedback

- Establish a mechanism for local communities to report wildlife sightings or incidents.
- Coordinate with forest/wildlife officials to share monitoring reports and get inputs.

6. Emergency Response Readiness

- Maintain a wildlife rescue and response contact list.
- Have SOPs in place for wildlife accidents or electrocution events.

7. Documentation and Reporting

- Maintain a Wildlife Monitoring Register with GPS-tagged records.
- Prepare and submit periodic reports (monthly/quarterly) to relevant authorities.
- Photographic evidence of wildlife sighting and incidents.

APPENDIX 8: ENVIRONMENTAL MONITORING TEST REPORT

ENVIRONMENTAL QUALITY MONITORING REPORT

Name of the Project: Construction of 400/220, 2X 500 MVA; 220/132 KVA, 2X 160 MVA and 132/33 KV, 2X50 MVA GIS at Rangia (Kumarikata) along with the associated Transmission lines with bay extension work at existing 132/33 kV Nalbari GSS- (Package G(R))

Assam Electricity Grid Corporation Ltd

Date of Sampling 25/10/2024-26/10/2024

SHYAMA POWER INDIA LTD.
H.No.21, P.B. ROAD, REHABARI, Guwahati, Kamrup Metropolitan, Assam-781008

Sampling & Analysis Done By:
M/s GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
GUWAHATI, ASSAM-781028

AMBIENT AIR QAULITY MONITORING

Date of Sampling 25/10/2024-26/10/2024
N:26°38'26", E:91°36'22"

RANGIA (KUMARIKATA) GIS SUB STATION

Sampling & Analysis Done By:
M/s GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
GUWAHATI, ASSAM-781028

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028, www.greentecheec.in
Telefax -0361 3501950 Mobile: 9435046677, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in
TC-14361

Format No.: GEEC/FM/48

TEST REPORT

ULR Number: TC143612400000270F					
Test Report No.:	GEEC/FL/22/2024/10/20		Date:	11/11/2024	
Customer Name	SHYAMA POWER INDIA LTD.		Lab. ID No.:	GEEC/AA/2024/10/20	
Address:	H.No.21, P.B. ROAD, REHABARI, Guwahati, Kamrup Metropolitan, Assam-781008		Name of the Project:	Construction of 400/220, 2X 500 MVA; 220/132 KVA, 2X 160 MVA and 132/33 KV, 2X50 MVA GIS at Rangia (Kumarikata) along with the associated Transmission lines with bay extension work at existing 132/33 kV Nalbari GSS- (Package G(R))	
Sampling Location:	400/220/132 KV RANGIA (KUMARIKATA) GIS SUB STATION, AEGCL, KACHUBARI, TAMULPUR, ASSAM-781368 N:26°36'26", E:91°36'22"		Date of Sampling:	25/10/2024-26/10/2024	
Ambient Temperature:	Max.	Min.	Humidity in %	Max	Min
	24.8	21.0°C		96	65
Wind Speed in Kmph:	Max	Min	Wind Direction	12 Hrs	18 Hrs
	9	5		NNE	NNE
Sampling Condition:	In GF/A, PTFE Filter Paper & Plastic Bottle		Date of Sample Receipt:	26/10/2024	
Monitored By:	Mr.Sanjib B.Rajkhowa		Test Start Date:	28/10/2024	
Equipments Details:	Fine Dust Sampler:APM-550 MFC (Sl.No. 421 DTK-2017) RDS: APM-460 (Sl.No.2196 DTK 2017)		Test End Date:	29/10/2024	

AMBIENT AIR QUALITY

Sampling and Analysis carried out as per GEEC/SOP/01

Sl. No.	Parameters	Unit	Results	Limits	Test Method
1	Particulate Matter (PM_{10})	$\mu g/m^3$	40	100	IS 5182(23)
2	Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	19	60	IS 5182(24)

Remark: .The parameters tested on the specific date are found to be within the NATIONAL AMBIENT AIR QUALITY STANDARDS, CPCB NOTIFICATION DATED 18TH NOVEMBER, 2009

Checked by:
Dr. Belinda Lahon
Quality Manager

Reviewed by:
Pranjal Buragohain
Authorised Signatory

* The results relate only to the item tested.
* The test report shall not be reproduced except in full, without written approval of the laboratory.
* The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

********** End of Report **********

Page1 of 1

NOISE LEVEL MONITORING

Date of Sampling 25/10/2024-26/10/2024
N:26°38'26", E:91°36'23"

RANGIA KUMARIKATA GIS SUB STATION

Sampling & Analysis Done By:
M/s GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
GUWAHATI, ASSAM-781028

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028, www.greentecheec.in
Telefax -0361 3501950 Mobile: 9435046677, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in
TC-14361

TEST REPORT

Format No:GEEC/FM/47A

ULR Number: TC143612400000271F			
Report No:GEEC/FL/22/NLM/2024/10/20		Date:	11/11/2024
Name of the Industry	SHYAMA POWER INDIA LTD.	Lab Id.:	GEEC/NLM/2024/10/20
Address	H.No.21, P.B. ROAD, REHABARI, Guwahati, Kamrup Metropolitan, Assam-781008	Name of the Projcet:	Construction of 400/220, 2X 500 MVA; 220/132 KVA, 2X 160 MVA and 132/33 KV, 2X50 MVA GIS at Rangia (Kumarikata) along with the associated Transmission lines with bay extension work at existing 132/33 kV Nalbari GSS- (Package G(R))
Noise Level Report			
Monitoring Location:	400/220/132 KV RANGIA (KUMARIKATA) GIS SUB STATION, AEGCL, KACHUBARI, TAMULPUR, ASSAM-781368 N:26°38'26", E:91°36'23"	Date of Monitoring:	25/10/2024-26/10/2024
Weather/Wind:	Partially Cloudy	Sound Level Meter	SL 4023 SD
Monitored By:	Mr. Sanjib B. Rajkhowa	Sl.No.	Q656054

Measurement Results (Day Time)

Sl. No.	Parameters	Unit	Results	Method	CPCB Limit as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Leq (dBA)
1	Leq	dB(A)	58.7	Ambient Noise GEEC/SOP/AN/01 Issue date 27/05/2017	CPCB Limit for Commercial Area: Day Time Leq < 65 Night time Leq < 55
2	Lmin	dB(A)	43.1		
3	Lmax	dB(A)	65.4		

Remark: The parameters tested on the specific date are found to be within the CPCB Limit for Commrcial Area

Checked by
Dr. Belinda Lahon
Quality Manager

Reviewed by:
Pranjal Buragohain
Authorised Signatory

The results relate only to the item tested.
The test report shall not be reproduced except in full, without written approval of the laboratory.
The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

Page 01/02

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028, www.greentecheec.in
Telefax -0361 3501950 Mobile: 9435046877, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in
TC-14361

TEST REPORT

Format No:GEEC/FM/47A

ULR Number: TC143612400000271F			
Report No:GEEC/FL/22/NLM/2024/10/20		Date:	11/11/2024
Name of the Industry:	SHYAMA POWER INDIA LTD.	Lab Id.:	GEEC/NLM/2024/10/20
Address	H.No.21, P.B. ROAD, REHABARI, Guwahati, Kamrup Metropolitan, Assam-781008	Name of the Projcet:	Construction of 400/220, 2X 500 MVA; 220/132 KVA, 2X 160 MVA and 132/33 KV, 2X50 MVA GIS at Rangia (Kumarikata) along with the associated Transmission lines with bay extension work at existing 132/33 kV Nalbari GSS- (Package G(R))
Noise Level Report			
Monitoring Location:	400/220/132 KV RANGIA (KUMARIKATA) GIS SUB STATION, AEGCL, KACHUBARI, TAMULPUR, ASSAM-781368 N:26°38'26", E:91°36'23"	Date of Monitoring:	25/10/2024-26/10/2024
Weather/Wind:	Partially Cloudy	Sound Level Meter	SL 4023 SD
Monitored By:	Mr. Sanjib B. Rajkhowa	Sl.No.	Q656054

Measurement Results (Night Time)

Sl. No.	Parameters	Unit	Results	Method	CPCB Limit as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Leq (dBA)
1	Leq	dB(A)	40.8	Ambient Noise GEEC/SOP/AN/01 Issue date 27/05/2017	CPCB Limit for Commercial Area: Day Time Leq < 65 Night time Leq < 55
2	Lmin	dB(A)	35.7		
3	Lmax	dB(A)	46.3		

Remark: The parameters tested on the specific date are found to be within the CPCB Limit for Commrcial Area

Checked by
Dr. Belinda Lahon
Quality Manager

Reviewed by:
Pranjal Buragohain
Authorised Signatory

The results relate only to the item tested.
The test report shall not be reproduced except in full, without written approval of the laboratory .
The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

********** End of Report **********

Page 02/02

SOIL SAMPLING

Date of Sampling 25/10/2024
N:26°38'25", E:91°36'23"

RANGIA KUMARIKATA GIS SUB STATION

Sampling & Analysis Done By:
M/s GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
GUWAHATI, ASSAM-781028

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028, www.greentecheec.in
Telefax -0361 3501950 Mobile: 9435046677, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in
TC-14361

GEEC/FM/47/B

TEST REPORT

ULR Number: TC143612400000272F			
Ref. No.:	GEEC/FL/32/2024/10/05	Date of Reporting:	11/11/2024
Customer Name:	SHYAMA POWER INDIA LTD.	Lab. ID No.:	GEEC/SOIL/2024/10/05
Customer Address:	H.No.21, P.B. ROAD, REHABARI, Guwahati,Kamrup Metropolitan, Assam-781008	Name of the Project:	Construction of 400/220, 2X 500 MVA; 220/132 KVA, 2X 160 MVA and 132/33 KV, 2X50 MVA GIS at Rangia (Kumarikata) along with the associated Transmission lines with bay extension work at existing 132/33 kV Nalbari GSS- (Package G(R))
Sampling Location:	400/220/132 KV RANGIA (KUMARIKATA) GIS SUB STATION, AEGCL, KACHUBARI, TAMULPUR, ASSAM-781368 N:26°38'25", E:91°36'23"		
Sample Description:	Soil	Date of Sampling:	25/10/2024
Sample Condition:	Marked & Sealed	Sample Drawn By:	Mr.Sanjeeb B. Rajkhowa
Sample Reciept Date:	26/10/2024	Sampling Method:	GEEC/SOP/03
Test Start Date:	28/10/2024	Test Completion Date:	02/11/2024

SOIL ANALYSIS REPORT

Sl. No.	TEST	UNITS	RESULTS	TEST METHOD
1	pH	---	4.86	IS 2720 Part 26
2	Electrical Conductivity	mS/m	110	IS 14767
3	Moisture Content	%	22.6	IS 15106
4	Organic Matter	%	2.6	IS 2720 Part 22

Checked by:
Dr. Belinda Lahon
Quality Manager

Reviewed by:
Pranjal Buragohain
Authorised Signatory

* The results relate only to the item tested.
* The test report shall not be reproduced except in full, without written approval of the laboratory .
* The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

********** End of Report**********

Page 1 of 1

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028. www.greentecheec.in
Telefax -0361 3501950 Mobile: 9435046577, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in

GEEC/FM/47/B

TEST REPORT

Ref. No.:	GEEC/FL/32/2024/10/05	Date of Reporting:	11/11/2024
Customer Name:	SHYAMA POWER INDIA LTD.	Lab. ID No.:	GEEC/SOIL/2024/10/05
Customer Address:	H.No.21, P.B. ROAD, REHABARI, Guwahati,Kamrup Metropolitan, Assam-781008	Name of the Project:	Construction of 400/220, 2X 500 MVA; 220/132 KVA, 2X 160 MVA and 132/33 KV, 2X50 MVA GIS at Rangia (Kumarikata) along with the associated Transmission lines with bay extension work at existing 132/33 kV Nalbari GSS- (Package G(R))
Sampling Location:	400/220/132 KV RANGIA (KUMARIKATA) GIS SUB STATION, AEGCL, KACHUBARI, TAMULPUR, ASSAM-781368 N:26°38'25", E:91°36'23"		
Sample Description:	Soil	Date of Sampling:	25/10/2024
Sample Condition:	Marked & Sealed	Sample Drawn By:	Mr.Sanjeeb B. Rajkhowa
Sample Reciept Date:	26/10/2024	Sampling Method:	GEEC/SOP/03
Test Start Date:	28/10/2024	Test Completion Date:	02/11/2024

Sl. No.	TEST	UNITS	RESULTS	TEST METHOD
1	Sulphite as SO3	%	6.2	GEEC/SOP/03
2	Chloride	mg/kg	10.6	GEEC/SOP/03
3	ORP	mV	390	GEEC/SOP/03

Checked by:
B Lahon
Dr. Belinda Lahon
Quality Manager

Reviewed by:
Pranjal Buragohain
Authorised Signatory

* The results relate only to the item tested.
* The test report shall not be reproduced except in full, without written approval of the laboratory .
* The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

********** End of Report**********

Page 1 of 1

WATER SAMPLING

Date of Sampling 25/10/2024
N:26°38'25", E:91°36'24"

RANGIA KUMARIKATA GIS SUB STATION

Sampling & Analysis Done By:
M/s GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
GUWAHATI, ASSAM-781028

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028, www.greentecheec.in
Telefax -0361 3501950 Mobile: 9435046677, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in
TC-14361

Format No.: GEEC/FM/50

TEST REPORT

ULR Number: TC143612400000273F			
Ref. No.: GEEC/FL/23/2024/10/26		Date of Reporting:	05/11/2024
Customer Name:	SHYAMA POWER INDIA LTD.	Lab. ID No.:	GEEC/WS/2024/10/26
Customer Address:	House No. 21, P B Road Rehabari Guwahati Kamrup Metropolitan Assam 781008	Date of Sampling:	25/10/2024
Sampling Location:	400/220/132/33 KV GIS Substation,AEGCL Kachubari Tamulpur N:26°38'25", E:91°36'24"	Sample Receipt Date:	26/10/2024
Sample Description:	Ground Water (Hand Pump of Project Premises)	Test Start Date:	26/10/2024
Sample Drawn By:	Mr. Sanjib B Rajkhowa	Test Completion Date:	04/11/2024
Sample Condition:	Sealed	Sampling Method:	GEEC/SOP/02

