12 Environmental Management Plan

12.1 Introduction

833. ADB's Safeguard Policy Statement (SPS) 2009 requires that an Environmental Management Plan (EMP) be prepared to ensure construction and operation of the Power Transmission Strengthening and Integration of Renewable Energy Project (PTSIREP) (the Project) will be undertaken in accordance with its safeguard requirements. This Chapter describes the EMP of the Project. It defines the roles and responsibilities for implementation, supervision and monitoring by PGCB and their Contractors; lists the mitigation measures which are to be implemented to reduce potential impacts and risks to a level acceptable to ADB and national regulatory authorities; gives guidance to the Contractors for preparation of their Contractors Site Specific Environmental Management Plans (CSEMP) and Health and Safety (H&S) Plans under the contract; gives an outline of the monitoring requirements to ensure that the mitigation measures are effective, the capacity development requirements to ensure all parties understand what is required, and, the corresponding cost of the mitigation, supervision and monitoring activities.

834. The primary aim of the EMP is to avoid, minimize, mitigate or compensate for potential negative environmental impacts and risks of the Project by identifying general and site-specific mitigation measures to be followed, and to support positive impacts where possible by enhancement measures. In doing so, it seeks to ensure compliance with (i) ADB's Safeguard Policy Statement 2009 requirements and international good practice as set out in the related International Finance Corporation (IFC) Environment, Health and Safety (EHS), General and Electric Power Transmission and Distribution guidelines, and (ii) applicable national environmental, health and safety requirements, including the international agreements which the Government of Bangladesh (GoB) is a signatory to, as well as having cognizance of the sensitivity of local ecological and human receptors in the project area of influence around each project site.

835. The specific objectives of the EMP are to:

- Summarize the potential negative environmental impacts and risks arising from the various activities associated with the construction, and operation and maintenance phases of the Project;
- Facilitate the implementation of mitigation measures to avoid, minimize, mitigate or compensate all negative impacts and risks from the design phase, through the pre-construction, construction, and the operation and maintenance phases of the Project;
- Define the roles, responsibilities, and obligations of PGCB's Project Management Unit (PMU) supported by a Safeguards Implementation Consultant (SIC) and the environmental and social unit (ESU) of PGCB;
- Set out the roles, responsibilities, and obligations of PGCB's Contractors and other third parties; and
- Define a supervision and monitoring mechanism, plus environmental reporting requirements to check if mitigation measures are effective and ensure the environmental compliance of the Project.

836. The EMP reflects the legal requirements of the Bangladesh government on environment, health and safety and ADB's Safeguard Policy Statement (2009) including international good practice related to the negative environmental impacts and risks predicted during implementation. It requires adherence to guideline levels and national standards; prohibits the use of PCBs in new transformers and the use of asbestos containing materials in new construction; and requires PGCB and their contractors to undertake community awareness raising activities on the health and safety risks of construction and utility electrical equipment.

837. This EMP provides the overall Project-level EMP for contract packages involving works:

Table 12.1: List of Packages

Package	Items
Package: 1 Pekua	Proposed 400/230/132 KV New AIS Substation at Pekua/Chakaria
	LILO of Matarbari PP – Banskhali PP double circuit 400KV line at Matarbari (Quad ACSR Finch)
	LILO of Anwara-Cox's Bazar 230KV line at Matarbari (Twin ACSR Mallard)
	LILO of Existing Matarbari – Chakaria 132KV line at Matarbari (ACSR Grosbeak)
Package: 2 Madhabpur Monohardi	Proposed 230/132/33 KV New AIS Substation at Madhabpur, Habiganj
	Proposed 230/132/33 New AIS Substation at Monohardi, Narsingdi
	2x132 KV AIS Bay Extension at Bajitpur Substation
	LILO of Sripur-Ashuganj 230KV double circuit line at Monohordi (Twin ACSR Mallard)
	LILO of Cumilla(N) – Shahjibazar PP 230KV double circuit line at Madhabpur (Twin ACSR Mallard)
	Monohardi-Bajitpur 132KV double circuit line (Single ACSR Grosbeak)
Package: 3 Tungipara Mathbaria Paikgacha	Proposed 132/33 New AIS Substation at Tungipara, Gopalganj
	Proposed 132/33 New AIS Substation at Mathbaria, Pirojpur
	Proposed 132/33 New AIS Substation at Paikgacha, Khulna
	2x132 KV AIS Bay Extension at Gopalganj Substation
	2x132 KV AIS Bay Extension at Satkhira Substation
	2x132 KV AIS Bay Extension at Bhandaria Substation
Package: 4 Kumarkhali Dupchanchia Matlab Uttar Chatkhil	Proposed 132/33 New AIS Substation at Kumarkhali, Kushtia
	Proposed 132/33 New AIS Substation at Dupchanchia, Bagura
	Proposed 132/33 New AIS Substation at Matlab Uttar, Chandpur
	Proposed 132/33 New AIS Substation at Chatkhil, Noakhali
	2x132 KV AIS Bay Extension at Kachua 230/132/33 KV Substation
Package: 5	Gopalganj-Tungipara 132KV double circuit line (Single ACSR Grosbeak)
	Satkhira-Paikgacha 132KV double circuit line (Single ACSR Grosbeak)
	Kachua- Matlab North 132KV double circuit line (Single ACSR Grosbeak)
	Bhandaria-Mathbaria 132KV double circuit line (Single ACSR Grosbeak)
	LILO of Chowmuhani-Ramganj 132KV double circuit line at Chatkhil (Single ACSR Grosbeak)
	LILO of Shahjibazar – Brahmanbaria 132KV double circuit line at Madhabpur (Single ACCC Grosbeak)
	LILO of Bogura(S)-Naogaon 132KV line at Dupchanchia (Single ACCC Grosbeak)
	LILO of Bheramara – Rajbari 132KV line at Kumarkhali (Single ACCC Grosbeak)
	Reconductoring of Shahjibazar-Brahmanbaria-Ashuganj 132KV line (Single ACCC Grosbeak)

838. The generic parts of the EMP are applicable to all contract packages regardless they will follow ADB or PGCB procurement requirements. In addition, works-specific measures are provided for the five different types of contract package. Site-specific measures have also been developed for the 10 number new substations, the 10 number of bay extension at five existing grid substations and the major transmission lines as shown in Table 12.2. Pertinent requirements related to equipment specifications will also need to be incorporated into the contract packages for the supply different equipment and other items under the Project.

Table 12.2: List of New Substations and Substation Bay Extensions under the Project

Sl	Substation Name	Type	Remarks		
			Capacity (MVA)	Land Requirement	Future Required Bay
1	Pekua	400/230/132 kV New AIS Substation	3x520 MVA (400/230 kV) & 2x225/300 MVA (230/132 kV)	32 Acres	400 kV: 4 230 kV: 4 132 kV: 4

Sl	Substation Name	Type	Remarks		
			Capacity (MVA)	Land Requirement	Future Required Bay
2	Madhabpur	230/132/33 kV New AIS Substation	3x225/300 (230/132 kV) & 2x80/120 (132/33 kV)	10 Acres	230 kV: 3 132 kV: 3
3	Monohardi	230/132/33 New AIS Substation	2x225/300 (230/132 kV) & 2x80/120 (132/33 kV)	10 Acres	230 kV: 3 132 kV: 3
4	Tungipara	132/33 New AIS Substation	2x80/120	4 Acres	132 kV: 3
5	Mathbaria	132/33 New AIS Substation	2x50/75 MVA	4 Acres	132 kV: 3
6	Paikgacha	132/33 New AIS Substation	2x50/75 MVA	5 Acres (Existing Land)	132 kV: 3
7	Kumarkhali	132/33 New AIS Substation	2x50/75 MVA	4 Acres	132 kV: 3
8	Dupchanchia	132/33 New AIS Substation	2x50/75 MVA	3 Acres	132 kV: 3
9	Matlab Uttar	132/33 New AIS Substation	2x50/75 MVA	3 Acres	132 kV: 3
10	Chatkhil	132/33 New AIS Substation	2x80/120 MVA	3 Acres	132 kV: 3
Sl	**Bay Extension***	**Type**	**Remarks**		
1	Baljitpur	132/33 AIS Substation 2 bays	2x250/350 (230/132 kV) & 2x80/120 (132/33 kV)	N/A	230 kV: 3 132 kV: 3
2	Gopalgunj (old)	132/33 AIS Substation 2 bays	2x80/120	N/A	132 kV: 3
3	Satkhira	132/33 AIS Substation 2 bays	2x50/75 MVA	N/A	132 kV: 3
4	Bhandaria	132/33 AIS Substation 2 bays	2x50/75 MVA	N/A	132 kV: 3
5	Kachua	132/33 AIS Substation 2 bays	2x50/75 MVA	N/A	132 kV: 3

** No additional land will be required for the bay extensions for the existing substations.*

12.2 EMP Structure

839. The definitive version of the EMP cleared by ADB is the most recent version disclosed on its website and it is against this that environment safeguards performance will be monitored by ADB. The EMP is a living document and may be updated as appropriate during project implementation, including in the event of any unanticipated impacts including design changes. However, any updated EMP will have to be cleared by ADB and disclosed on the ADB website.

Prior to the approval of detailed designs, PGCB will identify and review the implications of any design changes to the Project as assessed in the IEE and consult ADB regarding the need to update the IEE and thus EMP considering any variations put forward by their Contractors. If required, the IEE will be updated by PGCB for review, clearance, and disclosure by ADB before PGCB supported by the Safeguards Implementation Consultants (SIC) approve the Contractors designs and the start of any related works by their Contractors including site establishment and vegetation clearance. If different route alignments are put forward by the contractors the IEE will certainly need to be updated before approval of the Contractors designs, PGCB supported by the SIC will prepare the update but the contractor will be required to support them with preparation.

840. PGCB will award five (5) contract packages following ADB procurement requirements. The Contractors for all civil works packages will be contractually bound to implement the EMP. PGCB will ensure the EMP forms part of all bidding and contract documents for all works contract packages. During design and pre-construction, and construction, the Contractors will be responsible for implementing all relevant measures for the works in their contract package under the supervision of PGCB supported by their SIC up until handover of the infrastructure to PGCB. Any updates to it will be incorporated through a contract variation into the contract document. The Contractors must always follow the current version of the EMP which is the version disclosed on ADB's website. This includes any updates in response to unanticipated impacts.

841. To ensure the mitigation and monitoring measures are implemented, the environmental monitoring plan (EMoP) will be followed by PGCB supported by their SIC. Some quantitative monitoring in the EMoP will be delegated to the Contractors to undertake. In addition, in case of any requirement for corrective action due to noncompliance to the EMP during project implementation, these must be identified and immediately reported to ADB. Appropriate corrective action/s will be agreed between ADB and PGCB to bring the project implementation back on track. Corrective actions must be time-bound, budgeted and agreed between ADB and PGCB. The Contractors will cover the costs where corrective action is required due to noncompliance on behalf of the Contractor, its subcontractors or third parties it engages with the EMP.

842. This EMP covers the following:

- the proposed Corrective Action Plan for existing facilities (existing substations) to be implemented by PGCB prior to construction of the transmission lines;
- the Mitigation Plan, covering the mitigation of impacts and risks (during detailed design and pre-construction; construction, and operation and maintenance), including activity-specific and site-specific mitigation for the 10 no. new substation sites, 5 no. bay extension substations and major transmission lines. Part of this plan is the requirement for Contractors to develop Contractors Site Specific Environmental Management Plans (CSEMPs) and H&S Plans, both with several sub-plans, incorporating general measures described in the Environmental Codes of Practice (ECPs) and the chance find procedures in Appendix XVIII;
- a quantitative EMoP including monitoring parameters and performance indicators;
- implementation arrangements, including (a) the organizational roles and responsibilities for mitigation, supervision, monitoring and reporting; (b) capacity building needs; and (c) an initial cost estimate/EMP budget (see also Appendix XX on budget clarifications) subject to competitive bidding by contractors and SIC.
- In addition, PGCB and their Contractors have a role in implementing the grievance redress mechanism (GRM) (Chapter 11) for the facilitation of complaints or queries on project-related activities.

12.3 Potential Impacts and Risks

843. The principal purpose of formulating the EMP is to ensure commitments made are translated into implementation. Potentially significant impacts relate to construction, no significant impacts are

anticipated during operation subject to confirmation following migratory bird surveys. Impacts and risks are summarized as follows:

- Dust generation affecting the public and occupants of properties in immediately adjacent buildings due to land filling and levelling works, earthworks for construction, and transportation of materials.
- Noise and vibration causing disruption and disturbance to the public and occupants of properties in immediately adjacent buildings especially from piling work.
- Use of hazardous materials, including transformer oils and batteries, and the generation of solid and hazardous wastes including e-wastes for disposal during both construction and operation.
- Loss of trees and vegetation at substation sites and beneath the RoW of transmission lines including potential disturbance to nesting birds during site clearance and requiring 1:3 compensatory plantation as per Tree Plantation Plan, which is to be developed for PGCB approval by the contractor as per Bid Document.
- Electrocution and collision of avifauna on the transmission lines especially where they cross waterbodies or run in proximity to the coast where habitat supports migratory and local bird populations including threatened species.