SL. NO.	DESCRIPTION	METHOD	UNIT	RESULTS	IS-10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternate source
1	pH	IS 3025 Part 11 : 2022	–	6.60	6.5 - 8.5	No relaxation
2	Conductivity	IS 3025 Part 14 1984 (RA:2019)	ms/cm	0.129	–	–
3	Colour	IS 3025 Part 4 : 2021	Hazen	Colourless	5	15
4	Total Dissolved Solids	IS 3025 Part 16 : 2023	mg/l	107	500	2000
5	Total Suspended Solids	IS 3025 Part 17 : 2022	mg/l	<10	–	–
6	Turbidity	IS 3025 Part 10 : 2023	NTU	1.7	1	5
7	Dissolved Oxygen	IS 3025 Part 38 1989(RA 2019)	mg/l	3.2	–	–
8	Chlorides	IS 3025 Part 32 1988 (RA:2019)	mg/l	< 2	250	1000
9	Fluoride	APHA 24th EDITION, 2023	mg/l	<0.5	1	1.5
10	Iron	IS 3025 Part 53 : 2024	mg/l	0.24	0.30	No relaxation
11	Oil & Grease	IS 3025 Part 39 : 2021	mg/l	< 2	–	–
12	Sulphates	IS 3025 Part 24 : 2022	mg/l	< 2	200	400
13	Hardness	IS 3025 Part 21 2009 (RA:2019)	mg/l	84	200	600
14	Odour	IS 3025 Part 5 : 2018	–	Agreeable	Agreeable	Agreeable

Remarks: The parameters tested are within the Acceptable Limit of IS-10500:2012

Checked by:
Dr. Belinda Lahon
Quality Manager

Authorised by:
Mr. Pranjal Buragohain
Authorised Signatory

********** End of Report **********

* The results relate only to the item tested.
* The test report shall not be reproduced except in full, without written approval of the laboratory.
* The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

Page1 of 1

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্

GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS

House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028, www.greentecheec.in
Telefax -0361 3501950 Mobile: 9435046677, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in

Format No.: GEEC/FM/50

TEST REPORT

Ref. No.: GEEC/WS/2024/10/26		Date of Reporting:	05/11/2024
Customer Name:	SHYAMA POWER INDIA LTD.	Lab. ID No.:	GEEC/WS/2024/10/26
Customer Address:	House No. 21, P B Road Rehabari Guwahati Kamrup Metropolitan Assam 781008	Date of Sampling:	25/10/2024
Sampling Location:	400/220/132/33 KV GIS Substation,AEGCL Kachubari Tamulpur N:26°38'25", E:91°36'24"	Sample Receipt Date:	26/10/2024
Sample Description:	Ground Water (Hand Pump of Project Premises)	Test Start Date:	26/10/2024
Sample Drawn By:	Mr. Sanjib B Rajkhowa	Test Completion Date:	02/11/2024
Sample Condition:	Sealed	Sampling Method:	GEEC/SOP/02

SL. NO.	DESCRIPTION	METHOD	UNIT	RESULTS	IS-10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternate source
1	Nitrate	IS 3025 Part 34 1988 (RA:2019)	mg/l	< 5	45	No relaxation
2	E. Coli	HiMedia Kit	Present/ Absent	Absent	Absent	Absent
3	Total coliform	APHA 24th EDITION, 2023	Present/ Absent	Absent	Absent	Absent
4	Pesticides	APHA 24th EDITION, 2023	µg/l	BDL		
5	Taste	APHA 24th EDITION, 2023	--	Agreeable	Agreeable	Agreeable
6	Floating Materials	APHA 24th EDITION, 2023	--	Not visible	---	---

Remarks: The parameters tested are within the Acceptable Limit of IS-10500:2012

Checked by:
Dr. Belinda Lahon
Quality Manager

Authorised by:
Mr. Pranjal Buragohain
Authorised Signatory

********** End of Report**********

* The results relate only to the item tested.
* The test report shall not be reproduced except in full, without written approval of the laboratory.
* The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

Page1 of 1

APPENDIX 9: TREE ENUMERATION REPORT

TREE ENUMARATION OF D/C LOOP IN OF 220KV AMINGAON -RANGIAAT 400/220KV(NEW) RANGIA SUB STATION.						
SL NO	**LOCAL NAME OF TREE**	**GRITH IN Mtrs.**	**HEIGHT IN Mtrs. (APPROX.)**	**LEFT**	**RIGHT**	**NOS**
U/C TN-8 TO AP-1						
1.	Shirish	0.95	8		R	1
AP-1 TO AP-2						
1.	Velco	1.3	8		R	1
2.	Mos	1.2	8		R	1
3.	Velco	1.5	10		R	1
4.	Velco	0.6	5	L		1
5.	Houla	0.6	6	L		1
6.	Velco	1.3	7	L		1
7.	Velco	0.95	8	L		1
8.	Bogori	0.6	5	L		1
9.	Awa Dumur	3	10		R	1
10.	Aahud	2	10		R	1
11.	Mos	1.3	10		R	1
12.	Puma	1.4	10		R	1
13.	Himolu	1	10		R	1
14.	Zeya	0.75	5		R	1
15.	Himolu	1.7	6	L		1
16.	Houla	1.3	4		R	1
17.	Velco	0.8	6		R	1
18.	Himolu	0.95	8	L		1
AP-2 TO AP-3						
No Tree						
AP-3 TO AP-4						
No Tree						
AP-4 TO AP-5						
1.	Himolu	0.6	6	L		1
2.	Banana			L		10
3.	Himolu	0.7	10	L		1
4.	Velco	1.2	7	L		1
5.	Velco	1.2	7	L		1
6.	Velco	0.6	8	L		1
7.	Kadam	0.75	7		R	1
8.	Kadam	0.7	7		R	1
9.	Bogori	0.7	4	L		1
10.	Aahud	0.7	5	L		1
11.	Aahud	0.6	4	L		1
12.	Jamun	0.6	3	L		1
13.	Aahud	0.65	6	L		1
AP-5 TO AP-6						

1.	Velco	1	7	L		1
2.	Zeya Chara			L		10
3.	Zeya Chara				R	30
4.	Aahud	1.2	6		R	1
5.	Zeya Chara				R	15
6.	Zeya Chara			L		20
7.	Velco	1.2	7		R	1
8.	Himolu	1	9	L		1
9.	Aahud	0.95	5	L		2
10.	Himolu	0.7	8		R	1
AP-6 TO AP-7						
1.	Banana			L		30
2.	Banana				R	30
3.	Banana			L		20
4.	Banana				R	20
AP-7 TO AP-8						
1.	Banana			L		20
2.	Banana				R	30
3.	Aahud	0.82	5		R	1
4.	Banana			L		50
5.	Banana				R	30
AP-8 TO AP-9						
No Tree						
AP-9 TO AP-10						
1.	Teak Chara			L		5
2.	Teak Chara				R	8
3.	Himolu	1	10		R	1
4.	Himolu	1.2	10		R	1
5.	Himolu	1.1	10		R	1
6.	Shesu	1	7		R	1
7.	Tamul Chara				R	4
8.	Tamul Chara			L		5
9.	Banana				R	20
10.	Teak Chara				R	4
11.	Shirish	0.9	10		R	1
12.	Shirish	1.2	12	L		1
13.	Shirish	1.3	10	L		1
14.	Shirish	1	7	L		1
15.	Himolu	1	15	L		1
16.	Aahud	0.65	10	L		1
17.	Teak Chara			L		6
18.	Teak Chara				R	4
19.	Banana			L		15
20.	Litchi Chara				R	2

21.	Shesu	1	15	L		1
22.	Jamun	1	8		R	1
23.	Banana				R	20
24.	Aahud	0.6	5		R	1
25.	Aahud	1	6		R	1
26.	Himolu	1	7		R	1
27.	Himolu	1	17		R	1
28.	Himolu	**1**	**18**		R	**1**
29.	Amra	0.9	7		R	1
30.	Aahud	0.8	7	L		1
31.	Amra	0.6	6	L		1
32.	Himolu	1	5		R	1
33.	Korso	0.6	6		R	1
34.	Tamul Chara			L		6
AP-10 TO AP-11						
1.	Banana			L		20
2.	Banana				R	20
AP-11 TO AP-12						
No Tree						
AP-12 TO AP-13						
No Tree						
AP-13 TO AP-14						
1.	Velco	0.6	4		R	1
2.	Aahud	1.5	5		R	1
3.	Himolu	1.5	6		R	1
4.	Velco	0.8	4		R	1
5.	Velco	0.6	4		R	1
6.	Bogori Chara				R	1
AP-14 TO AP-15						
No Tree						
AP-15 TO AP-16						
No Tree						
AP-16 TO AP-17						
No Tree						
AP-17 TO AP-18						
No Tree						
AP-18 TO AP-19						
No Tree						
AP-19 TO AP-20						
1.	Banana				R	60
2.	Mango	1	3	L		1
AP-22 TO AP-21						
1.	Coconut	1	8	L		1

AP-21 TO AP-22						
No Tree						
AP-22 TO AP-23						
1.	Zeya	0.6	7	L		1
AP-23 TO AP-24						
1.	Coconut	1.1	4		R	1
AP-24 TO AP-25						
No Tree						
AP-25 TO AP-26						
1.	Khajur	1.2	3	L		21
2.	Himolu	**0.7**	**6**	**L**		**4**
3.	Himolu	**0.72**	**7**		**R**	**4**
4.	Himolu(Chara)			L		6
5.	Himolu(Chara)				R	5
6.	Bogori Chara			L		4
7.	Bogori Chara				R	3
8.	Banana			L		20
9.	Banana				R	20
10.	Kadam(Chara)			L		7
11.	Kadam(Chara)				R	6
12.	Kadam	0.7	8	L		2
13.	Kadam	0.7	8		R	3
AP-26 TO AP-27						
1.	Aahud	1	8	L		1
AP-27 TO AP-28						
1.	Himolu	1	10		R	1
2.	Shirish	1.5	12		R	1
3.	Velco	0.8	5		R	1
4.	Banana			L		150
5.	Banana				R	150
6.	Himolu	1.3	15	L		1
7.	Himolu	0.6	15	L		1
AP-28 TO AP-29						
1.	Banana			L		50
2.	Banana				R	50
3.	Himolu	0.75	6		R	1
4.	Odal	0.6	4		R	1
AP-29 TO AP-30						
1.	Aahud	0.6	5		R	1
2.	Himolu	0.6	5		R	1
3.	Aahud	0.6	6	L		4
4.	Himolu	1.8	20	L		1
5.	Shirish	0.8	6	L		1
6.	Himolu	0.6	5	L		1

7.	Himolu	0.6	7		R	6
8.	Koroi	0.7	10		R	1
9.	Banana				R	10
10.	Mango	0.85	5	L		1
11.	Banana			L		30
12.	Banana				R	30
13.	Mango	0.9	6	L		1
14.	Himolu	0.6	7	L		1
15.	Himolu	1	6		R	1
16.	Himolu	1	6		R	1
17.	Kadam	1	5		R	1
18.	Kadam	0.6	6		R	1
19.	Kadam	0.7	5		R	1
20.	Kadam	0.6	7	L		2
21.	Banana			L		10
22.	Banana				R	10
23.	Himolu	0.78	5		R	1
24.	Himolu	0.8	5	L		2
25.	Kadam	0.8	6		R	1
26.	Himolu	0.7	6	L		1
27.	Kadam	0.8	6	L		1
28.	Satiana	1	10		R	1
29.	Kadam	0.7	5	L		1
30.	Himolu	0.8	6		R	1
31.	Tamul			L		15
32.	Tamul				R	10
33.	Banana			L		20
34.	Banana				R	5
35.	Shirish	0.6	4		R	1
AP-30 TO AP-31						
1.	Tamul Chara				R	10
2.	Mos	1.3	20	L		1
3.	Himolu	1	8		R	1
4.	Mango	3	25		R	1
5.	Dumur	0.8	6	L		1
6.	Amra	0.7	6	L		1
7.	Dumur	0.8	5	L		1
8.	Satiana	1	10	L		1
9.	Otanga	1	7	L		1
10.	Himolu	2	25	L		1
11.	Dumur	0.7	5	L		1
12.	Chak Supari	0.85	10	L		1
13.	Mos	1	18		R	1
14.	Mos	1.5	10		R	1

15.	Mos	1	8		R	1
AP-31 TO AP-32						
1.	Shirish	1.1	6	L		1
2.	Mango	1.1	6	L		1
AP-32 TO AP-33						
1.	Aahud	1	5	L		3
2.	Aahud	0.78	5	L		1
3.	Aahud	1	6		R	5
4.	Aahud	1.2	6		R	1
5.	Aahud	0.7	6		R	1
6.	Houla	1	5		R	1
7.	Aahud	1.5	6	L		4
8.	Aahud	1	5		R	1
9.	Aahud	0.6	5	L		1
AP-33 TO AP-34						
1.	Puma	1.2	8	L		1
2.	Banana			L		10
3.	Tamul Chara			L		3
AP-34 TO AP-35						
No Tree						
AP-35 TO AP-36						
1.	Velco	0.8	5		R	2
AP-36 TO AP-37						
No Tree						
AP-33 TO AP-38						
1.	Bogori	0.6	4	L		1
2.	Aahud	1	4	L		1
3.	Aahud	0.8	4	L		1
4.	Aahud	0.8	5	L		1
5.	Aahud	0.7	4	L		1
6.	Aahud	0.8	4		R	4
7.	Aahud	1	4		R	2
8.	Radha Chura	0.6	4		R	10
9.	Radha Chura	0.6	4	L		10
10.	Banana			L		10
11.	Banana				R	6
12.	Shirish	0.65	5	L		1
AP-38 TO AP-39						
1.	Chak Supari	1	10		R	3
2.	Houla	0.7	5		R	1
3.	Banana			L		20
4.	Chak Supari	1	**8**		R	**7**
5.	Hatikunia	0.7	**5**		R	**1**
6.	Amra	0.8	6		R	**1**

7.	Shirish	1.5	18		R	**1**
8.	Shirish	0.9	7		R	**1**
9.	Velco	0.7	5		R	**1**
10.	Chak Supari	1	5		R	**1**
11.	Amra	0.85	6		R	**1**
12.	Amra	0.8	5		R	**1**
13.	Shirish	2	20		R	**1**
14.	Banana				R	15
15.	Banana			L		5
16.	Coconut Chara			L		2
AP-39 TO AP-40						
No Tree						
AP-40 TO AP-41						
1.	Shirish	1.5	10	L		1
2.	Shirish	1.3	5	L		1
3.	Dumur	0.6	3	L		1
4.	Mos	1.5	10	L		1
5.	Gamari	0.6	7	L		1
6.	Houla	1	5	L		1
7.	Gamari	0.8	8	L		1
8.	Banana			L		20
9.	Puma	1.5	8	L		1
10.	Gamari	0.6	5	L		1
11.	Coconut Chara			L		2
12.	Limbu Chara			L		10
13.	Coconut	1.2	4	L		1
14.	Houla	1	6	L		1
15.	Ajar	0.8	6	L		1
16.	Ajar	0.9	5	L		1
17.	Shirish	1.1	10	L		1
18.	Tamul Chara				R	30
19.	Gamari	0.6	4		R	1
20.	Shirish	1.5	15		R	1
21.	Shirish	1.6	15		R	1
22.	Mango	0.7	6		R	1
23.	Teak Chara				R	2
24.	Gamari	0.6	4	L		1
25.	Houla	0.7	5	L		1
26.	Teak Chara			L		5
27.	Houla	0.8	6		R	1
28.	Shirish	0.7	5		R	1
29.	Tamul Chara				R	12
30.	Amita Chara				R	50
31.	Tamul Chara				R	30

32.	Tamul Chara			L		95
33.	Amita Chara			L		80
34.	Gamari	1.5	10		R	1
35.	Himolu	0.6	4		R	1
36.	Gamari	1	10		R	1
37.	Gamari	0.6	5		R	1
38.	Dumur	0.6	4		R	1
39.	Gamari	0.6	5		R	1
40.	Radha Chura	0.6	5		R	4
41.	Shirish	0.6	6		R	1
42.	Velco	1.3	5		R	1
43.	Velco	1	5		R	1
AP-41 TO AP-42						
1.	Banana			L		200
2.	Banana				R	200
AP-42 TO AP-43						
No Tree						
AP-43 TO AP-44						
1.	Houla	1	6	L		1
2.	Houla Chara			L		5
3.	Shirish Chara			L		2
4.	Himolu	1.5	7		R	1
5.	Velco	0.6	5		R	1
6.	Bogori	1.3	5		R	1
7.	Amra	1	5	L		1
8.	Velco	0.6	5	L		1
9.	Velco	0.8	5	L		1
10.	Velco	0.8	5		R	1
11.	Velco	1	4		R	1
12.	Korso	1.5	6		R	1
13.	Gamari	0.8	6		R	1
14.	Velco	1	7	L		1
15.	Bogori	1	4	L		1
16.	Velco	1	4	L		1
17.	Aahud	0.6	4	L		1
18.	Aahud	0.6	5	L		1
19.	Aahud	0.6	4	L		1
20.	Velco	0.8	5	L		1
21.	Aahud	0.8	5	L		1
22.	Velco	1	5	L		1
23.	Velco	1	7	L		1
24.	Velco	1.7		L		1
25.	Houla	1.3	7	L		1
26.	Velco	0.6	6	L		1

27.	Velco	1.2	6	L		1
28.	Shirish	1.3	15	L		1
29.	Velco	1.7	10	L		1
30.	Velco	1	7	L		1
31.	Aahud	0.8	6		R	1
32.	Velco	1	7		R	1
33.	Aahud	1.3	5		R	1
34.	Velco	1.3	10		R	2
35.	Himolu	1.2	10		R	1
AP-44 TO AP-45						
1.	Teak	0.8	5		R	1
2.	Teak	0.6	6	L		2
3.	Velco	1	10	L		1
4.	Aahud	1.2	6	L		1
5.	Ajar	0.6	8	L		1
6.	Aahud	0.7	7	L		1
7.	Aahud	1	6	L		1
8.	Velco	1	6		R	1
9.	Velco	0.9	5		R	1
10.	Velco	1	5		R	1
11.	Velco	1	7		R	1
12.	Velco	1	7		R	1
AP-45 TO AP-46						
1.	Korso	1.5	7	L		1
2.	Korso	0.85	5	L		1
3.	Velco	1	5	L		1
4.	Velco	1	5		R	1
5.	Amra	1	5		R	1
6.	Velco	1.2	6		R	1
7.	Velco	1	5		R	1
8.	Velco	1	6		R	1
9.	Banana			L		100
10.	Banana				R	100
11.	Shirish	1.3	8		R	1
12.	Aahud	1	7		R	1
13.	Aahud	1.5	8	L		1
AP-46 TO AP-47						
1.	Zeya	0.6	5	L		5
2.	Zeya	0.6	5		R	7
3.	Zeya	0.9	6		R	1
4.	Zeya	1	6		R	1
5.	Coconut	1.1	2	L		1
6.	Banana			L		10
7.	Zeya	1.3	10	L		1

8.	Aahud	1	4	L		1
9.	Coconut	1.2	6		R	1
10.	Banana				R	30
11.	Otanga	1.2	8		R	1
12.	Bel	1.1	7		R	1
13.	Houla	1.7	8		R	1
14.	Gamari	1.8	20		R	1
15.	Gamari	1.3	8		R	1
16.	Awa Dumur	1.2	6		R	1
17.	Gamari	1.9	20		R	1
18.	Zeya	0.6	5		R	1
19.	Banana			L		200
20.	Velco	1.4	20		R	1
21.	Zeya	1	5		R	1
22.	Gamari	1	8		R	1
23.	Zeya	1	5		R	1
24.	Zeya	0.8	5		R	1
25.	Zeya	0.6	5		R	1
26.	Zeya	0.6	5		R	1
27.	Velco	0.9	8		R	1
28.	Velco	1.2	15		R	1
29.	Zeya	0.7	6		R	1
30.	Zeya	0.7	6		R	1
31.	Velco	1	20		R	1
32.	Zeya	0.6	6		R	1
33.	Zeya	0.6	6		R	1
34.	Zeya	0.6	6		R	2
35.	Zeya	0.7	6		R	1
36.	Zeya	0.6	5		R	1
37.	Aahud	1.4	15		R	1
38.	Aahud	0.8	6		R	1
39.	Aahud	1.5	10		R	1
40.	Aahud	1.7	8		R	1
41.	Velco	1.3	10		R	1
42.	Velco	1.2	10		R	1
43.	Aahud	0.6	5	L		1
44.	Banana			L		20
45.	Velco	1	4		R	1
46.	Velco	1.3	7		R	1
47.	Banana				R	10
48.	Zeya Chara				R	10
49.	Velco	1	6		R	1
50.	Gamari	0.6	5	L		1
51.	Banana			L		65

52.	Banana				R	50
AP-47 TO AP-48						
1.	Banana			L		500
2.	Banana				R	500
3.	Himolu	1.1	6	L		1
4.	Aahud	1	6		R	1
5.	Velco				R	2
6.	Velco			L		2
7.	Houla	0.6	5		R	1
8.	Bogori	0.7	3		R	1
AP-48 TO AP-49						
1.	Houla	0.6	5		R	1
2.	Tamul Chara				R	17
3.	Tamul Chara			L		13
4.	Awa Dumur	0.7	6	L		1
5.	Tamul Chara			L		100
6.	Tamul Chara				R	24
7.	Kadam	1.3	8		R	1
8.	Houla	1.2	8		R	1
9.	Zeya	0.8	6		R	2
10.	Ghora Neem	0.65	5		R	2
11.	Gamari	0.7	6	L		1
12.	Coconut Chara			L		1
13.	Gamari	1	7	L		3
14.	Tamul			L		130
15.	Bogori			L		60
16.	Himolu	1	8	L		1
17.	Ghora Neem	1	8	L		2
18.	Himolu	0.8	5	L		1
19.	Tamul				R	30
20.	Coconut Chara			L		4
21.	Gamari	0.6	5	L		1
22.	Teak Chara			L		4
23.	Houla	1.2	5		R	1
24.	Puma	0.7	4		R	1
25.	Zeya	1	5		R	1
26.	Ajar	0.75	5		R	1
27.	Banana			L		30
28.	Banana				R	30
29.	Teak	0.8	6			2
30.	Teak	0.65	6	L		1
31.	Himolu	0.6	5	L		1
32.	Ajar	0.9	5	L		1
33.	Teak	0.73	5		R	1

34.	Tamul Chara				R	5
AP-49 TO AP-50						
1.	Ajar	0.6	5		R	1
AP-50 TO AP-51						
No Tree						
AP-51 TO AP-52						
1.	Shirish	1	8	L		1
2.	Shirish	1.1	8	L		1
3.	Gamari	0.6	5	L		1
4.	Gamari	1	5	L		1
5.	Korso	1	3	L		1
AP-52 TO AP-53						
No Tree						
AP-53 TO AP-54						
1.	Himolu	1.2	18		R	1
2.	Himolu	1.2	10		R	1
3.	Gamari	0.8	5		R	1
4.	Kadam	1.3	15	L		1
5.	Kadam	1.3	7	L		1
6.	Ghora Neem	0.8	7	L		1
7.	Kadam	0.8	8	L		1
8.	Gamari	0.8	8	L		1
9.	Hatikunia	0.65	5		R	1
10.	Hatikunia	0.6	5		R	1
11.	Hatikunia	0.6	4		R	3
12.	Shirish	1.1	6		R	1
13.	Himolu	0.6	6		R	1
14.	Aahud	0.9	6	L		1
15.	Aahud	0.9	5	L		1
16.	Bogori	1	5	L		1
17.	Aahud	1	5		R	1
18.	Aahud	1	5		R	1
19.	Aahud	1	5		R	1
20.	Aahud	0.9	5		R	1
21.	Hatikunia(chara)				R	10
AP-54 TO AP-55						
1.	Aahud	0.6	5		R	1
2.	Banana			L		40
3.	Bogori	1	5		R	1
4.	Ajar	1.3	5		R	1
5.	Odal	1.2	5	L		1
6.	kadam(chara)			L		12
7.	kadam(chara)				R	6
AP-55 TO AP-56						

1.	Aahud	1.1	5	L		1
2.	Shirish	1.5	2	L		1
3.	Aahud	1.3	6	L		1
4.	Zeya	1	7	L		1
5.	Aahud	1	6	L		1
6.	Zeya	0.9	7	L		1
7.	Korso	1	4	L		1
8.	Aahud	1.1	4	L		1
9.	Aahud	1	5	L		1
10.	Zeya	1	6	L		1
11.	Aahud	0.85	5	L		1
12.	Aahud	0.7	5	L	R	1
13.	Zeya	1	5		R	1
14.	Aahud	1.4	5		R	1
15.	Aahud	0.7	5		R	1
16.	Zeya	0.85	5		R	1
17.	Shirish	0.7			R	50(14-16)
18.	Satiana	0.7	5	L		1
19.	Satiana	0.6	5	L		1
20.	Otanga	0.6	5	L		1
21.	Ajar	1	6	L		2
22.	Himolu	1.2	8	L		1
23.	Coconut Chara				R	1
24.	Tamul Chara				R	2
25.	Coconut				R	1
26.	Tamul				R	15
27.	Himolu	0.85	6		R	1
28.	Banana				R	30
29.	Teak Chara				R	5
AP-56 TO AP-57						
1.	Coconut		4		R	5
2.	Banana		3		R	15
AP-57 TO AP-58						
No Tree						
AP-58 TO AP-59						
No Tree						
AP-59 TO AP-60						
1.	Gamari	0.6	5	L		1
2.	Houra	0.6	4	L		1
AP-60 TO AP-61						
1.	Houra	1	5	L		1
2.	Kadam	1	8	L		1
3.	Gamari	1	10	L		1
4.	Amra	1.1	10	L		1

5.	Aahud	0.6	5	L		1
6.	Gamari	0.8	8	L		1
7.	Gamari	1.3	15	L		1
8.	Aahud	0.6	5	L		1
9.	Aahud	1.4	10	L		1
10.	Banana				R	10
11.	Zeya	1.3	8		R	1
12.	Bogori	0.8	5		R	3
13.	Bogori	1	5		R	1
14.	Tamul Chara			L		7
15.	Aahud	0.8	4		R	1
16.	Aahud	0.8	3		R	1
17.	Aahud	1.1	5		R	1
18.	Aahud	1	5		R	1
19.	Aahud	1	3		R	1
20.	Aahud	0.6	4		R	1
21.	Mos	1.3	10		R	1
22.	Aahud	0.7	2		R	1
23.	Aahud	1.7	9		R	1
24.	Aahud	0.6	5		R	1
25.	Aahud	2	5		R	1
26.	Aahud	0.7	4		R	1
27.	Puma	0.7	6		R	1
28.	Mos	1.6	10		R	1
29.	Mos	0.7	5		R	1
30.	Gamari	0.8	6	L		1
31.	Zeya	0.7	6	L		1
32.	Aahud	0.6	5	L		1
33.	Mos	1.6	15	L		1
34.	Aahud	1.4	7	L		1
35.	Mos	1.3	10	L		1
36.	Aahud	1	8	L		1
37.	Korso	0.8	5	L		1
38.	Aahud	1.1	6	L		1
39.	Aahud	1.1	5	L		1
40.	Aahud	0.7	5		R	1
AP-61 TO 62						
No Tree						
AP-62 TO 63						
No Tree						
AP-63 TO AP-64						
1.	Bogori	0.8	3		R	1
AP-64 TO AP-65						
No Tree						

AP-65 TO AP-66
No Tree
AP-66 TO 67
No Tree
AP-67 TO BAY
No Tree

TREE ENUMARATION OF D/C LOOP OUT OF 220KV AMINGAON -RANGIAAT 400/220kV (NEW) RANGIA SUB STATION.						
SL NO	**LOCAL NAME OF TREE**	**GRITH IN Mtrs.**	**HEIGHT Mtrs. (APPROX.)**	**LEFT**	**RIGHT**	**NOS**
GANTRY TO AP-1						
No Tree						
AP-1 TO AP-2						
No Tree						
AP-2TO AP-3						
No Tree						
AP-3TO AP-4						
1.	Ajar	0.7	5		R	1
2.	Gamari	0.6	4		R	1
3.	Gamari	0.6	5	L		1
4.	Aahud	0.7	10-12	L		4
5.	Himolu	0.7	7	L		1
6.	Mango (Chara)			L		1
7.	Dumur (Chara)			L		1
8.	Aahud	0.85	5	L		1
9.	Jiya	0.8	5	L		1
10.	Aahud	0.9	6	L		1
11.	Hatikunia(Chara)				R	1
12.	Korso	1	3		R	1
13.	Aahud	0.9	5		R	2
14.	Jiya(Chara)			L		1
15.	Ajar(Chara)			L		1
16.	Hatikunia	1.1	5	L		1
AP-04TO AP-05						
No Tree						
AP-05 TO AP-06						
No Tree						
AP-06 TO AP-07						
No Tree						
AP-07 TO AP-08						
1.	Karamcha	0.97	5		R	1
2.	Karamcha	1.53	5		R	1