No protected area, forest land or natural habitat is impacted. There are waterlogged areas (salt pans) around the Pekua and Paikgacha substations and transmission lines. These habitats are of local importance to non-threatened bird species and fish and provide various ecosystem services to the local community – they also have the potential to support migratory birds based on consultations and must be subject to further study prior to detailed design. Most of the project components do not impact on critical habitat, however, the Pekua substation and VRE Hub area of analysis covering South Chattogram support critical habitat with spotted greenshank (endangered species) recorded in the coastal habitat near to the existing power plant. Additionally, there are some low-lying areas around the substations during the monsoon period. Height of these lands will be raised up to the standard height of main access road during the construction stage according to the design.

- Occupational health and safety risks to workers including from working at height, lightening hazard, fall of materials from height and with electrical equipment.
- Community health and safety due to the presence of workers, electrical works in the public domain and crossing roads, due to construction traffic, structural safety of immediately adjacent buildings due to vibrations from piling work etc.
- Construction impacts that will adversely affect the baseline environment parameters (listed in Section 5.3) already above national standards and/or international guidelines such as the WHO guidelines must be minimized through targeted mitigation measures and regular monitoring of impacts.
- Concerns of the community and other key stakeholders regarding potential contractors' violations of the EMP that may affect them adversely as noted by the consultees (listed in Section 10.7 related to noise, dust, health and safety etc.) need to be incorporated into the detailed design and construction methods with supervision and monitoring to ensure compliance by the contractor.

12.4 Existing Facility Corrective Action Plan

844. Site inspections of 5 no. existing substations related to the bay extension components were undertaken during April-May 2024. An environmental audit was conducted by the ADB TA consultants, and a corrective action plan (CAP) for the five existing substations where the ten additional bays will be constructed has been prepared. This identified lapses in pollution, health and safety activities at all of the substations. The risk of PCBs and asbestos being present needs due attention. This environmental audit of the existing substations culminated in a Corrective Action Plan (CAP) to amend any noncompliance. The findings of the audit are included in the CAP contained in Table 6.4.

845. PGCB will implement the CAP prior to access being given to Contractors unless actions have been included in the contractor's scope of works.

846. PGCB will be responsible for undertaking the CAP activities at these existing substations before access is given to the contractor or reflecting them in the bidding and contract documents, so they are the responsibility of the contractor.

847. CAP is not applicable to the proposed new 10 substations.

Table 12.3: Corrective Action Plan of Existing Substations

No	Issues	Corrective Action	By whom/ budget source	By when
1	**Ensuring Health and Safety of Substation Staff** Staff need to use personal protective equipment (PPE) at all times Standardized medical kits need to be supplied and be kept supplied with in-date supplies on regular basis Safety sign boards must be installed at substation boundaries Drinking water supply meeting GOB standards with purifiers where required must be supplied to the staff Non-WC wastewater (bathing, basin, urinals) to be connected to the sewerage system or septic tank, it should not be allowed to discharge to open drains Dedicated area needed in all control buildings for accommodation/rest room/cooking if this is permitted on site	**Corporate Level** • Ensure existing EHS guidance is issued to all SS Managers, • Source first aid kits and PPE for distribution to SS Managers -- PPE (footwear, masks, protective clothing, and goggles in appropriate areas) to be provided to the staff in accordance with GOB requirements and with reference to EMP • Periodic checks of first aid kits and PPE at substations should be carried out by corporate office, recorded and information on the same should be monitored • Develop as part of health and safety system/procedure a checklist for SS managers on correct content of first aid kit, PPE to be provided at SS, need for renewal if out of date etc. • Develop as part of health and safety system/procedure an incentive/disciplinary system to ensure use of PPE by workers at SS, such as use of written warnings etc. • Provide training to all SS managers on use of the checklist and incentive/disciplinary system, as well as on (i) use of PPEs - the importance of safety needs to be stressed to effect behavioral/attitudinal change, (ii) general health and safety aspects, and (iii) emergency procedures in event of accident, fire or natural hazard to be given on a train-the-trainer basis (document training and attendance by SS managers) • Provide training to all SS managers on the development and implementation of emergency preparedness and response plans for (i) environmental incident, (ii) health and safety incident in accordance with the General EHS Guidelines **Substation Level** **Short term:** • Ensure existing EHS guidance, pollution prevention and hazardous waste management manuals are kept on site. • Ensure fully equipped first aid kits available at first aid stations in each working area and building to be signed and easily accessible; to include list of equipment and use by dates as well as poster of the first aid procedures and emergency contact details/local hospital. • Safety mats must be installed at all substations. • Ensure appropriate PPE is available at the substation and is actively used by staff by implementing the incentive/disciplinary system. • SS manager to provide training to all SS staff (including housekeeping staff) on (i)	PGCB corporate office and substation managers, O&M budget Costs to be borne by PGCB for repairing broken slabs, providing safety sign boards, drinking water purifiers, complete PPE and standardized medical first aid kits etc. Corporate office to provide guidance, training and oversee implementation by SS managers	Immediately for short term actions with compliance to be confirmed prior to access by EPC Contractor Long term actions; for compliance before handover of bay extension for operation and maintenance is undertaken

No	Issues	Corrective Action	By whom/ budget source	By when
		use of PPEs the importance of safety needs to be stressed to effect behavioral/attitudinal change, (ii) general health and safety aspects, and (iii) emergency procedures in event of accident (document training and attendance by SS managers) • Ensure that a trained first aider is always provided on-site; this can be a member of staff trained in emergency procedures to follow in event of accident. • Broken slabs at SS need immediate replacement to avoid any slip, trip or fall related accidents. • Safety sign boards must be installed within the substation and at substation boundaries including visual warning of electrocution • Mark emergency exist signage and ensure emergency exit routes are kept clear of debris at all times • Conduct fire drills and alarm tests on a monthly basis with records kept • Place posters on medical revival, prevention / fire safety • Drinking water purifiers where required must be supplied to the staff and supply of drinking water from borewells to be tested to confirm that it meets GOB requirements • Ensure all toilets are lockable given no separate toilets for women are provided • Lighting to standard LUX levels to be installed • Provide emergency eye wash and shower • Provide dedicated shelter for security guards on duty Long term: • Undertake repair works to and maintain all control buildings with structural repair of Bhandaria SS to ensure safety of workers • Connect the non-WC wastewater (bathing, basin, urinals) to the sewerage system or septic tank, it should not be allowed to discharge to open drains • Improve capacity of the storm drainage at Satkhira SS to prevent waterlogging of switchyard (this needs to be done in parallel with drainage design for the project) • Provide a dedicated area in all control buildings for accommodation/rest room which meets the ILO worker accommodation guidelines and if cooking is permitted ensure that a separate cooking area is set up that does not pose a fire hazard		
2	**Improvement of Waste Management**	**Corporate Level** • Ensure proper implementation of standardized waste management	PGCB corporate office and substation managers, O&M budget	Immediately for short term actions with compliance to be confirmed prior to

No	Issues	Corrective Action	By whom/ budget source	By when
	No proper arrangements for waste management Scrap material is currently scattered across the substation sites in open areas	system/procedure in accordance with national laws and regulations and the EHS Guidelines on Waste Management for all substations. • System/procedure to include avoiding or minimizing the generation of waste materials, as far as practicable. Where waste generation cannot be avoided but has been minimized, the preference should be recovery and reuse. Where waste cannot be recovered or reused, reputable, legitimate, licensed contractors must be appointed to treat, destroy, and dispose of it in an environmentally sound manner. • Develop as part of system/procedure a checklist for SS managers on correct storage and disposal of transformer oils, other fuel, oil, and chemicals, old transformers, scrap metals, electronic wastes, municipal solid wastes, and wastewater etc. • Provide training to all SS managers on implementation of the waste management system/procedure and use of the checklist (document training and attendance by SS managers) • Source covered, enclosed garbage bins and drip trays for distribution to SS to enable improved solid waste management. **Substation Level** In short-term: • Removal of all currently stored/dumped waste from the substation premises including end of life equipment. • Identify and demark in the SS compound an appropriate area for waste storage yard. Ensure labelled, covered, enclosed garbage bins and drop trays are available. All liquid-related wastes should be stored on an impermeable bunded surface to 110% capacity of the volume to be stored, or on drip trays if not available in the short term. • SS manager to provide training to all SS staff (including housekeeping staff) on waste management system/procedure • Implement waste management system/procedure to include the (i) segregation of all solid and hazardous waste generated; and (ii) environmentally sound storage of all solid and hazardous waste in dedicated, labelled areas within the premises of substations using covered, enclosed garbage bins and placing liquid wastes on drip trays if no impermeable bunded storage area. In long-term: • Ensure the waste storage yard is undercover with impermeable bunded surface to 110% capacity of the volume to be stored.	Costs to be borne by PGCB for development of area for storage of waste and subsequent environmentally safe and sound disposal etc. Corporate office to provide guidance, training and oversee implementation by SS managers	access by EPC Contractor Long term actions; for compliance before handover of bay extension for operation and maintenance is undertaken

No	Issues	Corrective Action	By whom/ budget source	By when
3	**Preventing Oil Leakages from Transformers and Oil Drums** Seals of older transformer and drums can leak No impermeable, bunded storage areas for drums to be kept Compliance with Bangladesh commitment under the Stockholm Convention[63]	**Corporate Level** In short-term: • Develop and cascade to all SS for implementation a strengthened, standardized waste oil and oil spill plan/procedure in accordance with national laws and regulations and the EHS Guidelines on Hazardous Materials Management. • Provide training to all SS managers on implementation of the waste oil and spill plan/procedure and use of the checklist (document training and attendance by SS managers) • Source drip trays and absorbent materials (e.g. sorbents, dry sand, sandbags) to soak up spills for supply to SS. In long-term: • Transformers at existing substations are mixed in age i.e. ranging between 1980-2020. Status of PCB presence can be checked and confirmed by PGCB for all transformers manufactured before 2016 as they are being tested under a DOE initiative for PCBs with other transformers screened against DOE/UNIDO guidelines and tested if they are at risk. PGCB will work with DOE to detect and clean any transformers containing PCB before 31.12.2025 per the Stockholm Convention obligations. • PGCB has to submit to ADB proof of all substation transformers being free from PCB before the loan is completed. **Substation Level** In short-term: • Carry out preventive maintenance of transformers and ensure values, nuts and bolts are fully functional and tightly secured, ensure rubber seals of radiators are intact, continue to do so on a regular basis such that there is no oil leakage. • Monitor and maintain account of the oil usage and spills/leaks at SS and have a site-based plan/procedure for dealing with any oil spillage. • Provide in a signed, accessible location on-site sufficient absorbent materials (e.g. sorbents, dry sand, sandbags) for soaking up oil spills.	PGCB corporate office and substation managers, O&M budget Costs to be borne by PGCB for management of transformer oil leakage etc. Testing for PCB is to be done by PGCB staff. Corporate office to provide guidance, training and oversee implementation by SS managers	Immediately for short term actions with compliance to be confirmed prior to access by EPC Contractor Long term actions; for compliance before handover of bay extension for operation and maintenance is undertaken, by 31.12. 2025 for proof of PCB free transformers and results of soil and groundwater investigations to be available

[63] The Department of Environment, which operates under the Ministry of Environment, Forest and Climate Change, has initiated a project called "Environmentally Sound Development of the Power Sector with Final Disposal of Poly Chlorinated Bi-phenyls (PCB)". The aim of the project is to identify transformers of Power Division's Companies (BPDB, DESCO, DPDC, NESCO, BREB, PGCB & WZPDCL) in Bangladesh that have been contaminated by PCBs and dispose of them in safe locations. The United Nations Industrial Development Organization (UNIDO) is providing technical assistance for the project, which is being funded by the Global Environment Facilities (GEF). In summary, the project is focused on identifying and safely disposing of PCB-contaminated transformers in PGCB.

No	Issues	Corrective Action	By whom/ budget source	By when
		• Soak up existing oil spills and, as required, remove soil to approximately a depth of 30cm for 1m beyond footprint of visible spillage for disposal to hazardous landfill site by reputable, legitimate, licensed contractor keeping photographic records and waste transfer notes. Extra gravel is to be placed to intercept and prevent any further oil percolation into the ground. • SS manager to provide training to all SS staff (including housekeeping staff) on waste oil and spill plan/procedure. In long-term: • All transformers to have containment bund / tanks for oil spillage management of 110% capacity for oil spillage during operations in order that any oil spill will be contained. • Soil and groundwater investigation to be undertaken by suitably qualified consultant to confirm extent of any contamination across/beneath SS from oil leaks and spills and additional remedial measures required. • Implement any additional remedial measures identified following the testing of soil and groundwater.		
4	**Ensuring Safe Storage of Hazardous Materials** Transformer oil being stored haphazardly without any bunding to prevent leakage to ground Storage areas for SF6 gas cylinders and lined facility for transformer oil, and non-hazardous material needs to be improved	**Corporate Level** • Develop and cascade to all SS for implementation a standardized hazardous materials management system/procedure in accordance with national laws and regulations and the EHS Guidelines on Hazardous Materials Management. • Develop as part of system/procedure a checklist for SS managers on correct storage and disposal of transformer oils, other fuel, oil, and chemicals, old transformers, SF6, scrap metals, electronic wastes, municipal solid wastes, and wastewater etc. • Provide training to all SS managers on implementation of the hazardous materials management system/procedure and use of the checklist (document training and attendance by SS managers) • SF6 detection handheld unit must be purchased and made available at each substation. • Drip trays must be purchased and made available at each substation without adequate capacity impermeable bunded storage area. **Substation Level** In short-term: • Identify and demark in the SS compound an appropriate area for hazardous	PGCB corporate office and substation managers, O&M budget Costs of construction of bunded area to be borne by PGCB. PGCB to purchase SF6 detection handheld unit to be made available at each substation etc. Corporate office to provide guidance, training and oversee implementation by SS managers	Immediately for short term actions with compliance to be confirmed prior to access by EPC Contractor Long term actions; for compliance before handover of bay extension for operation and maintenance is undertaken

No	Issues	Corrective Action	By whom/ budget source	By when
		materials storage yard and for storage of oil barrels, fuel, SF6 etc. • SS manager to provide training to all SS staff (including housekeeping staff) on hazardous materials management system/procedure • Implement housekeeping and hazardous materials management system/procedure to include the (i) segregation of all solid and hazardous waste generated; and (ii) environmentally sound storage of all solid and hazardous materials and waste in dedicated, labelled areas within the premises of substations e.g. proper stacking of SF6 cylinders. • All oil drums and waste oil or empty drums and SF6 cylinders should be moved to the dedicated, labelled storage area. If covered, impermeable 110% bunded area is not currently available on site immediately store all barrels of transformer oil, other fuel, oils, and chemicals temporarily on the drip trays; ideally to be undercover. • Post Material Safety Data Sheets at the storage area. • Ensure all SF6 cylinders have been serviced and remain within the service validity date. • Maintain record of SF6 leakage checks being undertaken, leakage volumes recorded and any SF6 maintenance works etc. In long-term: • Construct a dedicated, covered, bunded, impermeable area to 110% for storage of barrels of transformer oil, other fuel, oils, and chemicals as well as liquid-related waste such as empty oil drums to prevent leakage into the ground and causing pollution.		
5	**Improvement of Fire Safety** Non-availability of and insufficient capacity of foam-based extinguishers for transformer fire Lack of automatic alarm and fire suppressions system, lack of the water spray/nitrogen-based system for transformer fire.	**Corporate Level** • Fire extinguishers and other manual firefighting equipment must be purchased for distribution to SS that are requiring them. **Substation Level** **Short term:** • In each working area and building and at any oil storage site provide fire extinguishers and other manual firefighting equipment maintained in good working order and readily accessible – number to be adequate for size of premises, equipment installed, physical and chemical properties of substances present, and maximum number of people present, to avoid any fatal incident during O&M. • Ensure adequate quantity of foam-based extinguishers for the fire risk. • Erect/repair water spray mechanism for prevention of transformer fires at	PGCB corporate office and substation managers, O&M budget Costs to be borne by PGCB for purchase of fire extinguishers, installation/repair of water spray/nitrogen-based system for transformer fires etc. Corporate office to provide	Immediately for short term actions with compliance to be confirmed prior to access by EPC Contractor Long term actions; for compliance before handover of bay extension for operation and maintenance is undertaken

No	Issues	Corrective Action	By whom/ budget source	By when
		substations. Long term: • Install/erect/repair automatic alarm and fire suppressions system, water spray mechanism/nitrogen-based system for prevention of transformer fires at substations. • Three substations among the five were noticed without any firewall. Provisions should be made to ensure proper safety mechanisms are insta to isolate the two transformers from any fire risks. Install fire walls to transformers.	guidance, training and oversee implementation by SS managers	

848. PGCB management and substation in-charge will be responsible for applying any corrective actions under the guidance of the PMU and the SIC unless PMU delegates them to the respective Contractor through the scope of the contract before access is granted for works located within existing substations. PGCB will be responsible for submitting a report confirming the completion of corrective actions to ADB for clearance prior to the Contractor being given access to the existing substation in question to undertake works including site establishment.

849. The Contractor for the contract packages involving existing substations will be responsible for implementing corrective actions that are delegated to them by PGCB as part of their contractual obligations, in addition to the requirements of the EMP mitigation plan which are to be followed whilst undertaking works in existing substations.

12.5 Contractors Site Specific Environmental Management Plans (CSEMPs)

850. The Contractor will be responsible for the development of Contractors Site-Specific Environmental Management Plans (CSEMPs) and H&S Plans, setting out in detail how it will implement the measures listed in the Mitigation Plan and other commitments PGCB has made in this Project EMP. The general measures which will be included within them are described in the ECPs. Contractor will need to obtain PMU approval of its CSEMP and H&S Plan prior to the commencement of works which includes site establishment and vegetation clearance. SIC will support the PMU in reviewing and approving the CSEMPs and H&S including its subplans. PGCB will need to ensure the CSEMP and H&S Plan mirror and do not conflict with the Project EMP requirements and any requirement of national laws and regulations, including environmental clearance requirements. The CSEMP and H&S Plan will be a living document to be updated as required and reapproved by PGCB if construction methods or site conditions change or in response to an accident, near miss etc.

851. The key subplans of the CSEMP which will be prepared and implemented by Contractor will include the following – the H&S Plan is to be a stand-alone plan given its importance but is considered here as a sub-plan:

(a) **Demolition and Construction Method Statements** describing how each activity involved in demolition (as applicable) and construction works will be undertaken (schedule, access routes, anticipated traffic volumes, and working methods) with respect to ensuring compliance with the Project EMP requirements. Specific construction method statement is to be developed for the landfill works with particular attention to how this will be conducted in an environmentally sound manner.

(b) **Temporary Facilities Plan**, including details and the layout of the various temporary construction facilities required including any access roads, offices and workshops, material storage, laydown areas, refueling areas, waste storage areas, rest areas, sanitation and welfare facilities, construction labor camps or overnight accommodation.

(c) **Pollution Prevention Plan**, to be prepared with reference to the IFC EHS Guideline environmental requirements including those on Construction and Demolition.[64] This plan will detail the measures to control noise and vibration and, if required, include separate demolition (if any), piling and blasting management plans. Measures to control dust and air emissions will be included and details of how water resources will be protected, how water discharges including spills and leaks, surface water runoff, bentonite slurry and concrete wash water will be managed. The procedures and

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

designated areas for the environmentally safe and sound storage, transportation and use of fuel, oil, and other hazardous substances, as applicable, will be described. Further, this plan will cover the issue of SF6 management.

(d) **Spoil Management Plan** on the management of excess spoils from various excavation, site levelling and cut and fill activities.

(e) **Piling Management Plan** specifically addressing noise and the management of piling mud and drainage management for all activities where piling is required. Management of drilling and piling muds.

(f) **Waste Management Plan**, detailing the measures required for the environmentally safe and sound collection, segregation, storage, transportation, and disposal of all solid and hazardous waste referring to the IFC EHS Guidelines on Waste Management and Construction and Demolition. The management of sanitary wastewater will be described. The plan will itemise how wastes can be reduced and recycled - disposal will be the last resort[65]. It will identify the suitably licensed reuse/recycling vendors and waste management facilities for the disposal of solid and hazardous wastes to be used by the Contactor. Use of open dump sites for disposal is not permitted and for this reason municipalities must not be relied upon by the Contractor for the disposal of wastes. Note: a separate Asbestos Management Plan will need to be prepared if asbestos is to be expected in the buildings that are to be demolished (no risk is identified to date, but for confirmation by contractor).

(g) **Drinking Water Supply and Sanitation and Welfare Plan**. This Plan will detail measures to ensure adequate water supply and sanitation and welfare provisions for the temporary construction facilities, including offices, rest areas, washrooms, and construction labor camps or overnight accommodation in order not to cause shortages and/ or contamination of existing drinking water sources and to ensure the safe and healthy working conditions for the laborers.

(h) **Occupational and Community Health and Safety (H&S) Plan**. This plan will be informed by a facilitated health and safety risk assessment participated in by PGCB/SIC and the Contractors and detail out workplace and community health and safety measures following the mitigation hierarchy referring to the IFC EHS Guidelines related to H&S and the ILO guidelines/code of practice.[66] Risks of communicable vector borne and viral diseases to also be addressed, including adequate sanitation.[67]

Health and Safety (H&S) Plan will include:

a. Safety Training Program – to provide general and specialized training courses for all workers on the site and at all levels of supervision and management. General courses will consist of (i) an

[65] For example, food waste can be composted, Plastic waste – can be reused and recycled, Other domestic waste e.g., cans, paper etc. much of this will be able to be recycled, Demolition waste e.g., bricks, concrete etc. a lot of which can be reused during construction or by others for their construction, Metals – can be recycled, Wood – can be recycled, and Hazardous used oil can be reused providing that it is taken by suitably licensed vendors to do so.

[66] https://www.ilo.org/resource/other/safety-and-health-construction-revised-edition
https://www.ilo.org/sector/Resources/codes-of-practice-and-guidelines/WCMS_861584/lang--en/index.htm

[67] Contractors will provide adequate sanitation and welfare facilities including hand washing and PPE in sufficient quantity on-site and at labor camps/overnight accommodation so workers can follow healthy hygiene practices as well as avoiding conditions for vectors to breed; contractors will also consider local health care facilities' capacity to deal with any infections agreeing with the nearest Health Center and/or Hospital for emergency cares of workers. Medical insurance will be provided by contractors for all workers with sick leave allowance to ensure symptomatic workers do not attend site; avoid no-work-no-pay policies, whereby by fear of not getting paid workers would be tempted to report to work and hide any symptoms.

initial Safety Induction which all workers will be required to attend prior to being allowed to work on site, all visitors and project workers who have not attended the safety induction course must be always accompanied by inducted workers when within the working area and (ii) periodic safety training refreshers covering similar topics to induction, conducted not less than once every six months. All subcontractor workers will be required to participate in relevant training courses appropriate to the nature, scale, and duration of the subcontract. Since they have heightened risk only trained workers must undertake certain activities e.g., working at height, working in confined spaces, working with electricity etc. Workers must have attended such training before they are involved in relevant works and the contractor must either offer an internal training course or organize for attendance at an external specialist training course. Workers must have a training record of attending a suitable training course. Untrained workers will not be permitted to work at height, enter confined spaces, work with live electricity etc.

b. Medical Check-Up/Health Surveillance – of workers fitness, eyesight, hearing, respiratory health, and communicable and noncommunicable diseases before works commence; and then repeated every six months by the contractor during construction. Only workers who have passed their fitness test and have the requisite medical clearance must undertake certain activities e.g., working with electricity etc.

c. Safety Meetings – to be conducted monthly during construction phase by PGCB. During construction the meetings will require attendance by the safety representatives of all contractors and subcontractors on-site. The minutes of all safety meetings including actions agreed will be taken and sent to PGCB within seven days of the meeting.

d. Safety Inspections – the contractor will regularly inspect, test, and maintain all safety equipment, scaffolds, guardrails, working platforms, hoists and other lifting equipment, ladders and other means of access, lighting and signage, firefighting equipment, first aid kit, stock take and condition of PPE etc. Signs will be graphic and in the languages of workers, kept clear of obstructions and legible to read. Lighting will meet illumination guidelines for the working area as per IFC EHS Guidelines on OHS. Equipment, which is damaged, dirty, incorrectly positioned or not in working order, will be immediately repaired, or replaced, by the contractor.

e. H&S Audit - during construction the contractor's H&S officer and PGCB will undertake monthly audits of compliance with the H&S plan.

f. Personal Protective Equipment (PPE) as a last resort where risks cannot be avoided – workers will be provided (before they start work) with appropriate PPE at no cost to the workers. PPE provided to workers (regardless formal and informal, directly contracted or subcontracted) in accordance with Table 2.7.1. Summary of Recommended Personal Protective Equipment according to Hazard in IFC EHS Guidelines on OHS including safety shoes, helmets, goggles, earmuffs, and face masks and ensure that this is always worn by them with a strict disciplinary system (no work condition if not compliant) being enforced for any non-compliance.

g. Work Zone Noise Levels: during construction protective measures need to be provided and as per the IFC EHS Guidelines on OHS, Table 2.3.1. sets the level at 85 dB (A) for 8 hours exposure and will be adopted, as well as 140 dB(C) peak/instantaneous noise exposure for workers working near the high noise generating machinery. High noise work areas must be adequately signposted. In these high noise work areas PPE in the form of sound reducing earmuffs/ear

plugs to the workers are to be provided. In the first instance however, reduction in noise levels to the lowest practical level must be achieved by adoption of suitable preventive measures, such as, use of enclosures with suitable absorption material, etc. Workers operating in the high noise work areas will be given auditory tests as part of health surveillance.

h. EMF levels at the construction site to be kept within international good practice levels as per ICNRP (reference and peak values) for the occupational exposure.

i. Electricity: IFC EHS Guideline on Electric Power Transmission and Distribution requirements for working with electricity will be observed with only licensed electricians that meet the requirements set out in them allowed to work on live electricity with strict adherence to safety standards including those listed in said guidelines. Live lines will be deactivated and properly grounded before work is performed on, or in proximity, to the lines and this will be checked and certified in writing by the contractor's H&S Officer in advance. While working at heights personal safety measures such as harnesses, tool bags, ropes etc. will need to be provided.