3.	Koroi	1.12	6		R	1
4.	Gamari	0.7	8		R	1
5.	Aahud	1.53	9		R	1
6.	Aahud	1.8	4		R	1
7.	Banana		2	L		45
8.	Aahud	0.97	3	L		6
9.	Aahud	0.94	3		R	7
10.	Aahud	1	3		R	1
11.	Aahud	1	3		R	1
AP-08 TO AP-09						
No Tree						
AP-09 TO AP-10						
No Tree						
AP-10TO AP-11						
No Tree						
AP11 TO AP-12						
1.	Banana		2	L		100
2.	Banana		2		R	100
3.	Shimul	0.99	9		R	1
AP-12 TO AP-13						
1.	Neem	0.95	4	L		2
2.	Teak	1	10	L		1
3.	Karamcha	0.92	4	L		1
4.	Karamcha	1.14	4	L		1
5.	Nahar	1.3	9		R	1
6.	Houla	1	4	L		1
7.	Modhuri	0.6	2	L		1
AP-13 TO AP-14						
1.	Banana			L		80
2.	Banana				R	30
AP-14 TO AP-15						
3	Kramcha	0.6	3		R	1
4	Shimul	1.1	10		R	1
6	Kramcha	0.97	3	L		1
9	Banana		2	L		40
10	Banana		2		R	40
AP-15 TO AP-16						
1.	Banana			L		70
2.	Banana				R	80
3.	Radha Chura	0.95	5	L		1
4.	Awa Dumur	0.6	3	L		1
5.	Houla	0.9	5		R	1
6.	Lalipuma	0.65	6		R	1
7.	Lalipuma	0.82	6		R	1

8.	Banana		2		R	80
9.	Banana		2	L		5
10.	Teak	0.7	8	L		1
11.	Teak	0.7	6		R	1
12.	Teak	1.2	7		R	1
13.	Teak	1	8		R	1
14.	Coconut	1	2		R	4
15.	Teak	1	7		R	1
16.	Teak	0.9	5		R	2
17.	Coconut	1	3	L		1
18.	Teak	0.6	6		R	1
19.	Teak	0.7	6		R	1
20.	Teak	1	5		R	1
21.	Teak	0.7	4	L		1
AP-16 TO AP-17						
No Tree						
AP-17 TO AP-18						
1.	Banana		2	L		70
2.	Banana		2		R	20
3.	Bogori	1	4		R	1
4.	Bogori	1.1	3		R	1
5.	Bogori	0.65	2		R	1
6.	Velco	1	6	L		1
7.	Velco	0.62	6	L		1
8.	Velco	0.72	6	L		1
9.	Dumur	0.6	2	L		1
10.	Khokan	0.8	2	L		1
11.	Shimul	0.7	5	L		1
12.	Kramcha	0.78	5	L		1
13.	Khokan	0.61	6	L		1
14.	Houla	0.72	4	L		1
15.	Kramcha	1	4	L		2
16.	Banana		3	L		5
AP-18 TO AP-19						
1.	Banana		2		R	45
2.	Houla	1	3	L		1
3.	Shisham	1.12	7	L		1
4.	Dumur	0.6	2	L		1
5.	Shimul	0.85	11	L		1
6.	Shisham	1.6	13	L		1
7.	Gamari	0.8	4	L		1
8.	Shimul	1	6		R	1
9.	Shimul	1.2	10		R	1
10.	Banana		2		R	30

11.	Aahud	0.6	4		R	1
12.	Aahud	0.8	4		R	1
13.	Aahud	0.8	5		R	1
14.	Kohimulla	0.75	3	L		2
15.	Shimul	0.9	12	L		1
16.	Shimul	1.2	8	L		1
17.	Gamari	0.72	8	L		1
18.	Lalipuma	0.7	6	L		1
19.	Lalipuma	0.7	6		R	1
20.	Banana		2		R	30
21.	Aahud	1	9		R	1
22.	Aahud	1.2	8		R	1
23.	Teak	0.88	8	L		1
24.	Sajna	1.1	5	L		1
25.	Banana		2	L		30
AP-19 TO AP-20						
1.	Gamari	0.9	7		R	1
2.	Teak	0.6	7		R	1
3.	Shimul	1.5	19		R	1
4.	Teak	1	8	L		1
5.	Banana		2	L		20
6.	Banana		2		R	30
7.	Jamuk	0.67	6		R	1
8.	Jamuk	0.63	6		R	1
9.	Jamuk	0.85	10	L		1
10.	Mango	0.9	6	L		1
11.	Litchi	0.66	3	L		4
12.	Titasofa	0.95	9	L		1
13.	Mango	1.55	9	L		1
14.	Mango	1.7	9	L		1
15.	Banana		2	L		30
16.	Banana		2		R	25
17.	Jackfruit	1.75	11	L		1
18.	Saura	0.63	3		R	1
19.	Banana		2		R	40
20.	Banana		2	L		40
21.	Hatikunia	0.6	4		R	1
22.	Banana		2		R	70
23.	Velco	0.88	5		R	1
24.	Velco	0.88	3		R	1
25.	Shimul	1	4		R	1
AP-20 TO AP-21						
1.	Houla	0.65	4	L		1
2.	Bogori	1	4	L		1

3.	Banana		2	L		3
4.	Banana		2		R	2
5.	Khokan	0.97	6	L		1
6.	Dumur	0.6	3	L		1
7.	Jiya	1.31	6	L		7
8.	Khujli	0.7	3	L		1
9.	Hatikunia	0.88	3		R	1
10.	Aahud	0.66	8		R	1
11.	Aahud	1.28	7		R	1
12.	Shimul	0.74	4		R	1
13.	Aahud	1.15	7		R	1
14.	Velco	0.64	4		R	1
15.	Shimul	1.1	9		R	1
16.	Velco	0.76	8		R	1
17.	Aahud	1.29	6	L		1
18.	Kadam	1.44	13	L		1
19.	Banana		2		R	20
AP-21 TO AP-22						
1.	Lalipuma	0.89	9	L		1
2.	Banana		2	L		30
3.	Banana		2		R	80
4.	Khujli	0.6	4	L		1
5.	Khokan	0.72	8	L		1
6.	Jamun	0.7	7	L		1
7.	Aahud	1	9	L		1
8.	Teak	1.2	13	L		1
9.	Teak	0.95	8		R	1
10.	Teak	1.27	13		R	1
11.	Coconut	1.15	13		R	1
12.	Jamun	1.12	11		R	1
13.	Mango	0.8	5		R	1
14.	Coconut	1.1	12		R	3
15.	Jhao	0.6	3	L		1
16.	Aahud	1.25	7	L		1
17.	Aahud	1.35	8	L		1
18.	Titasofa	0.62	6	L		1
19.	Jiya	1.17	7	L		1
20.	Khokan	1.24	9		R	1
21.	Gamari	1.13	4		R	1
22.	Gamari	0.65	4		R	1
23.	Jiya	0.6	4		R	1
24.	Banana		2		R	125
25.	Banana		2	L		120
26.	Bel	0.82	3	L		1

AP-22 TO AP-23						
1.	Teak	0.7	6	L		1
2.	Teak	0.7	5		R	4
3.	Banana		2		R	59
4.	Banana		2	L		85
5.	Gamari	4	3	L		5
6.	Coconut	1	3	L		2
AP-23 TO AP-24						
1.	Ajar	0.85	7		R	1
2.	Ajar	0.8	4	L		1
3.	Gamari	0.9	6	L		1
4.	Gamari	0.95	7	L		1
5.	Gamari	1	9	L		1
6.	Gamari	0.85	8	L		1
7.	Gamari	0.64	7	L		1
8.	Aahud	1.55	10	L		1
9.	Gamari	0.91	6	L		1
10.	Gamari	0.92	8	L		1
11.	Gamari	1.15	10	L		1
12.	Gamari	1	7	L		1
13.	Kramcha	0.6	3	L		1
14.	Aahud	0.8	5		R	1
15.	Awa Dumur	3.01	18		R	1
16.	Saura	1	4		R	1
17.	Khujli	0.91	7		R	1
18.	Khokan	1.13	12		R	1
19.	Khokan	1.34	10		R	1
20.	Shimul	0.82	7		R	1
21.	Shimul	0.95	8		R	1
22.	Coconut	1.3	4		R	3
23.	Coconut	1.3	4	L		2
24.	Teak	0.65	7		R	1
25.	Teak	0.8	7	L		3
26.	Houla	1.5	8		R	1
27.	Banana		2		R	25
28.	Teak	0.66	7		R	1
29.	Teak	0.73	7		R	1
30.	Teak	0.74	7		R	1
31.	Teak	0.75	6		R	1
AP-24 TO AP-25						
No Tree						
AP-25 TO AP-26						
1.	Banana		2	L		200
2.	Banana		2		R	200

3.	Teak	1.3	8		R	1
4.	Teak	0.76	5		R	1
5.	Teak	1.16	9		R	1
6.	Banana		2	L		20
7.	Teak	0.6	6		R	1
8.	Bogori	0.8	2		R	1
9.	Banana		1	L		28
10.	Banana		1		R	30
11.	Amra	0.98	4		R	1
12.	Khokan	1.2	6		R	1
13.	Sajna	0.8	3	L		1
14.	Houla	0.9	9	L		1
15.	Aahud	1.35	5		R	1
16.	Aahud	1.45	4		R	1
17.	Aahud	1.1	6		R	1
18.	Aahud	1.2	5		R	1
19.	Aahud	0.62	3	L		1
20.	Aahud	0.75	4	L		1
21.	Aahud	0.78	4	L		1
22.	Krishna Chura	0.76	3	L		1
23.	Mango	0.7	8	L		1
24.	Jamun	0.6	7	L		1
25.	Shimul	1.19	13	L		1
26.	Khokan	0.6	3	L		1
27.	Aahud	1.05	7		R	1
28.	Aahud	0.75	7		R	1
29.	Aahud	0.78	4		R	1
30.	Mango	0.6	5	L		1
31.	Aahud	1.9	15	L		1
32.	Aahud	1.4	10	L		1
33.	Aahud	2.3	12	L		1
34.	Aahud	3.1	11	L		1
35.	Mango	1	7	L		1
36.	Shisham	1	8		R	1
37.	Coconut	1	5		R	1
38.	Banana		2	L		30
39.	Jackfruit	0.8	7	L		1
40.	Aahud	1.9	15	L		1
41.	Aahud	3.5	13	L		1
42.	Jhao	1	10	L		1
43.	Shisham	1	7	L		1
44.	Shisham	0.65	7	L		1
45.	Jol Shirish	0.75	6	L		1
46.	Tamul	3	4	L		20

47.	Shimul	1.24	13		R	1
48.	Gamari	0.7	6	L		1
49.	Shimul	0.75	6	L		1
50.	Shimul	0.85	6	L		1
51.	Aahud	1.15	7		R	1
52.	Gamari	1.11	12	L		1
53.	Gamari	1.6	14	L		1
54.	Aahud	2.5	12	L		1
55.	Banana		2	L		40
56.	Banana		2		R	50
AP-26 TO AP-27						
1.	Banana		2		R	40
2.	Banana		2	L		40
3.	Aahud	0.6	4		R	1
4.	Aahud	0.6	3	L		3
5.	Banana		2		R	30
6.	Banana		2	L		30
7.	Titasofa	0.7	7	L		1
8.	Hoja	1.5	8	L		1
9.	Titasofa	0.89	7		R	1
10.	Banana		2	L		350
11.	Banana		2		R	350
12.	Gamari	0.84	5	L		1
13.	Khujli	0.7	5	L		1
14.	Gamari	1.11	9	L		1
15.	Dumur	0.7	3	L		1
16.	Simul	0.9	5		R	1
17.	Simul	0.9	6		R	1
18.	Banana		2	L		70
19.	Aahud	1.4	8	L		1
20.	Khujli	0.8	6	L		1
21.	Kramcha	0.75	5	L		1
22.	Simul	0.7	5	L		1
23.	Simul	1.7	14		R	1
24.	Velco	1.6	13	L		1
25.	Mos	0.7	5		R	1
26.	Velco	0.98	12		R	1
27.	Velco	1.45	13		R	1
28.	Velco	0.76	10		R	1
29.	Mos	1.4	10		R	1
30.	Velco	0.63	3		R	1
31.	Velco	0.72	5		R	1
32.	Sajna	1	4	L		1
33.	Velco	1.42	13		R	1

34.	Mos	0.99	8		R	1
35.	Velco	1.42	14		R	1
36.	Lalipuma	0.72	5		R	1
37.	Dumur	0.6	4	L		1
38.	Simul	1.19	15	L		1
39.	Simul	0.8	6	L		1
40.	Simul	0.9	11	L		1
41.	Mos	1.1	12	L		1
42.	Mos	1.1	12	L		1
43.	Mos	0.9	13	L		1
44.	Shimul	2	20	L		1
45.	Shimul	1.4	15	L		1
46.	Shimul	0.9	5	L		1
47.	Shimul	1.89	20	L		1
48.	Jhao	1.2	5	L		1
49.	Banana		2	L		56
50.	Shimul	1.17	20		R	1
51.	Mos	0.9	7		R	1
52.	Mos	0.9	7		R	1
53.	Dumur	0.7	2		R	1
54.	Mos	1.2	11		R	1
55.	Jhao	0.9	4		R	1
56.	Banana		2		R	30
57.	Banana		2	L		25
58.	Banana		2	L		20
59.	Banana		2		R	20
60.	Gamari	1	3	L		1
61.	Hoja	1	7		R	1
62.	Neem	1.1	8		R	1
63.	Jiya	0.78	4		R	1
64.	Banana		2		R	25
65.	Banana		2	L		30
66.	Velco	1.3	8		R	1
67.	Velco	0.8	5		R	1
68.	Madhar	1.5	8		R	1
69.	Madhar	1.75	11		R	1
70.	Madhar	2.2	10		R	1
71.	Gamari	0.92	6		R	1
72.	Velco	1.7	16		R	1
73.	Karamcha	1.4	5	L		1
74.	Madhar	0.74	5	L		1
75.	Shimul	1.7	18	L		1
76.	Ajar	1	8	L		1
77.	Karamcha	0.9	4	L		1