(i) **Traffic Management Plan**. This plan (a subplan of the H&S plan) will be prepared in consultation with the respective authorities responsible for roads and traffic. It will identify the off-site routes to be used, entrances and exits off the public road, procedures for the safety of the local community, particularly pedestrians and vulnerable groups, and mechanisms to avoid traffic congestion because of construction traffic movements and where transmission and distribution line works interfere with the highway. A designated person as the traffic controller, wearing colored vest will be engaged for traffic management.

(j) **Biodiversity Management Plan** setting out procedures for site clearance, tree cutting and earthworks with pre-checks and supervision undertaken by the Contractor's Ecologist plus (i) construction worker prohibitions on fishing, hunting, poaching, etc. (ii) an emergency fauna rescue and handling procedure, including contacts of forest department, nearest veterinary etc. and (iii) measures to avoid the spread of invasive species including the installation of washing stations for the pressure washing of vehicles at construction site entrances. Prior to preparation of the BMP the contractor will have completed the pre-construction ecology surveys required in the mitigation and monitoring plans and prepare a report for submission to PMU/SIC to confirm no unanticipated impacts; this includes bird surveys during appropriate periods round the year for the migratory and local birds in the project area of influence for the works in proximity to waterlogged areas (salt pans) at Pekua and Pakigacha. If required, due to the survey outcomes, the contractor will prepare a Tree Plantation Plan[68] where trees are to be cut confirming details of compensatory plantation if trees or other notable flora and fauna are present, confirming how no net loss of biodiversity will be achieved. The biodiversity mitigation measures will include avoidance of avian electrocution collision with transmission lines through bird sensitive design and the installation of "Bird Divertors" at suitable intervals in locations where birds are determined to be at risk.

Tree Plantation Plan: setting out details of trees to be lost and how the requirement for 1:3 compensatory plantation will be achieved. The plan will be updated and finalized by the Contractor after the final route selection for the transmission lines. The objective of the tree plantation and replacement programme is to compensate for the loss of trees due to the proposed implementation

[68] the Contractor shall appoint a part-time ecologist to monitor EMP implementation full-time on-site for the duration of all "Physical Works" involving tree and vegetation clearance activities and prepare tree plantation plan.

of transmission lines. The species for the proposed tree plantation have been selected based on the statistics of the lost vegetation and in consultations with the concerned officials of the Forest Department (FD) of respective divisional office. The Contractor will be responsible for planting trees at the selected places as agreed by the PMU and SIC. The Contractor will need to procure and raise saplings until they survive.

(j) **Chance Find Procedure** setting out how damage to existing physical cultural resources will be avoided and the procedure to be followed in the event of a chance find incident. Sample Chance find procedure is described in Appendix XVIII.

(k) **Labor Management Plan** addressing the recruitment and management of the workforce including details of sanitation and welfare facilities, construction labor camps or overnight accommodation per ILO guidelines[69] and a worker code of conduct[70] to ensure workers have appropriate conduct whilst working and living in the local community. It will ensure compliance with the national labor law including that all workers whether formally or informally employed by the Contractor or their subcontractor(s) have a contract, identification card, the right to stop work, and do not work more than the legal working hours; it will discourage the use of daily workers by subcontractors and ensure adequate keeping of wage records. It will address the encouragement of local and women employment as well as measures needed to protect vulnerable worker groups including gender-based violence/sexual exploitation, abuse, and harassment prevention.

(l) **Emergency Preparedness Plan** will be prepared by the Contractor after assessing all potential hazards and emergency scenarios that could be encountered in relation to pollution, floods, health and safety, and security during construction to detail out how they will be quickly and effectively responded to.[71] This includes a sub-plan on flooding management.

(m) **Stakeholder Engagement Plan** to set out how the Contractor will interact with the local community and other stakeholders, issue advance notice of construction works, and disseminate the GRM, and manage site complaints in line with the GRM for the Project.

(n) **Training Plan** to set out how the Contractor will provide EHS training to its sub-contractors and all formally and informally employed workers on the construction site including daily tool box talks flagging their right to stop work if H&S risks are present, as well as awareness raising activities for the local community.

[69] https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_116344.pdf with particular attention to providing one bed per worker and lockable storage

[70] Code must be informed by the CSEMP and address the following aspects: Zero tolerance in respect of health and safety; Requirement on always wearing PPE on site; Zero tolerance of bribery or corruption; Respect for local community and customs, avoiding community conflict situations; Zero tolerance of illegal and unacceptable activities/behavior, including but not limited to engagement in: prostitution; gender-based violence/sexual exploitation, abuse, and harassment; illegal sale or purchase of alcohol; sale, purchase, or consumption of drugs; gambling; fighting etc.; Alcohol and drugs policy and testing regime; Role of workers in good housekeeping; Role of workers in maintaining good hygiene; Respect of wildlife and the environment; Description of disciplinary measures for infringement of the code of conduct and other employer rules (e.g., immediate removal from site, fine etc.)

[71] Including communication systems and protocols to report an emergency e.g., spills and leaks, health emergency, work-related accident including electrocution, traffic accident, accident involving the community, natural disaster including flooding or cyclones, fire, virus outbreak etc. It will need to be developed in consultation with local emergency services with adequate fire and first aid first-responders based on the construction site to facilitate immediate response. Provide readily available first-aid for workers as well as an ambulance for more serious cases. Make arrangements for a doctor on call and nearest Health Center and/or Hospital for emergency care of workers whether formally or informally employed by the Contractor or their subcontractors. Regular drills will be required involving all workers to prepare for any incident.

12.6 Environmental Codes of Practice (ECPs)

852. The following ECPs (Appendix IX) contain general, non-activity- or site-specific measures which need to be integrated into the Contractor's site specific EMP (CSEMPs) for implementation during the construction.

- ECP 1: Waste Management
- ECP 2: Fuels, Oils and Other Hazardous Substances Management
- ECP 3: Water Resources Management
- ECP 4: Drainage Management
- ECP 5: Soil Quality Management
- ECP 6: Erosion and Sediment Control
- ECP 7: Top Soil Management
- ECP 8: Topography and Landscaping
- ECP 9: Borrow Areas Management (note that borrow areas and dredging not permitted, only existing licensed sources are to be used)
- ECP 10: Air Quality Management
- ECP 11: Noise and Vibration Management
- ECP 12: Protection of Flora
- ECP 13: Protection of Fauna
- ECP 14: Protection of Fisheries
- ECP 15: Road Transport and Road Traffic Management
- ECP 16: Construction Camp Management
- ECP 17: Cultural and Religious Issues
- ECP 18: Workers Health and Safety (H&S)
- ECP 19: Sulfur Hexafluoride (SF6) Management
- ECP 20: Construction Management in Ecologically Sensitive, Salt Plan, Fish Ponds and Waterlogged Areas

853. Measures in the IFC EHS General and Electric Power Transmission and Distribution guidelines, ADB's Good Practice Guidance for the Management and Control of Asbestos: Protecting Workplaces and Communities from Asbestos Exposure Risks, the ILO Code of Practice on Safety and Health in Construction and worker accommodation are to also be taken on board by the contractor preparing the CSEMPs and the H&S Plans.

12.7 Environmental Mitigation Plan

854. The Mitigation Plan sets out the plan for the avoidance, minimization, mitigation and compensation of impacts and risks during the following three phases:

(1) detailed design and pre-construction;
(2) construction (including demolition of existing small structures);
(3) operation and maintenance.

855. There are five parts to the Mitigation Plan, as follows, with Parts 2-3 applicable to the respective contract packages:

(1) Part 1: General Mitigation (applicable to all civil works components)
(2) Part 2: New Substations / Bay Extensions
(3) Part 3: Transmission Lines

856. The Mitigation Plan describes the general, activity- and site-specific mitigation measures to address the impacts and risks, which have been identified during the impact assessment, and ensure compliance with applicable national standards and international guidelines (Chapter 2). Performance

indicators to check that the measures are being implemented effectively are listed, along with the responsible entities for implementing them and supervising and monitoring their effectiveness (either PGCB, the SIC and/or the Contractors). The Contractors will be contractually bound to implement these measures plus the more general ECPs by incorporating both into site-specific CSEMPs and H&S Plans, as described in the following sections. Measures that must be commenced during the design and pre-construction phase will continue to be implemented by the Contractor during the construction phase. Within the defects liability period of 1.5 years the Contractor will also be responsible for maintenance. Following that, PGCB will take over the responsibilities for both operation and maintenance.

Table 12.4: Environment Management Plan

12.7.1 Part 1 – General Mitigation

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
Detailed Design and Pre-Construction Phase								
Compliance with national laws and regulations and SPS 2009 requirements	Environmental and social impacts/risks of construction and O&M phase -- lack of management of detailed design, construction and O&M leading to environmental degradation, H&S risks for construction and O&M workers as well the local community	– PGCB and contractor to comply with national laws and regulations including those set out in the EIA/IEE in addition to international good practice e.g., IFC EHS General Guidelines (April 2007), the EHS Guidelines for Electric Power Transmission and Distribution (April 2007), the ILO guidelines on safety and health in construction and the mitigation set out within this table. – Any conditions of the national SCC and ECC[75] and all other permissions or permits required to be complied with by PGCB and contractor throughout the project duration. – PGCB and contractor to comply with the definite version of the EMP which is the version disclosed on ADB's website. This includes any measures in an updated EIA/IEE following design or any updates in response to unanticipated impacts. Contractors will be responsible for implementing and budgeting for all measures required.	– No breaches of national regulations and/or international good practice guidelines. – No breaches of EMP by PGCB, contractor, subcontractors or other third parties with prompt corrective action taken if required. – Status of EMP compliance documented in EMRs	Upon loan effectiveness for PGCB (prior to contract award in case of advance contracting or third-party works) and contract award for contractor then throughout project implementation	√	√	√	PGCB and Contract Cost

[72] PGCB to implement EMP requirements as well as supervising and monitoring the contractor's implementation of measures delegated to them, including reviewing and approving detailed designs, CSEMPs/H&S Plans and subplans, and other documentation, reporting compliance in EMRs for submission to ADB.

[73] SIC to support PGCB in EMP implementation, supervision, and monitoring of the contractors, the reviewing and approving of documentation, and reporting.

[74] Contractor to implement the measures delegated to them for the duration of their contract period, pre-construction measures are to be completed before the commencement of works and then to implement requirements throughout construction works reporting to PGCB monthly on the status of EMP implementation

[75] Environment Clearance Certificate from DOE

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		– If there is any conflict between the measures set out in this EMP and the national ECC the most stringent provision is precedent. – Contractors will have in place corporate environment, health and safety policies and corporate environment, health, and safety management system certifications, such as, ISO 14001 for environment, ISO 45001 for health and safety, or equivalent. – Contractors will not engage in any activities described on the ADB Prohibited Investment Activities List in Appendix 5 of ADB's SPS (2009)						
Securing national environmental clearance and other permissions		– PGCB to annually renew ECC informing DOE of any changes in scope and design (submitting copy of updates to EIA/IEE) since it was issued and ensure that all other required national permissions are secured and renewed as needed before the commencement of related works. – Contractor at request of PGCB to obtain permissions as part of their scope of works; and to obtain those permissions which by default the Contractor is responsible to obtain. – Contractor to report to PGCB any tree cutting required that was not originally planned in the EIA/IEE and PGCB/contractor to obtain any tree cutting permit required from Forest Department prior to cutting of trees. A tree plantation plan will be prepared by the contractor for undertaking 1:3 compensatory plantation with the timeline for	All ECC and other permits, licenses, and clearances are obtained prior to commencement of related work. Copies of these will be included in the EMR for the period in which they were obtained.	Upon loan effectiveness for PGCB (prior to contract award in case of advance contracting or third-party works) and contract award for contractor then throughout project implementation	√	√	√	PGCB (Contract cost if requested by PGCB or to be obtained by default by the contractor)

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		completion prior to commissioning of substations and transmission lines. – Avoidance of tree cutting in the bird nesting season.						
Procurement of contractors for demolition and construction work and goods supply		– PGCB to ensure the EMP is incorporated in the bidding documents and the final (definitive) EMP cleared by ADB is incorporated into the contract documents for construction works prior to contract award, any updates to it will be incorporated as a contract variation. This includes any site-specific EMP included in an updated EIA/IEE following detailed design or any updates in response to unanticipated impacts. – PGCB to ensure that the requirement to comply with the final (definitive) EMP as well as pertinent EHS requirements form an integral and binding part of the contract, including appropriate incentives and/or penalties for (non-) compliance related to EHS management. – PGCB to ensure that contractors for construction have Bangladesh experience in handling hazardous waste (such as Asbestos if found or contaminated soil) and aware of local guidelines for disposal of demolition or construction muck from sites.	– Final EMP to be included in bidding and contract documents for construction works. – Relevant clauses in the contract document for works and goods supply contracts. – Copy of EMP related contract extracts will be attached to EMR for the period in which the contract was awarded.	Prior to issue of bidding documents and contract award	√	√	NA	PGCB
Detailed design and updates to IEE		– Contractors to ensure that detailed designs reflect the requirements of the EIA/IEE/EMP and international engineering best practice/good EHS practice including site-specific measures where these are required with regards to biodiversity and physical cultural resources as well as other sensitive receptors.	– Detailed Design cleared and approved reflects EMP requirements. – ADB informed of any unanticipated impacts identified at any point	Prior to detailed design approval and for implementation during construction	√	√	√	PGCB and Contract Cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		– During detailed design contractors to ensure national seismic design requirements are followed especially for buildings and tower foundations; building and structural designs are to be checked for seismic safety by design team and an independent expert separate to design team, to confirm international good practice seismic design standards are met. – Contractor's detailed designs will be reviewed by PGCB's PMU with support of SIC to confirm that all measures required by this EMP have been adequately incorporated in them and that they reflect international engineering best practice/good EHS practice before they are approved. – Prior to the approval of detailed designs PGCB will consult ADB regarding the need to update the EIA/IEE. If required, the EIA/IEE will be updated for clearance and disclosure by ADB before approval of the detailed designs and the start of related works including site establishment. Contractor to support PGCB in respect of any update to the EIA/IEE following detailed design. Update will be required if the contractor adjusts the route alignments that were assessed within the IEE and where bird surveys have been required to be conducted. – If other changes in project scope or design occur during project implementation, or if any unanticipated impacts are identified, contractor to inform PGCB who are to immediately inform ADB of	during project implementation. – IEE updated as required to reflect detailed design and any unanticipated impacts and reviewed and cleared by ADB prior to the start of related works.					