78.	Karamcha	1.1	4	L		1
79.	Madhar	0.8	4		R	1
80.	Shimul	1.3	18		R	1
81.	Dumur	0.6	3		R	7
82.	Gamari	0.8	7		R	1
83.	Teak	1	7		R	1
84.	Gamari	1	8		R	1
85.	Madhar	1.2	4		R	1
86.	Shimul	1	11		R	1
87.	Kadam	1.4	12		R	1
88.	Jiya	1	5		R	1
89.	Dumur	1	3		R	1
90.	Kadam	1.1	8		R	1
91.	Amra	1	6	L		1
92.	Karamcha	1	6	L		1
93.	Madhar	1.1	9	L		1
94.	Madhar	1.5	6	L		1
95.	Banana		2	L		30
96.	Banana		2		R	50
97.	Ajar	0.65	8	L		1
AP-27 TO AP-28						
1.	Aahud	0.6	5	L		1
2.	Aahud	0.7	5	L		1
3.	Aahud	0.6	5	L		1
4.	Banana		2	L		30
5.	Banana	2	2		R	20
6.	Shimul	1.6	19	L		1
7.	Madhar	1.5	12	L		1
8.	Madhar	1.4	10	L		1
9.	Shimul	1.8	17	L		1
10.	Banana		2	L		10
11.	Velco	1.2	11	L		1
12.	Velco	1.1	10	L		1
13.	Karamcha	0.6	3	L		1
14.	Shimul	0.6	4	L		1
15.	Hatikunia	0.6	4		R	4
16.	Hoja	0.7	8		R	1
17.	Shimul	1.8	18		R	1
18.	Velco	1	7		R	1
19.	Shimul	0.7	4		R	1
20.	Velco	0.6	4	L		3
21.	Madhar	1.27	12	L		1
22.	Velco	0.95	8	L		1
23.	Velco	0.94	9	L		1

24.	Karamcha	0.72	4	L		1
25.	Krishna Chura	2.8	18	L		1
26.	Saura	0.9	3	L		1
27.	Aahud	1.8	10		R	1
28.	Aahud	1.05	7		R	1
29.	Aahud	2.1	12		R	1
30.	Aahud	1.7	8		R	1
31.	Amra	0.7	4		R	1
32.	Velco	0.6	7	L		1
33.	Jiya	0.7	2		R	1
34.	Shimul	0.89	8	L		1
35.	Velco	0.7	7	L		1
36.	Houla	0.8	5	L		1
37.	Velco	0.75	7		R	1
38.	Velco	1	7		R	1
39.	Banana		2		R	80
40.	Ghora Neem	0.7	4	L		1
41.	Jiya	0.69	4	L		1
42.	Shimul	1.4	20	L		1
43.	Khujli	1.09	8	L		1
44.	Gamari	1.1	9	L		3
45.	Aahud	1.2	7	L		1
46.	Aahud	0.92	5	L		1
47.	Aahud	2.2	11	L		1
48.	Aahud	2.8	7		R	1
49.	Saura	0.62	3		R	1
50.	Radha Chura	2	12		R	1
51.	Khujli	0.6	3		R	1
52.	Satiana	0.6	5		R	1
53.	Jhao	1.1	8		R	1
54.	Madhar	0.8	4		R	1
55.	Banana		2		R	5
56.	Jiya	0.85	5	L		1
57.	Velco	0.9	7	L		1
AP-28 TO AP-29						
1.	Banana		2	L		270
2.	Shimul	0.65	4	L		1
3.	Velco	0.91	7		R	1
4.	Shimul	1.06	8		R	1
5.	Ajar	0.94	8		R	1
6.	Dumur	0.6	3		R	1
7.	Dumur	0.7	3	L		1
8.	Velco	1	7	L		1
9.	Shimul	1.2	11	L		1

10.	Dumur	0.6	3	L		1
11.	Velco	0.78	4	L		1
12.	Velco	1.8	12	L		1
13.	Dumur	0.67	2	L		1
14.	Ajar	0.9	5	L		1
15.	Ajar	0.6	4	L		1
16.	Krishna Chura	3.1	11		R	1
17.	Velco	0.6	3		R	1
18.	Ajar	0.62	6		R	1
19.	Velco	0.78	5	L		1
20.	Gamari	0.8	6	L		1
21.	Gamari	0.93	11	L		1
22.	Gamari	0.7	7	L		1
23.	Gamari	0.72	7	L		1
24.	Gamari	0.71	6	L		1
25.	Gamari	1.2	9	L		1
26.	Gamari	1.27	8	L		1
27.	Ghora Neem	0.76	9	L		1
28.	Ghora Neem	1.3	9	L		1
29.	Banana		2	L		200
30.	Banana		2		R	200
31.	Gamari	1.2	9	L		1
32.	Sajna	0.8	4	L		1
33.	Shimul	0.65	5		R	1
34.	Shimul	0.68	5		R	1
35.	Velco	0.82	7	L		1
36.	Velco	1	6		R	1
37.	Velco	0.73	8		R	1
38.	Velco	0.93	7		R	1
39.	Velco	1.4	7		R	1
40.	Shimul	1.2	10		R	1
41.	Shimul	1.55	14		R	1
42.	Velco	0.7	3		R	1
43.	Mal	1.28	8		R	1
44.	Shisham	0.89	10		R	1
45.	Jiya	0.6	5		R	1
46.	Koroi	0.96	9	L		1
47.	Velco	0.7	4	L		1
48.	Gamari	1	10	L		1
49.	Velco	1	9	L		1
50.	Velco	0.7	5	L		1
51.	Gamari	1.22	10	L		1
52.	Gamari	0.9	8	L		1
53.	Titasofa	1.2	9	L		1

54.	Velco	1.1	11		R	1
55.	Velco	0.8	7		R	1
56.	Shimul	1.5	16		R	1
57.	Shimul	1.4	13		R	1
58.	Aahud	1.1	8		R	1
59.	Gamari	0.7	5	L		1
60.	Aahud	1.5	13	L		1
61.	Aahud	1.1	7	L		1
62.	Shimul	1.2	14	L		1
63.	Aahud	1.2	11		R	1
64.	Aahud	1.8	11		R	1
65.	Velco	1.1	8		R	1
66.	Sajna	1	6		R	1
67.	Ghora Neem	0.74	6	L		1
68.	Ghora Neem	0.62	6	L		1
69.	Gamari	1.1	9	L		1
70.	Jiya	0.9	8		R	1
71.	Aahud	1	5	L		1
72.	Amra	1	5		R	1
73.	Amra	0.7	4		R	1
74.	Aahud	1.7	8		R	1
75.	Sajna	1	7		R	1
76.	Modhuri	0.8	6		R	1
77.	Shimul	0.7	3	L		1
78.	Shimul	1.2	5	L		1
79.	Shimul	0.93	8	L		1
80.	Shimul	0.92	6	L		1
81.	Koroi	1	5	L		1
82.	Shimul	0.8	4	L		3
83.	Shimul	1	5	L		2
84.	Shimul	0.9	6		R	2
85.	Banana	0.8	2	L		3
86.	Banana	0.8	3	L		1
87.	Velco	1	7	L		1
88.	Velco	1.17	5	L		1
89.	Bogori	0.8	2		R	1
90.	Velco	0.88	5		R	1
91.	Banana		2	L		160
92.	Banana		2		R	150
93.	Banana		1		R	30
AP-29 TO AP-30						
1.	Banana		1		R	62
2.	Banana		1	L		80
3.	Shimul	0.6	3	L		1

4.	Shimul	1	8	L		1
5.	Shisham	0.82	7		R	1
6.	Banana		2		R	40
7.	Banana		2		R	80
8.	Banana		2	L		90
9.	Shimul	0.7	4	L		1
10.	Kadam	0.8	4	L		1
11.	Gamari	0.95	8		R	1
12.	Gamari	0.62	4		R	1
13.	Jiya	0.8	5		R	1
14.	Jamun	0.6	3		R	1
15.	Gamari	0.82	7		R	1
16.	Houla	0.6	3		R	3
17.	Kadam	0.88	7		R	1
18.	Banana		2		R	30
19.	Banana		2	L		140
20.	Awa Dumur	2.1	7	L		1
21.	Kadam	1	7		R	1
22.	Shimul	0.7	5		R	1
23.	Banana		3	L		400
24.	Banana		3		R	236
25.	Shimul	0.6	5	L		2
26.	Shimul	0.6	5		R	1
27.	Banana		2		R	16
28.	Banana		2	L		40
29.	Banana		2		R	40
30.	Kadam	0.9	4		R	1
AP-30TO AP-31						
1.	Velco	0.88	6		R	3
2.	Velco	1	7		R	1
3.	Shimul	1.5	10	L		1
4.	Velco	0.72	5	L		1
5.	Velco	0.82	6	L		1
6.	Aahud	3.1	7		R	1
7.	Velco	1	7		R	1
8.	Velco	0.88	6		R	1
9.	Gamari	1.14	7		R	1
10.	Velco	1.4	7		R	1
11.	Velco	0.82	7		R	1
12.	Mango	1.4	10		R	1
13.	Jhao	1.1	8		R	1
14.	Coconut	1.5	5		R	1
15.	Coconut	1.5	6	L		2
16.	Velco	1	8	L		2

17.	Gamari	1	9	L		3
18.	Gamari	1.34	8		R	1
19.	Gamari	1.6	8		R	1
20.	Gamari	1.4	8		R	1
21.	Titasofa	0.7	3		R	1
22.	Gamari	1.65	9		R	1
23.	Teak	0.6	4		R	1
24.	Coconut	1.5	10		R	3
25.	Teak	0.62	6		R	1
26.	Teak	0.68	6			1
27.	Gamari	0.92	9	L		1
28.	Gamari	0.8	9	L		1
29.	Velco	1.08	6	L		1
30.	Velco	0.87	9	L		1
31.	Gamari	0.62	3	L		1
32.	Satiana	0.75	3	L		1
33.	Banana		2	L		1
34.	Gamari	1.7	8		R	1
35.	Babla	1	6	L		1
36.	Bogori	1	2		R	2
37.	Shimul	1	7		R	2
38.	Aahud	1.8	7		R	1
39.	Hatikunia	4	3		R	1
40.	Aahud	1	4		R	1
41.	Aahud	1.65	8		R	1
42.	Bogori	1.22	3		R	1
43.	Velco	1	4	L		1
44.	Banana		2	L		4
45.	Teak	0.88	6	L		1
46.	Modhuri	1.2	6	L		1
47.	Velco	0.8	5	L		1
48.	Dumur	0.8	4	L		1
49.	Shimul	0.8	4	L		1
50.	Shimul	0.78	5	L		1
51.	Banana		3		R	90
52.	Banana		3	L		140
53.	Ghora Neem	0.6	3	L		1
54.	Teak	0.75	6	L		3
55.	Amra	1	3	L		1
56.	Gamari	1.2	3	L		1
57.	Velco	1.1	7		R	1
58.	Aahud	0.9	4		R	1
59.	Jiya	0.83	3		R	1
60.	Saura	1	3		R	1

61.	Velco	0.75	4		R	3
62.	Mango	1.2	7	L		1
63.	Shimul	1	6	L		1
AP-31 TO AP-32						
1.	Velco	0.9	3	L		1
AP-32 TO AP-33						
1.	Bogori	1.1	3	L		1
2.	Aahud	0.9	3	L		1
3.	Aahud	1.3	6		R	1
4.	Aahud	1	6		R	1
5.	Aahud	1.12	6	L		1
6.	Velco	1	6		R	1
7.	Velco	0.97	6		R	1
8.	Gamari	0.66	6		R	1
9.	Banana		2		R	30
10.	Banana		2	L		60
11.	Teak	0.6	6	L		1
AP-33 TO AP-34						
1.	Aahud	1.1	8		R	1
2.	Aahud	1.2	6		R	1
3.	Kherish	0.6	3		R	3
4.	Teak	0.65	5	L		1
5.	Velco	0.67	5	L		2
6.	Banana		2	L		40
7.	Banana		3	L		200
8.	Banana		3		R	135
9.	Shimul	2.2	14	L		1
10.	Shimul	1.5	12	L		1
11.	Shimul	1.5	12	L		1
12.	Shimul	1.2	11		R	1
13.	Shimul	1.5	13		R	1
14.	Shimul	1.5	10		R	1
15.	Shimul	1.5	10		R	1
16.	Shimul	1.5	13	L		1
17.	Shimul	1.5	12	L		1
18.	Shimul	2.1	13	L		1
AP-34 TO AP-35						
1.	Shimul	1.55	11		R	1
2.	Banana		2	L		5
3.	Banana		2		R	10
4.	Gamari	1	6		R	1
5.	Gamari	0.7	3		R	1
6.	Gamari	0.65	4		R	1
7.	Shimul	1	5		R	1

8.	Kherish	0.7	4		R	1
9.	Shimul	0.8	5		R	3
10.	Ghora Neem	0.7	4		R	1
11.	Ghora Neem	0.83	5	L		1
12.	Kohimulla	0.92	4	L		1
13.	Hatikunia	1.1	6	L		1
14.	Shimul	0.89	6	L		1
15.	Banana		3	L		80
16.	Banana		3		R	70
17.	Gamari	0.6	5		R	1
18.	Lalipuma	0.75	5		R	1
19.	Shimul	0.6	5		R	1
20.	Shimul	0.9	8		R	1
21.	Shimul	0.9	7		R	1
22.	Shimul	0.6	5	L		1
23.	Shimul	0.89	8	L		8
24.	Gamari	0.65	5	L		2
25.	Shimul	1.1	8	L		1
26.	Gamari	0.7	5	L		1
27.	Kherish	0.85	4	L		1
28.	Ghora Neem	0.65	3	L		1
29.	Shimul	1.2	14	L		1
30.	Gamari	1.44	14		R	1
31.	Mos	1	13		R	1
32.	Ghora Neem	0.6	4		R	9
33.	Shal	1	8		R	1
34.	Banana		2		R	80
35.	Ghora Neem	1	5	L		1
36.	Shal	1.32	7	L		1
37.	Shal	0.92	9	L		1
38.	Shal	1.06	9	L		1
39.	Lalipuma	1.08	6		R	1
40.	Shimul	1.7	13		R	1
41.	Madhar	0.7	5		R	1
42.	Gamari	0.6	5	L		1
43.	Kohimulla	0.89	6	L		1
44.	Shimul	0.9	13		R	1
45.	Dumur	0.6	3		R	1
46.	Aahud	1.1	5		R	1
47.	Shimul	1	10		R	1
48.	Aahud	0.76	5		R	4
49.	Shimul	0.6	5		R	4
50.	Aahud	0.7	3	L		1
51.	Shisham	1.3	14	L		1

52.	Banana		2		R	40
53.	Banana		2	L		40
54.	Houla	0.9	6	L		1
55.	Jiya	1	5		R	1
56.	Gamari	1	9	L		1
57.	Houla	1.3	7	L		1
58.	Jhao	0.8	2	L		1
59.	Houla	0.9	4	L		1
60.	Houla	11	9	L		1
61.	Gamari	1	13	L		1
62.	Gamari	1	13	L		3
63.	Gamari	0.88	6	L		2
64.	Dumur	0.6	2	L		1
AP-35 TO AP-36						
1.	Bogori	0.8	3	L		1
2.	Bogori	0.77	3	L		1
3.	Bogori	0.74	3	L		1
4.	Dumur	0.68	3	L		1
5.	Awa Dumur	0.9	3	L		1
6.	Awa Dumur	1	4	L		1
7.	Velco	0.6	5	L		1
8.	Dumur	1	5	L		1
9.	Velco	0.99	5	L		1
10.	Dumur	0.65	2		R	1
11.	Velco	0.68	4	L		1
12.	Dumur	0.76	4	L		1
13.	Velco	0.65	5		R	1
14.	Velco	0.74	5		R	1
15.	Velco	0.95	6		R	1
16.	Velco	0.87	5		R	1
AP-36 TO AP-37						
No Tree						
AP-37 TO AP-38						
1.	Karamcha	0.6	4	L		1
2.	Shimul	0.61	6	L		1
3.	Shirish	0.64	7	L		1
4.	Kadam	0.92	9	L		1
5.	Kadam	0.64	10	L		1
6.	Teak		1		R	16
7.	Velco	0.88	4	L		1
8.	Velco	0.76	5	L		1
9.	Velco	0.65	5	L		1
10.	Velco	0.61	5	L		1
11.	Kadam	0.65	5	L		1