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		change to determine the need to update the EIA/IEE. – Use of any asbestos containing materials is prohibited. – Use of PCB based oil for transformers/transformer oil is prohibited. – Use of chlorofluorocarbons (CFCs) and halon-based substances are prohibited.						
Construction EHS management planning during pre-construction and location of temporary construction facilities		– Contractor to develop Contractors site-specific Environmental Management Plans (CSEMPs) and H&S Plans including all subplans as required by the EMP to be approved by PGCB with support of SIC incorporating the requirements of (i) this Environmental Mitigation Plan, (ii) the ECPs (Appendix IX), (iii) the conditions of National Environmental Clearance (iv) international engineering best practice/good EHS practices e.g., IFC EHS guidelines including the Construction and Demolition section and ILO Code of Practice, and (v) site-specific measures where these are required with regards to biodiversity and physical cultural resources as well as other sensitive receptors. These will be living documents, to be updated as required and re-approved by PGCB as construction proceeds, if construction methods or site conditions change, in response to an accident, incident, near miss etc. – CSEMPs will include a biodiversity management plan with tree plantation plan, as required. Prior to their preparation the contractor will conduct pre-	– CSEMPs/H&S Plans and all subplans cleared and approved before work are reflective of Project EMP requirements to minimize impacts and risks on EHS during subsequent stages of the project. Copies and any updates to these plans are to be attached to EMR during the period in which PGCB approved them. – Ecological surveys conducted and survey report submitted for PGCB approval prior to preparation of the biodiversity management plan including tree plantation plan, as required .	Prior to mobilization and site establishment and for implementation during construction	√	√	√	Contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		construction ecological surveys required to inform them (applicable to all components including existing substations) and submit the survey report. – Construction is to only be undertaken on PGCB-owned land and no temporary or permanent relocation to be undertaken unless the resettlement plan is followed. – Contractor to seek to locate all temporary construction facilities required including laydown and storage areas within the boundaries of PGCB land (new or existing substations) except for overnight accommodation for workers that could be provided in existing properties off-site. If other public or private land is required for temporary construction facilities due to lack of space within PGCB land, land use to be negotiated with private landowner, submit land ownership papers and copy of agreement for temporary land use with a photographic record of pre-project condition. Sites that are waterlogged or supporting natural habitat must not be used. Drainage must be installed at all temporary facility locations to avoid waterlogging – the drainage must not exacerbate waterlogging on the adjacent land. – Noisy and dusty facilities or those that may generate sediment laden runoff or wastewater (e.g., concrete batching plant, asphalt plant, refueling areas, labor camps, maintenance yards, storage areas) must be sited at least 500m from residential property and outside biodiversity sites and away						

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		from any physical cultural resources; pollution prevention equipment must be installed on such facilities. Laydown and storage areas that are not potential pollution sources may be located a minimum of 50m distant, but these must be outside dense habitation, not block accesses or road users. No land requiring extensive landfill or levelling will be used, there will be no clearance of trees/vegetation on land to be used by the contractor. Photographic record of land condition to be undertaken before any works to establish temporary facilities. – Design of sanitation and welfare facilities at construction sites and labor camps/overnight accommodation to conform to IFC EHS general guidelines, ILO's guidance on worker accommodation and national regulations and to be approved by PGCB.[76] Contractors to provide all basic requirements; individual beds and beddings, individual lockers, mosquito nets, artificial lights, natural lights, windows and ventilation, fans, emergency exits, firefighting equipment, kitchen and dining halls, mobile charging points, toilets and washing facilities, potable drinking water, recreational space etc.						

[76] Indoor toilets (one per six staff) with hand washing facilities and if overnight accommodation private bathing area, showers or baths, all connected to existing sewage system or septic tank with soak away; Shaded rest area that is accessible and can accommodate the number of workers on site; Indoor food preparation and separate clean eating area, provision of sufficient fuel supply for cooking other than wood; Enclosed garbage bins for disposal of waste, as burning of waste will be prohibited, and; Potability testing before work commencement, a drinking water supply that meets drinking water standards to be provided etc.

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		– Contractors will determine if they source canned drinking water from an existing commercial supplier (as the preferred option) or provide their own source of treated water for workers; all drinking water provided is to be regularly tested and confirmed to meet drinking water standards. – For sources other than canned drinking water undertake baseline water quality sampling per EMoP to confirm source suitability and, if necessary, provide additional water treatment facilities during construction to facilitate safe drinking water supplies. If contractors use existing or install their own borewell for construction water supply permissions will be obtained from authorities together with agreement of local communities before abstraction. – Contractors will use locally sourced materials as far as practical to reduce transportation, but all raw materials will be sourced only from existing licensed sources e.g., sand and aggregates from quarries or borrow areas which hold ECC with submission to PGCB of all necessary documents such as records of materials used and source with copies of ECC. Contractors will not open any borrow areas or quarries under the project, and will not undertake dredging for river sediment unless approved by PGCB and the EIA/IEE/EMP has been updated. – Contractors to provide adequate facilities for the collection, separation, and storage of construction waste (including from labor camps/overnight						

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		accommodation) on-site and safe transportation for composting or recycling or disposal through reputable, legitimate, licensed third parties with all waste transfer records retained. Leaving or disposing of construction waste by burying it on-site or disposing of it at unlicensed waste management facilities is strictly prohibited. Unsanitary open dumps are not to be used by the contractor or their third parties for this reason. Respective municipalities must not be relied upon by the Contractor for the disposal of waste since this is likely to result in it being open dumped due to lack of sanitary waste management facilities in Bangladesh requiring long-distance transport for disposal. – Burning of waste is also to be strictly prohibited.						
Consideration of H&S thorough detailed design and construction H&S management planning during pre-construction		– Contractors to undertake facilitated H&S risk assessment with PGCB through a workshop attended by PMU/SIC during the detailed design (and at other key stages) so it can inform both the detailed design and pre-construction preparations, considering both occupational and community H&S risks resulting from subsequent stages of the project. Facilitated workshop will involve the design and construction team of the contractors and PGCB O&M staff. – Informed by the outcome develop a H&S Plan to avoid, minimize and mitigate occupational H&S risks. PGCB will be required to approve the H&S	CSEMPs/H&S Plans and all subplans cleared and approved before work are reflective of EMP requirements to minimize impacts and risks on EHS during subsequent stages of the project. Copies and any updates to be attached to EMR during the period in which they are approved by PGCB.	Prior to mobilization and site establishment and for implementation during construction	√	√	√	Contract cost

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		Plan and then ensure their own staff on-site follow it when on site. – Contractors will set up an accident reporting system for any health and safety incidents (near miss, minor, lost time, fatal) involving workers or community to be reported to PGCB within 24 hours of occurrence with a response plan detailing the incident and how its reoccurrence will be avoided. PGCB to then report any lost time or fatal incidents to ADB within 48 hours. Record of all incidents and response taken should include date, time, details of incident, treatment given and outcome, and lessons learnt for the future. Contractors will ensure all workers are covered by medical/accident insurance to pay out in the event of a disability or fatality. Contractor's insurance includes a community liability clause for payment of compensation in case of any accidents because of construction. – Emergency contact number and details for medical, fire, etc. are to be displayed in all construction sites.						
Environmental safeguards staffing and employment of construction workers; environment safeguards training and	Environmental and social impacts of construction phase -- lack of EHS management capabilities on PGCB and Contractor's part, leading to environmental	– PGCB to assign ESU to the project and appoint SIC as set out in the EMP institutional arrangements. ESU staff will be delegated authority under the contract to be able to halt construction works if any EHS issues arise. – Contractor to recruit EHS team under an Environmental, Social and Health and Safety (ESHS) Manager and enough EHS Supervisors as set out in the EMP institutional arrangements for onsite supervision and monitoring of environment	– ESU assigned to the project with PMU supported by SIC. – Contractor equipped with approved EHS team prior to mobilization. – EHS staffing details for period to be included in EMR.	Upon loan effectiveness for PGCB (prior to contract award in case of advance contracting) and contract award for contractor and then throughout project implementation	√	√	√	PGCB and contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
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awareness raising activities	degradation, H&S risks for construction workers as well the local community.	safeguards implementation daily for the duration of works. – Subcontractors to be required to appoint an EHS representative for each construction site – Use of day labor is to be discouraged, if day labor is used the contractor will have to ensure increased supervision on-site from their side due to increased risks from lack of health and safety awareness etc. – CVs of the contractors EHS team plus team structure to be submitted to PGCB in bid document or immediately on contract award for approval before mobilization. List of staff and copies of CVs to be reflected in the first monthly progress report to PGCB. Any updates to be reflected in the succeeding progress reports. – Maintain administrative procedures for recruitment. – No illegal forced or child labor to be employed in construction with the minimum age for employment on the construction site to be 18 given hazardous nature of works involved – no persons under 18 to be employed. – Working hours to be in accordance with Bangladesh labor laws to minimize H&S risks. – Contractors must not discriminate and must proactively encourage the employment of suitably skilled women on the project. – Contractors must proactively encourage local employment for unskilled roles whilst ensuring suitably qualified and experienced workers for skilled roles; local labor can be used for manual and	– No breach of Bangladesh labor laws and labor management sub-plan under the CSEMPs. – Breakdown of construction worker profiles, plus verifiable proof of age and wage documentation for every worker, insurance certificates and labor related permissions are maintained by the contractor throughout the project. – No incidents/ community complaints related to impacts from influx of workers. – Detailed training plan reflecting EMP requirements developed. – Records of all training activities are retained. Training undertaken will be documented and reported in EMRs including photos and records of participants					

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Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
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		office work, but precedence must be given to ensuring that all workers are appropriately skilled given the hazardous nature of construction works. Contractors are to provide construction skill enhancement training to local communities to enhance the skill of local people and help avoid conflict, if skilled workers not locally available. – Contractors to ensure the provision medical/accident insurance for all workers (formal and informal) for the duration of their contracts and 14 days sick leave for all construction workers. – PGCB to prepare a detailed training plan elaborating how training and awareness raising activities required by EMP will be conducted and with the support of SIC conduct required training sessions on EMP implementation and GRM operationalization for all those with management responsibilities to clarify requirements, roles and responsibilities, record keeping and reporting at each stage of the project. Contractor to ensure all members of contractor's EHS team, design team, and construction management team attend trainings. – Contractor to prepare a detailed training plan upon contract award elaborating how training and awareness raising activities required by EMP will be conducted. – Prior to the start of and then throughout construction contractor to conduct training for construction management and provide all workers	(including gender breakdown) – Trainings and awareness raising delivered in accordance with the training plan. – Contractors and construction workers fully aware of their responsibilities under the EMP through training					

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		and visitors onsite, irrespective of them being formally or informally employed by contractor, subcontractor or third-party with an EHS induction before being allowed on-site including dos and don'ts in relation to construction site, temporary workers camps, local communities, forests, protected areas, etc. Contractor to ensure topics covered by training and induction will include but not be limited to good housekeeping at all times; environmentally sound waste management practices; hygiene and communicable disease prevention including STDs and HIV/AIDS; sexual exploitation, abuse and harassment prevention; culturally acceptable practices. – Contractor to prepare with guidance of health experts communicable diseases information video/brochures/leaflets for distribution to all workers during induction, covering factual health issues as well as behaviour change issues (e.g., good hygiene) around the transmission and infection vector borne and viral communicable diseases including STDs and HIV/AIDS. – Contractor to prepare with guidance of labor experts a worker Code of Conduct and information video/brochure/leaflet for distribution to all workers during induction addressing culturally acceptable practices etc.						
Establishment of a functioning Grievance	Unresolved community grievances and	– PGCB to set up and operationalize a three-layer GRM for local community and workers as set out in the IEE, identifying GRM focal persons and GRC	– GRM as per IEE operationalized, affected persons aware of its	Upon loan effectiveness for PGCB (prior to	√	√	√	PGCB and contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
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Redress Mechanism	increased conflict due to lack of operational Grievance Redress Mechanism (GRM)	and ensuring all the members are trained on the process. – Contractor's EHS team too operationalize the informal site level GRM per the IEE, and support PGCB in resolving and addressing grievances entering the formal GRM, keep record of all grievances registered, status, time taken for redressal and outcomes, etc. Nominate a GRM Focal Point for each construction site who will keep affected persons and local communities informed of the status of work and be readily available onsite to receive, document and deal with grievances at site level. – PGCB and contractor to ensure GRM as well as the GRM process and means to submit a grievance is communicated verbally to the community (especially those within 50m of SS and 500m of power line works)[77] before commencement of works. Information on GRM to be disseminated through community meetings, one-on-one consultations, posters, leaflets, brochures, SMS, or sign boards in prominent areas. Contractor to provide notice boards at all substations, construction site offices and active work sites including highly visible details of the GRM including the name, designation, contact numbers including phone/SMS/What's App, address of both the PGCB and contractor's GRM focal persons plus the	existence and are actively using GRM to raise their grievances. – 100% of grievances received are recorded and resolved in a timely manner as per GRM process; no unresolved grievances. – Records to be kept of all grievances received and their resolution for reporting per the IEE. – Details of GRM being operation, including photos of awareness raising activities to be submitted in EMR. – Details of all grievances received and resolved during the period to be reported in EMR.	contract award in case of advance contracting) and contract award for contractor				

[77] 50m from substations and 500m of TL ROW is the project area of influence that was adopted for the IEE.

General Mitigation								
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		timeline and process of redressal together with a suggestion box that is regularly checked for any grievances received. – GRM will be available to all workers for receiving and handling complaints about unfair treatment or unsafe living or working conditions, ensuring no coercion nor reprisal. Construction workers will be given access to register any grievances with the contractors or direct access to the PGCB GRM Focal person. – Contractor to carry out awareness raising among workers on the GRM at the start of employment onsite, including details on how to submit a grievance, process, and timeframes including disseminating GRM contact details on noticeboards and placing suggestion boxes at construction site offices and at employer provided staff accommodation. – PGCB and contractor to encourage affected persons to use the GRM but also clarify that the GRM can run in parallel with legal redress. PGCB and Contractor to inform about ADB's Accountability Mechanism as the last resort.						
Meaningful consultations, information disclosure and community awareness raising activities	Unresolved community grievances regarding disruption and disturbance and increased conflict	– PGCB to prepare a detailed stakeholder engagement plan for meaningful consultation with the local community (especially those in 50m of substations and 500m of power line works) before commencement of works. – No work will start on site until PGCB has locally disclosed the IEE on their website with executive	– Stakeholder engagement plan prepared, and IEE is locally disclosed and accessible to affected persons. – Details of all consultations and awareness raising	Upon loan effectiveness for PGCB (prior to contract award in case of advance contracting) and contract award for	√	√	√	PGCB and contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
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	due to lack of communication with the local community regarding project impacts and risks	summary translated into Bangla and placed hard copies at construction site offices. Copies of the executive summary in Bangla will be printed and disseminated through community meetings, one-on-one consultations, or sign boards in prominent areas. Hard copies and translation to Bangla of the full IEE are to be provided by PGCB upon request by affected persons. If an IEE update is required, it will be similarly disclosed as will findings of EMRs. – Contractor to consult with and seek agreement of landowners and local communities within 500m on proposed locations for any temporary labor camps, site offices, storage areas, areas for waste management, etc. – Contractor to consult with and seek agreement of local communities to temporarily use any community resources (e.g., water supplies) during construction to identify any potential conflict, if additional demand may place stress on community resources plan for alternative sourcing for these resources for project needs. – Contractor to consult with local communities and other concerned stakeholders including local government officials and public utilities as well as the local police and municipalities during design in order that any concerns raised can be reflected in the choice of SS site layout, route alignment and construction method, contractor to continue liaising in construction.	activities undertaken by PGCB and contractor documented and reported in EMRs including photos and records of participants (including gender breakdown). – Local communities and other concerned stakeholders kept informed throughout project implementation, and aware of construction, providing with awareness raising etc.	contractor and then throughout project implementation				

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		– Contractor to communicate at least four weeks (one month) prior to the commencement of works advance notice to local communities. This is to be done verbally through local government offices and community meetings, one-on-one consultations, posters, leaflets, brochures, SMS, or sign boards in prominent areas about the agreed schedule of and details of the planned construction works including its anticipated impacts, such as traffic disruption (road closures, diversions, including notices/signs on either end and marking of the diversion routes) to help manage any disruption and disturbance to and potential conflicts with local communities. Contractor to continue with consultations with affected persons who will be most impacted (in 50m of substations and 500m of power line ROWs) on at least a weekly basis to keep them fully informed of the nature of works and schedule. They will be specifically notified about the commencement of works and any high dust or noise activities (especially demolition, earthwork and piling work) – Contractor to undertake construction safety community awareness raising activities in local affected communities within 50m of new substations and 500m of power lines routes, especially with schools. – Contractor to undertake electrical safety community awareness raising activities in local affected communities within 50m of new substations and 500m of power lines routes, and especially with						

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		schools, awareness raising activities to be repeated on completion of construction; to include electrocution risks, EMF, corona noise, etc. The awareness sessions should provide information regarding the findings of the IEE on EMF and specifically discuss best practice reference limits for EMF and how they have been applied to the Project. – Community awareness by PGCB will use distribution of posters, leaflets, and safety booklets to all households in Bangla within 50m of the substations and 500m from power line routes in addition to face-to-face awareness raising by the contractor. These posters and safety booklets will also be available to pick up within substations, local PGCB offices etc. – Contractors to distribute leaflets/pamphlets/posters to the local community covering (i) health awareness including STDs and HIV/AIDS and other vector borne and viral communicable diseases, and (ii) the conduct of construction workers that can be expected.						
Construction Phase								
Onsite construction activities in general including works for temporary facilities	Environmental and social impacts of construction phase -- lack of management of construction leading to	– Contractor to comply with EMP including EMoP and the approved CSEMP/H&S Plans (including all subplans) along with the IFC EHS Guidelines and ILO Code of Practice during construction. – PGCB to undertake at least weekly checks of EHS activities on active construction sites ensuring at least monthly supervision visits as well as periodic	– No breaches of national regulations and/or international good practice guidelines. – No breaches of EMP by PGCB, contractor, subcontractors or other	Throughout construction	√	√	√	PGCB and contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
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	environmental degradation, H&S risks for construction workers as well the local community.	"spot check" site visits to all contract packages whilst directing supervision efforts towards the most environmentally sensitive components of the project. – Contractor to ensure each active construction site has an EHS Supervisor on site full time with responsibility for ensuring EMP implementation on their site with enough H&S supervision capacity as per the EMP institutional arrangements. – Contractor's EHS team will oversee EMP implementation and provide guidance on corrective actions. The contractor through the EHS team will document activities and compliance with EHS and conditions onsite through photos and written records. – The contractor will comply with any corrective action plan required and cover the costs where corrective action is required due to noncompliance on behalf of the contractor, its subcontractors or third parties. – Contractors will ensure all their subcontractors and third parties, irrespective of being formally or informally employed by them, also comply with the EMP and any updates to it, as well as their own CSEMP/H&S Plan and that this responsibility is cascaded down any chain involved. Provisions will be incorporated into all sub-contracts to ensure compliance with the EMP and CSEMP/H&S Plan and all other subplans at all tiers; all will be given a copy of the IEE/EMP and CSEMP/H&S and all other subplans.	third parties with prompt corrective action taken if required – Compliance with EMP documented in Contractor's monthly progress reports – Status of EMP compliance documented in EMRs					

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		– Contractors will put in place appropriate incentives and/or penalties for (non-) compliance by subcontractors and workers related to the use of PPE, prohibition on firewood, fishing by workers or poaching birds etc. – Land filling activities should receive increased environmental supervision from the contractor and PGCB to ensure environmentally sound construction methods are being used at all times especially if sucontractors are used. – Piling activities should also receive increased EHS supervision attention from the contractor and PGCB to ensure safe and environmentally sound construction methods are being used at all times especially if sucontractors are used. – All equipment and machinery used during construction to be of modern design, maintained in good condition, and with secure and strong health and safety guards installed around moving parts and kept in use at all times. – Fuel, oils and lubricants for operating equipment and machinery must be kept on the drip trays whilst in use on site. – Stack emissions of any temporary diesel generator set (including back up suppliy at substations) or hot mix to comply with national emission standards with the stack height design according to both GoB requirements and international good industry practice (as per IFC EHS General Guidelines).						

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Environment safeguards training and awareness raising activities	Environmental and social impacts of construction phase -- lack of EHS management capabilities on PGCB and Contractor's part, leading to environmental degradation, H&S risks for construction workers as well the local community	– Contractors to ensure workers with a specific role have, before been allocated the task, attended specialized health and safety trainings related that role e.g., health and safety stewards, first aiders, fire safety officers, as well as ensuring workers have received task-specific trainings for working at height, demolition, working with electricity, etc. – Only allow suitably trained and qualified workers to work on electrical equipment and at height, these workers must have training record of attending suitable training course on electrical safety and working at height and be provided with and wear the appropriate PPE for their role. Untrained workers must not be permitted to work with either live electricity or at height. – During construction site and activity specific risk assessments to be undertaken prior to the commencement of related work to identify the hazards present and applicable measures to be followed. – Contractor to undertake regular, compulsory awareness raising activities for all workers related to the EMP, including short monthly EHS refresher sessions, daily toolbox talks and posting of information at construction site offices, labor camps, and all work sites etc. – Contractors to conduct regular emergency preparedness and response drills involving all workers irrespective of them being formally or informally employed by contractor, subcontractor or	– Records of all training activities are retained. Training undertaken will be documented and reported in EMRs including photos and records of participants (including gender breakdown) – Trainings and awareness raising delivered in accordance with the training plan. – Contractors and construction workers fully aware of their responsibilities under the EMP through training	Throughout construction at least weekly basis	√	√	√	Contract cost

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		third-party to prepare them in case of an environmental or health and safety incident including fire, spillage, natural disaster, disease outbreak, etc. – Emergency preparedness and response training for construction management will include modules on first aid and fire safety including training on how to use first aid and firefighting equipment provided on-site. – All construction workers to be made aware of the chance-find procedure and types of finds to be reported. – Driver training to include advice on behaviour to reduce the potential for disturbance, including use of horn, loud radios with windows open, switching engines off when not in use, strictly observing speed limits and not accelerating or braking aggressively.						
Construction workers	Upholding of the labour rights of construction workers to maintain H&S	– Contractor to allow collective bargaining and ensure that national labor law and ILO core labor standards are upheld. All workers receive at least the minimum wage as defined by national legislation and additional work hours are adequately compensated. Workers operate within legal working hours; no more than 60 hours per week. All overtime hours are voluntary; coercion, threats or penalties are not used to pressure the workers into overtime.	No breach of Bangladesh labor law or labor management sub-plan under the CSEMPs.	Throughout construction	√	√	√	Contract cost
Site clearance and earthworks	Impacts to soil and vegetation cover,	– Ensure clear demarcation of the working area and avoid encroachment outside the agreed impact	– EMP/CSEMP requirements successfully	Throughout construction	√	√	√	Contract cost

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including works for temporary facilities	loss of biodiversity habitat and disturbance to flora and fauna	area. Implement careful construction practices to avoid damage to trees. Vehicle movements to be restricted to demarcated working areas to reduce unnecessary impacts to adjacent land. – Demarcation of trees to be avoided and retained as per the Tree Plantation Plan. – Only marked trees are to be felled after joint verification with PMU and approval of tree list. In case tree cutting is required, PGCB to secure the necessary permit from the Forest Department and schedule tree cutting/trimming outside the bird breeding season with all trees checked by an ecologist for nesting birds and other fauna prior to being cut. Similarly, any burrows will be checked for fauna by an ecologist before any earthworks commence. – Record all trees removed during construction, compensation paid, and replacements at 1:3 planted (including location, species, size, and economic value) in accordance with the Tree Plantation Plan and monitor their current health and survival status, trees to be planted as early as possible but latest before commissioning to ensure maintenance for 1.5 years following plantation. – Use of herbicides or burning to clear vegetation is strictly prohibited. Cut/trimmed trees and other vegetation trimmings will be immediately removed from the site. No dumping of cut vegetation onto agricultural fields.	implemented as determined through regular site checks, photographic record etc. – No outstanding grievances related to impacts on biodiversity etc.					