12.	Shirish	0.9	7	L		1
13.	Shirish	1.48	14	L		1
14.	Khujli	1.21	10	L		1
15.	Kohimulla	0.6	4		R	1
16.	Aahud	0.9	4		R	1
17.	Shimul	1.48	15		R	1
18.	Velco	0.84	9		R	1
19.	Velco	3	2		R	3
20.	Shirish	1.6	13		R	1
21.	Gamari	0.82	6		R	1
22.	Gamari	1.06	7		R	1
23.	Gamari	0.73	7		R	1
24.	Aahud	0.63	3		R	1
25.	Shimul	0.6	4		R	1
26.	Koroi	1.1	15		R	1
27.	Dumur	1	2	L		1
28.	Koroi	1.1	11	L		1
29.	Banana		3	L		15
30.	Banana		3		R	35
31.	Gamari	0.8	5		R	1
32.	Gamari	0.83	3		R	1
AP-38 TO AP-39						
1.	Koroi	0.62	6		R	1
2.	Ajar	1.2	8		R	1
3.	Velco	2.2	10	L		1
4.	Karamcha	1	4		R	1
5.	Jhao	1.2	12	L		1
6.	Gamari	0.6	4		R	4
7.	Gamari	0.65	4		R	4
8.	Banana		2		R	10
9.	Coconut	1	7		R	1
10.	Awa Dumur	0.8	2		R	1
11.	Awa Dumur	1.2	5		R	1
12.	Coconut	1.08	9	L		1
13.	Gamari	0.94	8	L		1
14.	Teak	0.8	8	L		1
15.	Teak	0.6	8	L		1
16.	Teak	0.76	8	L		1
17.	Teak	0.65	8	L		1
18.	Teak	0.7	8	L		1
19.	Teak	0.6	8	L		1
20.	Teak	0.8	8	L		1
21.	Kadam	1.38	5	L		1
22.	Lalipuma	0.93	8	L		1

23.	Lalipuma	0.64	8	L		1
24.	Titasofa	0.67	4	L		1
25.	Titasofa	0.67	10	L		1
26.	Gamari	392	8	L		1
27.	Lalipuma	0.9	8	L		1
28.	Gamari	0.95	8	L		1
29.	Gamari	0.83	11	L		1
30.	Gamari	0.7	5	L		1
31.	Gamari	0.65	8	L		1
32.	Teak	0.64	9		R	1
33.	Teak	0.73	9		R	1
34.	Teak	0.7	9		R	1
35.	Teak	0.7	9		R	1
36.	Teak	0.8	9		R	1
37.	Teak	0.84	9		R	1
38.	Teak	0.74	9		R	1
39.	Teak	0.85	9		R	1
40.	Teak	0.75	9		R	1
41.	Teak	0.67	9		R	1
42.	Shimul	0.7	4		R	1
43.	Shimul	0.65	4		R	1
44.	Shimul	0.9	8		R	1
45.	Shimul	0.98	8		R	1
AP-39 TO AP-40						
No Tree						
AP-40 TO AP-41						
No Tree						
AP-41 TO AP-42						
1.	Gamari	0.85	5		R	1
2.	Ajar	0.65	4		R	1
3.	Shimul	0.98	8		R	1
4.	Koroi	1.1	8		R	1
5.	Sajna	0.7	3		R	1
6.	Lalipuma	0.74	5		R	1
7.	Lalipuma	0.64	5		R	1
8.	Sajna	0.9	3	L		1
9.	Lalipuma	0.9	4	L		1
10.	Sajna	1	3	L		1
11.	Houla	0.78	3	L		1
12.	Awa Dumur	1	4	L		1
13.	Awa Dumur	1.4	5		R	1
14.	Teak	1.38	8	L		1
AP-42 TO AP-43						
1.	Satiana	0.65	3		R	1

2.	Gamari	1	5		R	1
3.	Velco	1.09	5	L		1
4.	Velco	0.72	4	L		1
5.	Velco	0.62	4	L		1
6.	Mos	0.7	5	L		1
AP-43 TO AP-44						
1.	Koroi	0.6	5		R	1
2.	Koroi	1	7		R	1
3.	Shimul	1.3	7		R	1
4.	Shimul	0.95	7		R	1
5.	Shimul	0.85	7		R	1
6.	Velco	0.75	4		R	1
7.	Velco	0.68	4		R	1
8.	Velco	0.65	6		R	1
9.	Jhao	0.68	3	L		1
10.	Titasofa	0.75	8	L		1
11.	Houla	0.7	6	L		1
12.	Koroi	1.21	15	L		1
13.	Koroi	1.1	15	L		1
14.	Koroi	1.24	15	L		1
15.	Mos	0.95	12	L		1
16.	Lalipuma	0.7	6	L		1
17.	Lalipuma	0.66	6	L		1
18.	Ajar	1.16	13	L		1
19.	Awa Dumur	0.63	4	L		1
20.	Aahud	2.8	11	L		1
21.	Houla	0.9	5	L		1
22.	Aahud	1	8	L		2
23.	Aahud	1.45	5	L		1
24.	Aahud	0.67	6	L		1
25.	Velco	0.98	4	L		1
AP-44 TO AP-45						
1.	Banana		3	L		7
2.	Banana		3		R	15
AP-45 TO AP-46						
No Tree						
AP-46 TO AP-47						
1.	Shirish	0.61	3		R	
2.	Ajar	1.25	5	L		
3.	Kohimulla	1.3	5	L		
4.	Gamari	0.75	4		R	
AP-47 TO AP-48						
1.	Velco	0.6	4		R	1
AP-48 TO AP-49						

1.	Velco	0.9	5	L		1
AP-49 TO AP-50						
1.	Mos	1.3	9		R	1
2.	Aahud	0.9	4		R	1
3.	Gamari	0.6	5		R	1
4.	Gamari	0.6	5		R	1
5.	Kherish	1.8	7	L		1
6.	Aahud	1.05	7	L		1
7.	Aahud	1.3	7	L		1
8.	Shimul	1.5	11	L		1
9.	Saora	0.6	3	L		1
10.	Aahud	1.37	9	L		1
11.	Khujli	1.06	8		R	1
12.	Jackfruit	0.65	5		R	1
13.	Aahud	0.6	5		R	1
14.	Aahud	0.85	5		R	1
15.	Mos	0.66	4		R	1
16.	Krishna Chura	1.09	7		R	1
17.	Bogori	1.2	8		R	1
AP-50 TO AP-51						
1.	Kadam	0.92	5	L		1
2.	Kadam	0.7	3	L		1
3.	Aahud	1	5		R	1
4.	Kramcha	1	4		R	1
5.	Banana		3		R	10
6.	Aahud	0.68	5	L		1
7.	Gamari	1	6		R	1
8.	Velco	1.22	9		R	1
9.	Aahud	1	4		R	1
10.	Kadam	1.7	20		R	1
11.	Aahud	1.32	7		R	1
12.	Aahud	1.5	7		R	1
13.	Aahud	0.9	5		R	1
14.	Dumur	0.88	4		R	1
15.	Shimul	1.5	15		R	1
16.	Aahud	0.72	5		R	1
17.	Aahud	0.9	13	L		1
18.	Aahud	0.82	12	L		1
19.	Mango	1.05	13	L		1
20.	Jhao	0.97	12	L		1
21.	Aahud	0.7	11	L		1
22.	Aahud	1.6	13	L		1
23.	Aahud	1.38	14	L		1
24.	Jhao	0.9	5		R	1

25.	Aahud	0.75	9		R	1
26.	Aahud	1.4	9		R	1
27.	Aahud	1	12		R	1
28.	Jhao	1	5		R	1
29.	Koroi	1.8	17		R	1
30.	Aahud	0.65	3	L		1
31.	Aahud	1.2	8	L		1
32.	Aahud	1.5	10	L		1
33.	Aahud	2.10	10		R	1
34.	Sajna	1.9	4		R	2
35.	Ghora Neem	0.8	4		R	1
36.	Sajna	0.6	3		R	5
37.	Banana		2		R	20
38.	Velco	1.75	11		R	1
39.	Velco	0.92	9		R	10
40.	Velco	1.3	15		R	1
41.	Velco	1.16	5		R	1
42.	Velco	1.2	8		R	1
43.	Velco	1.55	15		R	1
44.	Velco	1.2	14		R	1
45.	Velco	1.27	13		R	1
46.	Velco	1.22	12		R	1
47.	Dumur	0.75	2		R	1
48.	Velco	0.65	5	L		1
49.	Houla	2.1	5	L		1
50.	Aahud	0.6	3	L		1
AP-51 TO AP-52						
1.	Teak	1.17	12	L		1
2.	Teak	1	11	L		1
3.	Teak	0.97	10	L		1
4.	Teak	0.96	9	L		1
5.	Teak	0.97	7	L		1
6.	Teak	0.91	7	L		1
7.	Teak	1.01	8	L		1
8.	Teak	0.94	7	L		1
9.	Shimul	1.32	15	L		1
10.	Banana		2		R	50
11.	Banana		2	L		20
12.	Shimul	1.12	8		R	1
13.	Banana		2		R	16
14.	Banana		2	L		50
15.	Amra	0.6	3		R	1
16.	Shirish	1.2	10		R	1
17.	Aahud	1.5	6		R	1

18.	Shirish	0.71	7		R	1
19.	Amra	1.4	6		R	1
20.	Mango	0.9	6		R	1
21.	Amra	0.72	4		R	1
22.	Bogori	1.32	4		R	1
AP-52 TO AP-53						
1.	Shirish	0.75	4	L		1
AP-53 TO AP-54						
1.	Shimul	1.23	8	L		1
2.	Shimul	1.12	6		R	1
3.	Shimul	0.62	4		R	1
4.	Shimul	0.6	4		R	1
AP-54 TO AP-55						
1.	Velco	0.89	6	L		1
2.	Velco	0.7	6	L		1
3.	Banana		3	L		30
4.	Shirish	1.4	15	L		1
5.	Velco	0.96	4		R	1
6.	Aahud	0.88	4		R	1
7.	Banana		4		R	50
8.	Satiana	0.91	3	L		1
9.	Aahud	0.72	3	L		1
10.	Aahud	0.7	4	L		1
11.	Aahud	0.65	3	L		1
12.	Aahud	0.69	3	L		1
13.	Amra	0.62	3	L		1
AP-55 TO AP-56						
No Tree						
AP-56 TO AP-57						
No Tree						
AP-57 TO AP-58						
1.	Otanga	1	5	L		1
2.	Amra	0.62	3	L		1
3.	Amra	0.62	4		R	1
AP-58 TO AP-59						
1.	Banana		3	L		17
2.	Banana		3		R	70
3.	Kadam	1.15	8	L		1
4.	Velco	1.5	3	L		1
AP-59 TO AP-60						
1.	Banana		3	L		1
2.	Banana		3		R	1
3.	Jamun	0.65	3	L		6
4.	Jamun	0.6	3	L		1

5.	Jamun	0.85	4		R	2
6.	Jamun	0.98	5		R	1
7.	Jamun	0.91	5		R	1
8.	Jamun	1.1	6		R	1
9.	Lalipuma	0.89	4		R	1
10.	Awa Dumur	0.88	9	L		1
11.	Khujli	1.2	11	L		1
12.	Khujli	0.95	7	L		1
13.	Lalipuma	1	12	L		1
AP-60 TO AP-61						
1.	Velco	1.12	9		R	6
2.	Velco	0.65	3	L		1
3.	Banana		2	L		10
AP-61 TO AP-62						
1.	Shirish	1.2	6	L		1
2.	Shirish	0.95	6	L		1
3.	Shirish	0.98	6	L		1
4.	Shirish	0.97	6	L		1
AP-62 TO AP-63						
1.	Koroi	1.4	10	L		1
2.	Lalipuma	0.92	3	L		1
3.	Lalipuma	0.89	6	L		1
4.	Shirish	0.91	5	L		2
5.	Shirish	0.6	3	L		2
AP-63 TO AP-64						
No Tree						
AP-64 TO AP-65						
No Tree						
AP-65 TO AP-66						
1.	Banana		3	L		5
2.	Banana		3		R	50
3.	Shirish	0.68	3	L		1
AP-66 TO AP-67						
1.	Shimul	0.75	2		R	1
2.	Gamari	0.7	4		R	1
3.	Shimul	1.07	18		R	1
4.	Gamari	0.96	8		R	1
5.	Aahud	0.88	6	L		1
6.	Shisham	0.95	9	L		1
7.	Shimul	0.892	10	L		1
8.	Shimul	0.88	6	L		1
9.	Kohimulla	0.75	8		R	1
10.	Kohimulla	0.63	6		R	1
11.	Banana		2		R	5

12.	Banana		2	L		10
13.	Banana		2	L		10
14.	Banana		2		R	10
15.	Shimul	0.6	3		R	4
16.	Aahud	1.23	3		R	1
17.	Bogori	0.6	3		R	1
18.	Aahud	0.6	5	L		1
AP-67 TO AP-68						
No Tree						
AP-68 TO AP-69						
1.	Madhar	0.77	5		R	1
2.	Shimul	0.75	5	L		1
3.	Shimul	0.64	5	L		1
4.	Shimul	0.8	6	L		1
5.	Madhar	0.85	5		R	1
6.	Madhar	0.7	4		R	1
7.	Aahud	0.6	4	L		1
8.	Aahud	0.85	4	L		1
9.	Banana		2	L		5
10.	Banana		2		R	5
11.	Lalipuma	0.65	4		R	1
12.	Satiana	0.6	4	L		1
13.	Aahud	1.3	4	L		1
14.	Puma	0.6	3	L		1
15.	Aahud	0.95	3	L		1
16.	Kadam	1.3	11	L		1
17.	Puma	0.9	4	L		1
18.	Aahud	0.6	5	L		1
19.	Banana		2	L		20
20.	Madhar	0.65	5	L		1
21.	Banana		2	L		40
22.	Aahud	1.5	8	L		
23.	Jamun	0.6	5	L		2
24.	Gamari	0.62	6	L		1
25.	Karamcha	0.7	5	L		1
26.	Shisham	0.9	11	L		1
27.	Karamcha	0.6	4	L		1
28.	Banana		2	L		10
29.	Mos	1021	9	L		1
30.	Mango	0.7	6	L		1
31.	Mos	0.82	9	L		1
32.	Mango	0.85	4	L		1
33.	Kadam	0.92	10	L		1
34.	Gamari	0.62	5	L		1