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		– Minimize removal of existing vegetation and topsoil. Excavated spoil to be reused as a landscaping material. Topsoil disturbed will be separately stored and used to restore exposed surfaces which will be promptly revegetated with native species including areas used for temporary construction facilities. If topsoil is stored for more than six months, the stacks will be monitored for anaerobic conditions and manual aeration will be undertaken if they develop. Topsoil storage areas will be protected from vehicle movements to avoid soil compaction. – Carry out works during the dry season to minimize soil erosion and sedimentation and in wet conditions minimize the use of heavy machinery. Consideration of the temporary use of removable steel plates to protect soil and its vegetation cover especially in locations that are subject to being waterlogged. – Construction lighting to be directional avoiding spill outside the working area at all construction sites and noise attenuating screens to be erected to avoid disturbance to wildlife in areas flagged in the IEE. – Strict prohibition of cutting of fuelwood or timber for cooking and heating by the construction workers. Contractor to provide alternative fuel source (e.g., kerosene/LPG) which will be stored safely. – Trainings will be provided to workers on identification of threatened species, dos and don'ts in relation to disturbance to local and migratory						

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		birds, prohibition on illegal activities including poaching, and regarding chance encounter with wild animals (especially those species that can be dangerous to human like snakes, etc.) at site or in the labor camp and wildlife rescue protocols; contacts for any wildlife rescue will be displayed in the construction office and labor camp – Construction activities to be scheduled to avoid high rainfall periods when drainage may become congested and result in flood, drainage connectivity and the natural flow of waterbodies must not be obstructed or diverted to another direction.						
Transportation, use of construction plant, demolition and earthworks including works for temporary facilities	Impacts due to dust and vehicle emissions on air quality Impacts due to construction noise	– Construction equipment and vehicles to meet national emission standards including for air and noise. – A provision for a daily log sheet to document dust suppression activities, which will be shared with PMU/ADB through periodic monitoring reports. – Avoid the use of diesel- or petrol-powered and use mains electricity or battery-powered equipment where practicable. – Belching of black smoke prohibited, use diesel fuel that has a low sulfur content, less than 0.1%. – Use low noise generating equipment e.g., less than 55dBA sound pressure level at 1m. – The use of horns in areas where sensitive receptors are located (houses, schools, clinics, mosques, etc.) will be prohibited. – Regularly check and maintain construction equipment and vehicles to keep them in good	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No exceedance of air quality or noise levels (Appendix X, and ECP 11) or increase in baseline air or noise pollution levels where they are already exceeded. – No outstanding grievances related to impacts from dust, air and noise pollution.	Throughout construction	√	√	√	Contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		working condition as per the manufacturer's specifications to meet emission standards. Record all maintenance works undertaken. – Vehicles shall not be left running idle for more than 5 minutes. – Regular sprinkling of water to be undertaken for dust suppression at the construction site (excavations, earthen or otherwise dusty access roads, and material stockpiles). (i.e. 3 times per day but more often if needed during traffic movements, earthwork, dry or windy conditions) but avoid overwatering as it can make for muddy conditions. – A designated person, traffic controller, wearing colored vest will be engaged for traffic management. – Stockpiles of spoils and other dust generating materials to be kept to a minimum. Cover stockpiles with tarpaulin. Locate stockpiles as far away as possible from residential property to avoid inconvenience from fugitive dust and from waterbodies to minimize pollution. Ensure they are enclosed by a solid fence or equivalent to avoid windblown dust and sediment laden runoff entering waterbodies. Minimize double handling and drop loads. – Remove materials that have the potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover, seed or fence stockpiles to prevent wind whipping.						

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		– Trucks transporting any loose materials or loose spoil from construction sites to local approved disposal sites will be covered with tarpaulin to reduce dust. – Position any stationary emission sources (e.g. diesel generators, compressors, etc.) as far as practical from sensitive receptors (houses, schools, clinics, mosques, etc.) – Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays. – Impose speed limits on construction vehicles to minimize exhaust and dust emissions along areas where sensitive receptors are located (houses, schools, clinics, mosques, etc.) – 10km/hr on site and 30km/hr on unpaved roads otherwise per the national limits. – Clean dust from access roads daily and then once after all construction work is completed. – Strictly prohibit the burning of waste generated by project-related activities. – Ensure workers working near or having long exposure to vehicle exhausts and earthworks are provided with clean N95 dust masks to avoid inhalation or particulate matter and other pollutants.						
Use of materials in construction works including works for temporary	Generation of construction wastes and use of hazardous materials	– In locations where waste is dumped (existing site conditions) the contractor will clean the site and collect the waste for onward disposal before they commence their works.	– No deterioration in soil and water quality from baseline levels – EMP/CSEMP requirements successfully	Throughout construction	√	√	√	Contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
facilities especially fuel, oil and chemicals		– Contractor to provide adequate facilities for handling and storage of construction materials to reduce the amount of waste that is caused by damage or exposure to the elements and a system for the collection/storage of wastes generated. Provide a central covered warehouse for storage of construction materials etc. Only volumes of material required for the day's work will be stored on-site – Fuel, oil, and chemicals used to be kept under lock and key and stored in labelled, sealed containers on drip trays to provide secondary containment. Waste oil to be stored in drums and similarly stored. In designated storage areas, these will be located on an impermeable 110% bunded surface and be under cover. – Mount construction plant and equipment containing oil and diesel on drip trays to catch leaks – all diesel operated equipment to have self-contained fuel tank. – Provide spill prevention kits (sorbent pads, loose sorbent material, etc.) at storage areas and other at-risk locations within clearly labelled containers to immediately confine any spills or leaks that occur. – Provision of designated hard standing areas for equipment servicing, refueling and wash down at least 50m from surface water and groundwater wells, with drainage directed through oil and grease interceptors before being discharged into a settling pond prior to discharge offsite.	implemented as determined through regular site checks, photographic record etc. – No outstanding pollution or waste related grievances from local communities or other interested stakeholders					

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		– No wastewater will be discharged direct to surface waterbodies or groundwater without adequate treatment. Use of pit latrines is prohibited as is open defecation and urination. Provision of adequate on-site sanitation facilities including connection to existing sewerage system linked to a wastewater treatment plant, septic tanks with soak-aways or alternative temporary sanitary facilities that do not allow untreated disposal of sewage to adjacent water bodies e.g., portable toilets where the wastewater generated is enclosed in a container and will later be taken offsite for wastewater treatment and disposal. – Minimize waste generation, restrict use of plastics and polyethene and use recyclable/biodegradable materials during construction to the extent possible. Ensure that the waste hierarchy is followed including prevention, minimization, reuse and recycling -- maximum reuse and recycling of waste. – Any plant or equipment that is rejected during the installation and commissioning due to damage or failure to immediately be removed from the site and returned to the supplier. – Constructions wastes, rejects, parts, etc. are not to be dumped outside substation boundaries or in drains/khals/beels/rivers or on agricultural land but stored for disposal in a temporary designated storage area. – It must be ensured that spoil reused on site is not contaminated with solid and hazardous waste						

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		(including oil spills) by maintaining good housekeeping and waste segregation/storage/transport/disposal. If spoil is contaminated it will need to be taken off site by a licensed waste management operator for disposal at a licensed waste management facility suitable for accepting hazardous waste. – Records of excavated spoil, generated waste, and transfer records will be kept by the contractors. Contractors will keep copies of the waste management company's licenses on file at the site office. Document all volumes and types of wastes generated and removed off site (inert, solid, hazardous) using transfer notes, to be taken by licensed waste contractors who should reuse/recycle or dispose of the waste according to type to suitably licensed and engineered waste management facilities. Spoil that is not required on site can be used by local communities if not contaminated. – Collect and transport construction waste to appropriately engineered and licensed solid/hazardous waste management facilities. Unsanitary open dumps and are not to be used by the contractor. Municipal waste collection systems must not be used as this is likely to mean that the waste is open dumped. Hazardous waste will need to be safely and soundly separately stored for disposal to suitably licensed hazardous waste management facilities. Contractor will identify the						

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		suitable vendors/facilities to take the waste generated for approval by the PMU.						
Onsite construction activities in general including works for temporary facilities	Health and safety risks to workers and the community	– Contractor is responsible for ensuring H&S of everyone on construction site including visitors and sub-contractor workers regardless they have been formally or informally employed. – Ensure adequate health and safety supervision is always on site (if staff temporarily off sick or on short term leave of less than a fortnight contractor to provide a named alternate in advance; if safeguard staff are on longer term leave, are posted elsewhere, or resign, contractor to ensure replacement CV is submitted to PGCB in 7 days of the contractor becoming aware with the staff joining the site within one month) – Require workers to confirm they have seen and understood the requirements of the health and safety plan before proceeding with the work. – Construction plant and equipment used on or around the site will be modern and fitted with appropriate safety devices. – Ensure adequate health and safety signage is provided – using graphics and in Bangla and other languages of the workers found on site. – Ensure shaded rest area with 4 liters of drinking water per worker and toilets that are easily accessible and can accommodate the number of workers on site. – MSDS or equivalent data/information in Bangla and other languages of the construction workers are to	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No outstanding health and safety grievances from workers, local communities or other interested stakeholders	Throughout construction	√	√	√	Contract cost

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		be readily available to any exposed workers and the first-aid personnel. – Ensure good housekeeping at construction site, storage areas, staff accommodation, etc. -- to be kept neat and tidy, e.g., no materials, equipment, trash laying around, cleanup worksites so that they are free of debris on daily basis. – If works are not completed within the day the contractor must not leave any hazardous conditions (e.g., unsigned, unfenced, and unlit open excavations without means of escape and emergency contacts in case an accident occurs) overnight unless absolutely no access by public can be ensured. – In the dense areas transport equipment only during non-rush hours i.e., avoid the hours of 6am to 8am and 4pm to 6 pm to minimize traffic congestion. – Road safety standards and norms to be strictly implemented by contractor, construction vehicles to strictly follow road regulations – During construction works, ensure qualified first aider and trained fire marshal is always available on-site with an appropriately equipped first aid kit and appropriate fire extinguisher and other firefighting equipment immediately available for use. – Provide an ambulance for more serious cases to transport the patient to the hospital for treatment – Emergency contact number and details for medical, fire, etc. are to be displayed in all construction sites.						

General Mitigation								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB[72]	**SIC[73]**	**Contractor[74]**	
		– Construction workers to be given medical checkup per statutory requirements before being allowed on site; medical records are to be maintained by the contractor's labor officer.						
Site reinstatement including of temporary facilities	Unanticipated damage to existing public and private property	– A photographic record will have been made of the pre-construction condition of land used for temporary facilities before construction to inform the reinstatement works. After completion of the construction work any temporary structures will be completely removed and the temporary land will be restored to its earlier condition with all waste being removed. – All spoil and construction waste and scrap material must be removed on the completion of works and temporarily disturbed sites restored back to their earlier condition. Roads and footpaths utilized to be cleaned and restored back to their previous condition satisfactorily to the community which is using them. – All planned and unanticipated damage to existing public and private property will be restored to pre-project condition and/or compensated at the cost of the contractor.	– Land reinstated to its former condition as compared to photographic record. – No grievances regarding reinstatement of land and property to its former condition.	On the completion of construction works prior to handover to PGCB	√	√	√	Contract cost

12.7.2 Part 2 – New Substations and Bay Extensions

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Detailed Design and Pre-Construction Phase								
Connection to Existing Substations	Environmental audit has identified gaps in EHS management at existing substations for bay extensions resulting in pollution, health and safety risks	– PGCB to undertake the corrective actions set out in the Corrective Action Plan (CAP) for existing substations to which lines will have bay extensions prior to allowing the contractor access to them to start work. Contractor at request of PGCB to address corrective actions as part of their scope of works. – If asbestos is identified but does not need to be disrupted and is not weathered and appears in good condition, consider leaving it where it is, as main health risks occur when asbestos is moved. If any asbestos will be disturbed by construction works, it must be removed following national requirements and international good practice per EHS General Guidelines on OHS and ADB Good Practice Guidance for the Management and Control of Asbestos and disposed of as hazardous waste material. – SIC to submit a report, including photos for each existing substation, on the status of corrective action implementation, compliance with national laws and regulations, and consistency with SPS 2009 requirements to validate PGCB's compliance with the CAP and submit to ADB for clearance. CAP must be fully implemented and PGCB must receive ADB clearance of this report before the	Implementation of the corrective action plan, all existing facilities (substations) meet national laws and regulations and are consistent with SPS 2009 requirements prior to the contractor being allowed access to them	Prior to access being granted to the contractor	√	√	TBC	PGCB

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		contractor is given access to an existing substation to start work. – Once the contractor has taken access then any non-compliance at the existing substation will become their responsibility so they must ensure they are satisfied CAP is completed by PGCB.						
Substation detailed design and construction EHS management planning during pre-construction	Environmental and social impacts of construction and O&M phase -- lack of management of detailed design, construction and O&M leading to environmental degradation, H&S risks for construction and O&M workers as well the local community	– Designs to reflect the requirements of the EMP and international engineering best practice/good EHS practices – Detailed design to ensure works will only take place on modified habitat found within the boundaries of the allocated substation land. – Detailed design to minimize the need to cut mature trees that are present at the substation sites – Detailed design to minimize visual impact and clutter with buildings in keeping with the local vernacular. Landscaping to be included as part of the detailed design to enhance ecology and visual appearance of the substation. – Take a life-cycle approach to detailed design, considering the use of construction materials and the energy and water efficiency of the building during operation adopting the “green building” concept e.g., using natural ventilation for reducing the need for air conditioners. Detailed design is to include rainwater harvesting and enable PGCB to	Detailed Design cleared and approved reflects EMP requirements to minimize impacts and risks on EHS during subsequent stages of the project	Prior to detailed design approval and for implementation during construction	√	√	√	PGCB and Contract Cost