35.	Kohimulla	0.7	7		R	1
36.	Gamari	0.8	7	L		1
37.	Banana		3	L		100
38.	Banana		3		R	40
39.	Jamun	0.78	7	L		1
40.	Kohimulla	0.8	6		R	1
41.	Aahud	3.5	14		R	1
42.	Mango	0.65	4	L		1
43.	Shimul	2.5	20	L		1
44.	Shimul	1.5	14	L		1
45.	Awa Dumur	1.1	7	L		1
46.	Sajna	0.82	3	L		1
47.	Teak	81	8	L		1
48.	Jamun	0.95	5	L		1
49.	Teak	0.6	6	L		1
50.	Shimul	0.95	7		R	1
51.	Shimul	0.62	4		R	1
52.	Kohimulla	1.1	8		R	1
53.	Teak	0.65	6		R	1
54.	Shimul	0.92	8		R	1
55.	Teak	0.7	6		R	1
56.	Jamun	0.64	5		R	1
57.	Shimul	0.83	8		R	1
58.	Mos	1.06	11		R	1
59.	Aahud	1.44	9		R	1
60.	Jamun	0.7	3	L		1
61.	Houla	0.65	3		R	1
62.	Kadam	0.85	5		R	1
63.	Mango	0.87	6		R	1
64.	Mango	1.04	7		R	1
65.	Kohimulla	1	6		R	1
66.	Banana		9	L		30
67.	Banana		3		R	30
68.	Bogori	0.63	3	L		1
69.	Kadam	0.83	6	L		1
AP-69 TO AP-70						
1.	Mos	1.2	14	L		1
2.	Shimul	0.73	7	L		1
3.	Shimul	1.05	12	L		1
4.	Awa Dumur	1.2	10	L		1
5.	Kohimulla	0.95	10	L		1
6.	Aahud	0.95	5	L		1
7.	Aahud	0.69	5			1
8.	Aahud	0.88	6	L		1

9.	Aahud	1.3	9		R	1
10.	Aahud	0.65	3		R	1
11.	Banana		3		R	50
12.	Banana		3	L		50
13.	Aahud	0.7	4		R	1
14.	Aahud	1	5	L		1
15.	Aahud	0.92	4	L		1
16.	Aahud	0.7	5	L		1
17.	Aahud	0.83	4	L		1
18.	Jamun	0.67	5	L		1
19.	Aahud	0.77	4	L		1
20.	Jamun	101	12	L		1
21.	Aahud	1.2	9	L		1
22.	Mango	0.7	5	L		1
23.	Bogori	0.9	2	L		1
24.	Mos	0.97	10	L		1
25.	Aahud	0.955	7	L		1
26.	Aahud	0.75	8	L		1
27.	Aahud	1.13	7	L		1
28.	Uram	0.61	6	L		1
29.	Shimul	1.15	10	L		1
30.	Shimul	0.71	5	L		1
31.	Shimul	0.6	4	L		1
AP-70 TO AP-71						
1.	Bogori	0.66	8	L		1
2.	Shirish	1.1	6		R	1
3.	Shirish	0.6	4		R	1
4.	Kohimulla	0.8	4	L		1
5.	Uram	0.77	9	L		1
6.	Khujli	1.07	7	L		1
7.	Mos	0.8	10		R	1
8.	Banana		3	L		20
9.	Banana		3		R	20
10.	Kohimulla	4	5	L		1
11.	Aahud	0.95	15	L		1
12.	Mango	0.89	11	L		1
13.	Satiana	0.6	4	L		1
14.	Banana		2	L		75
15.	Kohimulla	0.78	6		R	1
16.	Aahud	1.51	9	L		1
17.	Banana		3	L		40
18.	Mango	0.65	3	L		1
19.	Mango	0.68	3	L		1
20.	Shimul	0.7	3	L		1

21.	Shimul	0.7	4	L		1
22.	Mango	4	5	L		1
23.	Shimul	0.86	5	L		1
24.	Satiana	0.7	6		R	1
25.	Satiana	0.73	5		R	1
26.	Kohimulla	0.6	5		R	1
27.	Mango	0.8	5		R	1
28.	Satiana	0.64	3		R	1
29.	Satiana	0.65	4		R	1
30.	Satiana	0.75	4		R	1
31.	Satiana	0.8	3		R	1
32.	Shimul	0.95	8		R	1
33.	Banana		2	L		10
AP-71 TO AP-72						
1.	Banana		2	L		10
2.	Banana		2		R	10
AP-72 TO AP-73						
No Tree						
AP-73 TO AP-74						
1.	Shisham	0.9	6		R	1
2.	Aahud	0.8	4		R	1
3.	Aahud	0.6	4	L		1
4.	Shirish	1.2	13	L		1
5.	Banana			L		4
6.	Banana				R	15
AP-74 TO AP-75						
1.	Velco	0.75	5		R	1
2.	Velco	0.6	5		R	1
3.	Korso	0.6	5		R	1
4.	Velco	0.75	4		R	3
5.	Velco	0.6	5		R	1
6.	Velco	0.85	6	L		1
AP-75 TO U/C TN.-9						
1.	Velco	1.2	7	L		1
2.	Velco	0.9	7	L		1
3.	Velco	1.5	7		R	1
4.	Velco	0.85	7	L		4
5.	Awa Dumur	0.85	7	L		1
6.	Velco	0.8	5		R	1
7.	Himolu	0.6	5		R	1

APPENDIX 10: AVIFAUNA DETAILS AS PER AVISTEP ANALYSIS

AVISTEP India

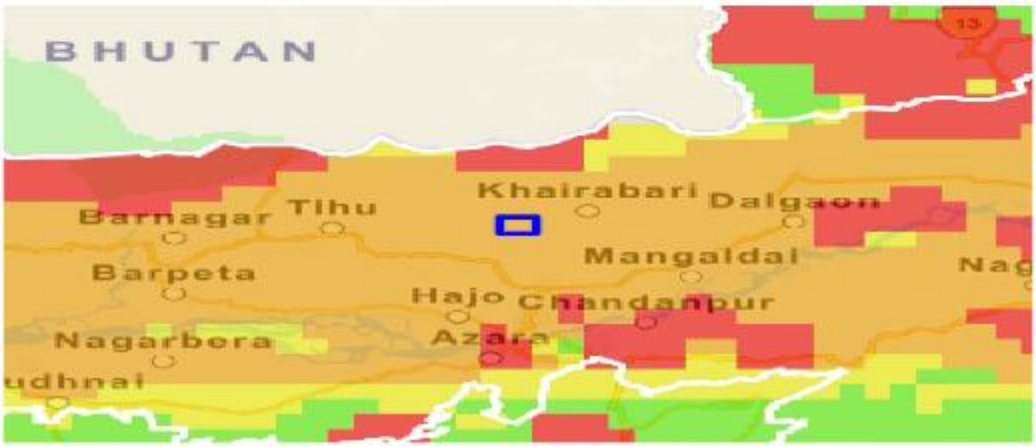
BirdLife

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Development is considered to pose a high risk to bird populations. However, comprehensive site-level assessment is necessary to confirm this level of risk.



Grid cells represent approximately 5km x 5km area

1 of 11

AVISTEP India

BirdLife INTERNATIONAL

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Bengal Florican	Houbaropsis bengalensis	Critically Endangered (CR)	100.0	Low
 Greater Adjutant	Leptoptilos dubius	Endangered (EN)	87.9	Medium
 Sarus Crane	Grus antigone	Vulnerable (VU)	75.4	Medium
 Lesser Adjutant	Leptoptilos javanicus	Vulnerable (VU)	73.7	Medium
 Manipur Bush-quail	Perdicula manipuransis	Endangered (EN)	65.3	Low
 Asian Woollyneck	Ciconia episcopus	Nearly Threatened (NT)	58.8	Medium
 Painted Stork	Mycteria leucocephala	Nearly Threatened (NT)	58.8	Medium

2 of 11

AVISTEP India

BirdLife INTERNATIONAL

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Swamp Francolin	Francolinus gularis	Vulnerable (VU)	53.4	Medium
 Black-necked Stork	Ephippiorhynchus asiaticus	Nearly Threatened (NT)	53.1	Medium
 Baer's Pochard	Aythya baeri	Critically Endangered (CR)	50.8	Low
 Black-bellied Tern	Sterna acuticauda	Endangered (EN)	43.7	Medium
 Spot-billed Pelican	Pelecanus philippensis	Nearly Threatened (NT)	38.8	Medium
 River Lapwing	Vanellus duvaucelii	Nearly Threatened (NT)	36.3	Medium
 Asian Openbill	Anastomus oscitans	Least Concern (LC)	35.4	Medium

3 of 11

AVISTEP India

BirdLife

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Black-tailed Godwit	Limosa limosa	Nearly Threatened (NT)	33.5	Low
 River Tern	Sterna aurantia	Vulnerable (VU)	33.2	Medium
 Common Pochard	Aythya ferina	Vulnerable (VU)	30.4	Medium
 White-rumped Vulture	Gyps bengalensis	Critically Endangered (CR)	26.2	Medium
 Slender-billed Vulture	Gyps tenuirostris	Critically Endangered (CR)	26.2	Medium
 Red-headed Vulture	Sarcogyps calvus	Critically Endangered (CR)	26.2	Medium
 Indian Peafowl	Pavo cristatus	Least Concern (LC)	24.3	Medium

4 of 11

AVISTEP India

BirdLife INTERNATIONAL

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 White Stork	Ciconia ciconia	Least Concern (LC)	23.4	Low
 Black Stork	Ciconia nigra	Least Concern (LC)	23.4	Low
 Oriental Darter	Anhinga melanogaster	Nearly Threatened (NT)	21.5	Medium
 Great Thick-knee	Esacus recurvirostris	Nearly Threatened (NT)	21.5	Medium
 Black-headed Ibis	Threskiornis melanocephalus	Nearly Threatened (NT)	21.5	Medium
 Alexandrine Parakeet	Palaeornis eupatria	Nearly Threatened (NT)	19.5	Low
 Steppe Eagle	Aquila nipalensis	Endangered (EN)	19.0	Medium

5 of 11

AVISTEP India

BirdLife INTERNATIONAL

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Pallas's Fish-eagle	Haliaeetus leucoryphus	Endangered (EN)	19.0	Low
 Rain Quail	Coturnix coromandelica	Least Concern (LC)	18.6	Medium
 Little Ringed Plover	Charadrius dubius	Least Concern (LC)	15.3	Medium
 Indian Spotted Eagle	Clanga hastata	Vulnerable (VU)	14.6	Medium
 Blossom-headed Parakeet	Himalayapsitta roseata	Nearly Threatened (NT)	14.6	Medium
 Falcated Duck	Mareca falcata	Nearly Threatened (NT)	14.6	Low
 Red-breasted Parakeet	Psittacula alexandri	Nearly Threatened (NT)	14.6	Medium

AVISTEP India

BirdLife INTERNATIONAL

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Red Junglefowl	Gallus gallus	Least Concern (LC)	11.5	Medium
 Common Greenshank	Tringa nebularia	Least Concern (LC)	11.5	Medium
 Common Redshank	Tringa totanus	Least Concern (LC)	11.5	Medium
 Red-wattled Lapwing	Vanellus indicus	Least Concern (LC)	11.5	Medium
 Ferruginous Duck	Aythya nyroca	Nearly Threatened (NT)	11.5	Medium
 Grey-headed Parakeet	Himalayapsitta finschii	Nearly Threatened (NT)	11.5	Low
 Greater Spotted Eagle	Clanga clanga	Vulnerable (VU)	10.8	Medium

AVISTEP India

BirdLife

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Indian Pond-heron	Ardeola grayii	Least Concern (LC)	7.7	Medium
 Indian Thick-knee	Burhinus indicus	Least Concern (LC)	7.7	Medium
 Kentish Plover	Charadrius alexandrinus	Least Concern (LC)	7.4	Medium
 Long-billed Plover	Charadrius placidus	Least Concern (LC)	7.4	Low
 Black Francolin	Francolinus francolinus	Least Concern (LC)	7.4	Low
 Greater Painted-snipe	Rostratula benghalensis	Least Concern (LC)	7.4	Medium
 Green Sandpiper	Tringa ochropus	Least Concern (LC)	7.4	Medium

8 of 11

AVISTEP India

BirdLife INTERNATIONAL

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Marsh Sandpiper	Tringa stagnatilis	Least Concern (LC)	7.4	Medium
 Barred Buttonquail	Turnix suscitator	Least Concern (LC)	7.4	Medium
 Yellow-legged Buttonquail	Turnix tanki	Least Concern (LC)	7.4	Medium
 Grey-headed Lapwing	Vanellus cinereus	Least Concern (LC)	7.4	Medium
 Brown Fish-owl	Ketupa zeylonensis	Least Concern (LC)	5.3	Low
 Ashy-headed Green-pigeon	Treron phayrei	Nearly Threatened (NT)	3.5	Low
 Red-headed Falcon	Falco chicquera	Nearly Threatened (NT)	2.7	Medium

9 of 11

AVISTEP India

BirdLife

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Himalayan Griffon	Gyps himalayensis	Nearly Threatened (NT)	2.7	Medium
 Spotted Owlet	Athene brama	Least Concern (LC)	2.7	Medium
 Pallas's Gull	Larus ichthyaetus	Least Concern (LC)	2.7	Medium
 Indian Cormorant	Phalacrocorax fuscicollis	Least Concern (LC)	2.7	Medium
 Common Sandpiper	Actitis hypoleucos	Least Concern (LC)	2.8	Medium
 Common Snipe	Gallinago gallinago	Least Concern (LC)	2.8	Medium
 Asian Blue Quail	Synoicus chinensis	Least Concern (LC)	2.8	Medium

AVISTEP India

BirdLife

Transmission Powerlines Assessment

26.55352N, 91.67267E

Sensitivity Score: 81%

Sensitive Species

Species	Scientific Name	Status	Collision	Occurence Certainty
 Common Buttonquail	Turnix sylvaticus	Least Concern (LC)	2.8	Low
 Cinereous Vulture	Aegypius monachus	Nearly Threatened (NT)	1.0	Medium
 Bearded Vulture	Gypaetus barbatus	Nearly Threatened (NT)	1.0	Low
 Lesser Fish-eagle	Ichthyophaga humilis	Nearly Threatened (NT)	1.0	Low
 Grey-headed Fish-eagle	Ichthyophaga ichthyaetus	Nearly Threatened (NT)	1.0	Low
 Rufous-bellied Eagle	Lophotriorchis kienerii	Nearly Threatened (NT)	1.0	Low

11 of 11

APPENDIX 11: WORKERS' CODE OF CONDUCT

*OFFICIAL USE ONLY

WORKERS' CODE OF CONDUCT

I, _____, do hereby acknowledge that preventing any misconduct as stipulated in this code of conduct, including Gender-Based Violence (GBV), Sexual Exploitation and Abuse(SEA)/Sexual Harassment (SH) is important. Any activity that constitutes an act of gross misconduct is therefore ground for sanctions, penalties, termination of employment or even prosecution. All forms of misconduct are unacceptable, be it on the worksite, the worksite surroundings or at worker's camps.

I agree, while working on this project, that I will:

1. Consent to security background checks.
2. Treat women, children (persons under the age of 18) and persons with disability with respect regardless of race, language, religion, political or other opinion, nationality, ethnicity, cultural beliefs/practices, financial or other status.
3. Not use language or behaviour towards men, women or children/learners that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
4. Not participate in sexual activity with children/learners—including grooming or through digital media. Mistaken belief regarding the age of, and consent from, the child is not a defence in the eyes of the law.
5. Not exchange money, employment, goods, or services for sex, with community members, including sexual favours or other forms of humiliation, degrading or exploitative behaviour.
6. Not have sexual interactions with members of the communities surrounding the workplace, worker's camps and fellow workers that are not agreed to, with full consent by all parties involved in the act. This includes relationships involving the withholding, promise of, or actual provision of benefit (monetary or non-monetary) to community members in exchange for sex - such sexual activity is considered "non-consensual" within the scope of this Project.
7. Attend trainings related to HIV/AIDS, GBV (SEA/SH), occupational health and any other relevant courses on safety, as requested by my employer.

Page | 1

*OFFICIAL USE ONLY

8. Report to the relevant committee, any situation where I may have concerns or suspicions regarding acts of misconduct by a fellow worker, whether in my company or not, or any breaches of this code of conduct.
9. Refrain from any form of theft of assets and facilities, including from surrounding communities.
10. Remain in designated working area during working hours.
11. Ensure that possession of, or being under the influence of alcohol, illegal drugs and other controlled substances in the workplace and during working hours is strictly prohibited.
12. Wear mandatory PPE at all times during work.
13. Follow prescribed environmental and occupational health and safety standards.
14. Channel grievances through the established Grievance Redress Mechanism.

RAISING CONCERNS

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

CONSEQUENCES OF VIOLATING THE CODE OF CONDUCT

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

****ATTESTATION****

I acknowledge that I have read and clearly understand this Code of Conduct, along with the consequences should I refuse to comply.

****WORKER****

Signed by:

Signature and Date: _____ __

****ENDORSED BY (THE EMPLOYER/SUPERVISOR) ****

Name and Designation:

Signature and Date: _____

_____

Page | 2

*OFFICIAL USE ONLY

শ্রমিকৰ আচৰণ বিধি

মই,_____ , এই আচৰণ বিধিৰ অধীনস্থ যিকোনো অনিয়ম, যাৰ অন্তর্ভুক্ত লিংগভিত্তিক হিংসা (GBV), যৌনশোষণ আৰু অপব্যৱহাৰ (SEA)/(SH) যৌন হানি ৰ দৰে কার্যলগত জড়িত ব্যক্তিক আটক কৰাটো অতি গুৰুত্বপূর্ণ বুলি বিশ্বাস কৰোঁ। যিকোনো ধৰণৰ গম্ভীৰ অনিয়মৰ দৰে কার্যত লিপ্ত থাকিলে আইনসন্মত ভাবে দণ্ডনীয় আৰু ইয়াৰ বাবে চাকৰিৰ পৰা বহিষ্কাৰ বা আইনী পদক্ষেপ গ্রহণৰ ব্যৱস্থা আছে। কামৰ ঠাই আৰু সেই স্থানৰ পৰিৱেশ বা শ্রমিক শিবিৰত এই ধৰণৰ সকলো আচৰণ গ্রহণযোগ্য নহয়।

মই এই প্রকল্পত কাম কৰি থাকোতে, নিম্নলিখিত নিয়মসমূহ মানি চলিম:

১. নিৰাপত্তা জনিত নিয়মাৱলী সমূহ ভালদৰে মানি চলিম।

২. মহিলা, শিশু (১৮ বছৰৰ তলৰ লোক) আৰু শাৰীৰিক ভাৱে অক্ষম ব্যক্তিসকলক জাতি, ভাষা, ধর্ম, ৰাজনৈতিক মতামত, জাতীয়তা, সাংস্কৃতিক বিশ্বাস/অনুশীলন, অর্থনৈতিক বা অন্য স্থিতিৰ পৰা নিৰপেক্ষভাৱে সন্মান প্রদর্শন কৰিম।

৩. পুৰুষ, মহিলা বা শিশু/বিদ্যার্থীৰ সৈতে অপ্রাসঙ্গিক, অপমানজনক, যৌন হানি অথবা যৌন উৎপিড়ন দৰে কার্য কলাপৰ লগতে অশ্লিতিকৰ ভাষা বা আচৰণ প্রদর্শন নকৰোঁ।

৪. শিশু/বিদ্যার্থীৰ সৈতে যৌন সম্পর্কত লিপ্ত নহওঁ— এয়া ডিজিটেল মাধ্যমেৰে জৰিয়ত হওঁক বা অন্য উপায়ৰে হ'লেও। শিশুৰ বয়সৰ সম্পর্কত ভুল ধাৰণা বা তেওঁৰ অনুমতি থকাৰ ভুল ব্যাখ্যা আইনগত ভাবে গ্রহণযোগ্য নহয়।

৫. বিশেষ সম্প্রদায়ৰ সদস্যসকলৰ সৈতে যৌন সুবিধাৰ বিনিময়ত ধন, চাকৰি, সামগ্রী বা সেৱা দান নকৰোঁ, বা অন্য কোনো অপমানজনক অথৱা শোষণমূলক আচৰণ নকৰোঁ।

৬. কর্মক্ষেত্র, শ্রমিকৰ শিবিৰ আৰু সহকর্মীসকলৰ সৈতে বা আশে-পাশে থকা সম্প্রদায়ৰ সদস্যসকলৰ সৈতে যৌন সম্পর্ক স্থাপন নকৰোঁ। ইয়াৰ ভিতৰত যৌনতাৰ বিনিময়ত সম্প্রদায়ৰ সদস্যসকলক সুবিধা (আর্থিক বা অ-আর্থিক) ৰখা, প্রতিশ্রুতি দিয়া বা প্রকৃততে প্রদান কৰা সম্পর্কসমূহো অন্তর্ভুক্ত - এনে যৌন কার্যকলাপক এই প্রকল্পৰ পৰিসৰৰ ভিতৰত "অসন্মতিসূচক" বুলি গণ্য কৰা হয়।

৭. লিংগভিত্তিক হিংসা, যৌনশোষণ আৰু যৌন হানিৰ অপব্যৱহাৰপ্রতিৰোধ কৰা প্রশিক্ষণত আৰু কার্য কর্মক্ষেত্রৰ স্বাস্থ্য আৰু নিৰাপত্তা সম্পর্কীয় প্রশিক্ষণত অংশগ্রহণ কৰিম।

৮. কোনো সহকর্মী (আমাৰ কোম্পানীৰ, বা অন্য কোম্পানীৰ) সৈতে অনৈতিক আচৰণ সংঘটিত হোৱাৰ সন্দেহ থাকিলে, আমি সংশ্লিষ্ট সমিতিক অৱগত কৰিম।

৯. কর্মসংস্থান আৰু কর্মসংস্থান লগত জড়িত সম্প্রদায়ৰ সম্পত্তি কোনো ধৰণৰ চুৰি নকৰোঁ।

Page | 3

*OFFICIAL USE ONLY

১০. কর্ম ঘণ্টাৰ সময়ত নির্ধাৰিত কামৰ স্থানত উপস্থিত থাকিম।

১১. কর্মঘণ্টাৰ সময়ত মাদক, সুৰা বা নিষিদ্ধ বস্তু ব্যৱহাৰ নকৰোঁ।

১২. কর্মক্ষেত্রত নির্ধাৰিত ব্যক্তিগত সুৰক্ষা সঁজুলি (PPE) সদায় পৰিধান কৰিম।

১৩. পৰিবেশ আৰু কর্মক্ষেত্রৰ স্বাস্থ্য আৰু নিৰাপত্তাৰ নির্ধাৰিত মানদণ্ড মানি চলিম।

১৪. অভিযোগৰ ক্ষেত্রত স্থাপন কৰা অভিযোগ নিষ্পত্তি প্রক্রিয়া (Grievance Redress Mechanism) অনুসৰণ কৰিম।

অভিযোগ উত্থাপন

এই আচৰণ বিধিত নিষিদ্ধ যিকোনো কার্য সম্পর্কে অভিযোগ উত্থাপন কৰা যিকোনো ব্যক্তিৰ ওপৰত কোনো ধৰনৰ ব্যৱস্থা প্রতিশোধমূলক কার্য হাতত নলঁও। এনে প্রতিশোধমূলক কার্য্য এই আচৰণ বিধিৰ উলংঘন হিচাপে গণ্য কৰা হ'ব।

আচৰণ বিধি উলংঘনৰ ফলাফল

এই আচৰণ বিধি উলংঘন কৰিলে গম্ভীৰ ফলাফলৰ সন্মুখীন হ'ব লাগিব, যাৰ অন্তর্ভুক্ত চাকৰিৰ পৰা বহিষ্কাৰ বা আইনী ব্যৱস্থা গ্রহণও অন্তর্ভুক্ত হ'ব পাৰে।

স্বীকাৰোক্তি

মই এই আচৰণ বিধি পঢ়িছোঁ আৰু ইয়াৰ বিধি-বিধান আৰু প্রযোজ্য পৰিণামবোৰ সম্পূর্ণৰূপে বুজি পাইছোঁ।

শ্রমিক স্বাক্ষৰ আৰু তাৰিখ:

অনুমোদন (নিয়োগকর্তা/পৰিদর্শক)_____

নাম আৰু পদবি:_____

স্বাক্ষৰ আৰু তাৰিখ: _____

Page | 4

APPENDIX 12: DETAILS OF IBA SITES OF ASSAM

IMPORTANT BIRD AND BIODIVERSITY AREAS IN INDIA – ASSAM

IN-AS

IBAs of Assam		
IBA site codes	**IBA site names**	**IBA criteria**
IN-AS-01	Amchang Wildlife Sanctuary	A1
IN-AS-02	Barail Range	A1, A2, A3
IN-AS-03	Barnadi Wildlife Sanctuary	A1
IN-AS-04	Bauwwa *Beel*	A1
IN-AS-05	Behali Reserve Forest	A1, A3
IN-AS-06	Bherjan-Borajan-Podumoni Wildlife Sanctuary	A1
IN-AS-07	Borchibam-Bilmukh Bird Sanctuary	A1
IN-AS-08	Bordoloni-Sampora	A1, A2, A4i
IN-AS-09	Chakrashila Complex	A1, A4i, A4iii
IN-AS-10	Chandubi Lake and adjoining areas	A1
IN-AS-11	Deobali Jalah	A1, A4i
IN-AS-12	Dhansiri Reserve Forest	A1, A4i
IN-AS-13	Dibru-Saikhowa Complex	A1, A2
IN-AS-14	Deepor *Beel* Sanctuary	A1, A4iii
IN-AS-15	Dum Duma-Dangori & Kumsong Reserve Forests	A1
IN-AS-16	East and North Karbi Anglong Wildlife Sanctuaries	A1
IN-AS-17	Garampani, Nambor and Doigrung	A1
IN-AS-18	Hollongapar Gibbon Sanctuary	A1
IN-AS-19	Hubong and Umru	A4iii
IN-AS-20	Inner Line (East), Katakhal and Barak Reserve Forests	A1
IN-AS-21	Jamjing and Sengajan	A1
IN-AS-22	Jatinga	A1, A4iv
IN-AS-23	Jengdia *Beel* and Satgaon	A1
IN-AS-24	Jhanjimukh-Kokilamukh	A1, A4i
IN-AS-25	Kaziranga National Park	A1, A2, A4i, A4iii
IN-AS-26	Kuarbari-Dalani	A1
IN-AS-27	Langting-Mupa Reserve Forest	A1
IN-AS-28	Laokhowa and Burhachapori Sanctuaries	A1, A2
IN-AS-29	Lumding Reserve Forest	A1
IN-AS-30	Majuli Island	A1, A4iii
IN-AS-31	Manas National Park	A1, A2
IN-AS-32	Nameri National Park	A1, A2
IN-AS-33	Orang National Park	A1, A4i
IN-AS-34	Pabho Reserve Forest	A1, A2
IN-AS-35	Pobitora Wildlife Sanctuary	A1, A2, A4iii
IN-AS-36	Pani-Dihing Bird Sanctuary	A1, A4iii
IN-AS-37	Rigu Reserve Forest	A1, A2
IN-AS-38	Sibsagar Tanks	A1, A4i
IN-AS-39	Sun *Beel*	A1
IN-AS-40	Sonai-Rupai Wildlife Sanctuary	A1
IN-AS-41	Subansiri Duliang	A1, A2
IN-AS-42	Tamaranga-Doloni-Bhairab Complex	A1, A4iii
IN-AS-43	Tirap-Barbidibing	A1
IN-AS-44	Upper Dihing (East) Complex	A1, A2
IN-AS-45	Upper Dihing (West) Complex	A1, A2
IN-AS-46	Urpod *Beel*	A1, A4iii
IN-AS-47	Barail Wildlife Sanctuary	A1, A2, A3
IN-AS-48	Chirang Reserve Forest	A1, A2
IN-AS-49	Dadara-Pasariya Singimari	A1
IN-AS-50	Innerline (West) and Kathalkal Reserve Forest	A1
IN-AS-51	Krungming Reserve Forest, Khorongma & Kopili-Umrangsu Reservoir	A1, A4ii
IN-AS-52	Maguri and Motapung Beels	A1, A2
IN-AS-53	Manas Reserve Forest	A1, A2
IN-AS-54	Marat Longri Wildlife Sanctuary	A1
IN-AS-55	Saroswer Beel	A1, A4iii