New Substations and Bay Extensions								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contractor	
		readily fit additional solar panels on the building rooftop once operational. – For installation of solar panels under the works package selection of an environmentally safe and sound solar photovoltaic panel from a manufacturer who offers a facility for return of end-of-life equipment. Solar panels installed must not contain hazardous materials e.g., cadmium, lead, or selenium. Equipment purchased for use on the project is to be accompanied by letter from the manufacturer stating its composition and the leaching potential of any heavy metal content to determine if it is acceptable and how it is to be disposed on at end-of-life. Solar panels to have an anti-reflective coating to minimize glint and glare and maximize light absorption, racking to be anti-reflective made of galvanized steel or aluminum. – Detailed design to ensure all lighting is of energy efficient LED type with solar powered LED lighting where practical Use of fluorescent/HPSV lamps will be avoided since they are less energy efficient/classed as hazardous waste for purposes of disposal. – Outdoor lighting to be installed must be of low intensity with little or no blue wavelength and operated using passive infrared (PIR) technology movement sensors set at person height so as not to be kept permanently on overnight, it must be						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		directional and shielded, so light does not fall outside the site boundary. Outdoor yard lighting must be placed in a manner that does not project light into adjoining areas as this could disturb biodiversity or occupants of houses near the vicinity of the substation. – Ensure that all substation equipment is raised on foundations located above the flood level including an allowance for climate change plus freeboard. – Construction method statements for landfilling activities must ensure a robust containment wall or bund is installed and that the excess water from sand fill is evaporated or infiltrates to ground, there must be no drainage to or waterlogging of adjacent land and no drainage to or sedimentation of adjacent waterbodies. – Drilling and piling mud must be managed to avoid it being discharged to adjacent land and untreated to waterbodies. – Substations that are in proximity to waterbodies, including salt pans, or waterlogged areas, and residential or other sensitive properties need to ensure drilling or piling noise and mud is managed to avoid adverse effects on water quality, ecology and the adjacent land and local community.						
	Emissions of SF6, a potent greenhouse	– Use of alternative insulation medium (such as Hydrophobic Cycloaliphatic Epoxy) to be considered as the preferred option.	Detailed Design cleared and approved reflects EMP requirements including leak	Prior to detailed design approval and for	√	√	√	Contract Cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	gas, to the atmosphere	– The leakage of SF6 in gas insulated equipment must be minimized. – Detailed design of SF6 insulated equipment (e.g., switchgear) and AIS substations will comply with international norms and standards for handling, storage, and management of SF6. – SF6 insulated equipment and AIS will be hermetically pressure sealed “sealed for life” units, tested and guaranteed by the supplier at less than 0.1% leakage rate. – Equipment purchased by PGCB or the contractor for use on the project is to be accompanied by letter from the manufacturer stating that it meets these requirements. – Substations with SF6 insulated equipment to be equipped with a Leak Detection System (LDS) for SF6. This will be designed such that any leakage of SF6 will trigger an alarm to the nearest concerned O&M location so that staff may immediately rectify any leak. – Provision of SF6 leakage detection kit at each substation is mandatory. – SF6 emergency response plan to be prepared by contractor for construction. PGCB in relation to operation to deal with event of an accidental leak.	detection system with copies of equipment purchase letters included in EMRs, all SF6 project equipment must have <0.1% leakage rate etc.	implementation during construction				
	Pollution of soils and water due to discharge of	– Use of PCBs will be prohibited in all new transformers and other substation equipment. Equipment purchased by PGCB or the contractor	Detailed Design cleared and approved reflects EMP requirements with copies of	Prior to detailed design approval and for	√	√	√	PGCB and

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	transformer oil or other fuel, oil or chemicals into the environment due to spills or leaks or discharge of wastewater from substation washrooms	for use on the project is to be accompanied by letter from the manufacturer stating that it is guaranteed PCB free and to be labelled as PCB free before its installation. – Contractor to provide PGCB with Material Data Sheets for insulating oil meeting technical specifications for use in new transformers. – Toilets/washrooms to be connected to either existing sewerage system (connected to a sewage treatment plant) or to septic tank with soakaway sufficient distance from waterbodies – any discharge to surface water must meet the project effluent quality standards (Appendix X, and ECP 1 & 16). – Detailed design of substations to locate new transformers, storage areas and septic tanks/soakaway as far away as possible from any surface waterbodies and groundwater sources to reduce pollution risk. If within 500m of surface water or groundwater well further assessment to be carried out by contractor to demonstrate using a source-pathway-receptor model there will be no adverse impact on aquatic ecology or human health. – Detailed design of transformers and fuel, oil chemical, and waste storage areas to incorporate impermeable concrete surface bunded to 110%	equipment purchase letters and MDS included in EMRs.	implementation during construction				Contract Cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		volume which is not connected to the drainage system to collect spills and leaks. – Detailed design of fuel, oil chemical, and materials and waste storage areas to provide for a covered storage area of sufficient size to accommodate all anticipated storage requirements with segregation of wastes, ensure storage areas can be locked, are well-ventilated and will not reach extreme temperatures. Ensure space also provided in the storage area for solid and hazardous waste garbage bins to be stored. – Provide spill prevention kits (sorbent pads, loose sorbent material, etc.) at storage areas and other at-risk locations within clearly labelled containers. – Conduct a flood and drainage risk assessment and incorporate effective drainage design (allowing for climate change) to prevent possible flooding or waterlogging of the substation during the wet season, whilst ensuring that surface runoff from the project site is no more than the existing site runoff rate. – Substation design must ensure that existing drainage flows/drains/culverts are not blocked and avoid exacerbating flooding and waterlogging of adjacent land due to raising of land above the flood level and removing the storage capacity – If the substation selected by PGCB is inundated or waterlogged landfill will be required to create the						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		development platform, the flood and drainage risk assessment must include modelling of the impact of the detailed design on the surrounding 500m to ensure that inundation or waterlogging on adjacent land will not be beyond the current greenfield level as a result of the presence of the raised substation land. – No drainage water will be permitted to discharge direct to surface water, oil interceptors are to be fitted on all drainage to catch oil spill.						
	Health and safety risks related to fire safety and emergency response	– Identify presence of any unstable land/steep slopes and avoid these during the detailed design. – Identify presence of floodplain or depressions that get waterlogged in the rainy season and avoid these during detailed design. – If the substation selected by PGCB is inundated or waterlogged landfill will be required to create the development platform. – Detailed design of control buildings to follow national building and fire safety standards as well as international good practice – Provide fire walls on all transformers. – Detailed design of building to include emergency exits with emergency exit signage – Provide fully stocked, in-date first aid kit installed in a prominent, signed position, first aid posters and emergency contacts to also be displayed	Detailed Design cleared and approved reflects EMP requirements	Prior to detailed design approval and for implementation during construction	√	√	√	PGCB and Contract Cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Provide eye wash station and water supply to shower located near the storage areas for fuel/oil/chemicals – Detailed design of substations to include fire safety measures including detector, alarm, and firefighting equipment in accordance with national regulations and IFC EHS Guidelines on OHS. – Provide sand buckets, full of sand, placed in a prominent, signed location near to fire-risk locations such as transformers and oil storage areas. – Provide fire extinguishers (including for oil and electric fires) in a prominent, signed location near to fire-risk locations such as transformers and oil storage areas with service and expiration dates clearly labelled. – Provide automatic fire alarm and fire suppression system in the control buildings along with posters on fire safety. – All electrical hazards will feature written and visual warning signs that meet the IEEE standards to include the ISO 7010 "Hazard Type: Electrical Symbol" warning of the risk of electrocution.						
	Impacts to health and safety of O&M workers and the public	– Use of any asbestos containing materials is prohibited. – Include in the design of all substations (if not already present or in poor condition) and around transformers a secure wall or fence sufficiently	– Detailed Design cleared and approved reflects EMP requirements – Compliance with ICNRP occupational/community EMF	Prior to detailed design approval and for implementation during construction	√	√	√	PGCB and Contract Cost

New Substations and Bay Extensions								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contractor	
		high it cannot be climbed over with lockable entry featuring written and visual warning signs to include the ISO 7010 "Hazard Type: Electrical Symbol" warning of the risk of electrocution. – Indoor work areas at substations to be well ventilated and naturally or artificially well-lit in accordance with national regulations and the IFC EHS Guidelines on OHS. – Detailed design of substations to ensure EMF levels within the substation boundary are within international good practice levels as per International Commission on Non-Ionizing Radiation Protection (ICNIRP) (reference and peak values) for occupational exposure;78 in areas where EMF levels could be exceeded posting of written and visual warning signs. Use of shielding equipment/materials to decrease EMF exposure as required. – Detailed design of substations to ensure EMF levels at the boundary is within international good practice levels as per International Commission on Non-Ionizing Radiation Protection (ICNIRP) (reference and peak values) applicable to the public exposure. – For control buildings provide adequate natural and/or artificial lighting levels to meet the IFC EHS	exposure levels (reference and peak values)					

[78] https://www.icnirp.org/cms/upload/publicatio ns/ICNI RPemfgdl.pdf

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		Guidelines on Occupational H&S (Table 2.3.3. Minimum Limits for Workplace Illumination Intensity) – Pit latrines and disposal of untreated sanitary wastewater to surface or groundwater is prohibited. – Staff will reside off site but detailed design of substations to include adequate sanitation and welfare facilities for all workers to be posted at or visiting the substations including separate indoor kitchen, eating and rest areas (with day bed facilities for rest periods) to the control room and adequate number of indoor toilets/washrooms (one per six staff and separate for men/women with hot and cold running water hand washing facilities) which are connected to either existing sewerage system or to septic tank with soakaway. Drainage from all sinks and urinals to be connected to the septic tank as well as the WC. Provide a dedicated shelter and rest area for the 24-hour security guards, shielding them from rain, wind, and extreme (hot and cold) temperatures. – Disposal of worker generated waste (e.g., plastic bottles) on-site is prohibited and adequate waste storage areas to be incorporated into the detailed design. Composting of food waste may be permitted on-site if detailed design incorporates enclosed composting facilities (enclosed to avoid						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		attraction of vermin etc.) located away from accommodation and any properties outside the site boundary. – Source of drinking water that meets GOB and WHO drinking water standards to be provided to substations. If any surface or groundwater sources are proposed for use in substations, Contractor is to undertake a baseline water quality sampling per EMoP to confirm its suitability for use. If drinking water standards are not met, detailed design to consider alternative source or include water treatment facilities (RO) at the substation to facilitate safe drinking water supply. Detailed design to include water meters for monitoring of water abstracted. – Provide gated, safe vehicular access for entry/exit off the public highway having adequate sight lines for all drivers and warning signs of entrance as well as adequate parking for cars. Entrance ways over bridges or culverts must have safety rails on either side. – Final surface level of substation equipment will be at least 0.5 m above the existing ground level or highest flood level including an allowance for climate change (whichever is higher) – Foundations to be constructed in such a way as to be adequately drained to prevent washouts and flooding impacts to adjacent land.						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Junctions between new access roads and existing roads will not impede or damage the latter nor any associated drainage channels, irrigation infrastructure, etc. – If crossing of drainage channels is required for substation entrance creation, a bridge or culvert is to be used to maintain the natural flow of the drain. These should be designed to 1:100 years return period with the invert level of culverts below the bed level to enable the natural substrate to return.						
	Impacts from dust generated by earthworks	– Detailed design of substations to minimize cut and fill and land raising to reduce the extent of earthworks and thus dust generation during construction, also maximize reuse of spoil to minimize the need for disposal off site. – During detailed design, contractors will quantify extent of earthworks required, amount of spoil to be generated and location for disposal of excavated spoil through landscaping within the site boundary – generation of excess spoil to be avoided.	– Detailed Design cleared and approved reflects EMP requirements – Compliance with air quality levels applicable to the substation location as per (Appendix X, and ECP 10).	Prior to detailed design approval and for implementation during construction	√	√	√	PGCB and Contract Cost
	Impacts due to substation noise	– Detailed design to ensure maximum sound power level of equipment at 1 m is 85 dBA through use of sound attenuation, in areas where these noise levels will be exceeded OHS noise warning signage identifying that ear protection to be worn must be installed as part of detailed design.	– Detailed Design cleared and approved reflects EMP requirements – Compliance with noise levels applicable to the substation location as per (Appendix X, and ECP 11).	Prior to detailed design approval and for implementation during construction	√	√	√	PGCB and Contract Cost

New Substations and Bay Extensions								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contractor	
		– Detailed design of transformers and other noise sources to be located as far as practical from the substation site boundary since noise diminishes with distance. – Contractors will be required to measure and confirm the distance from their detailed design and construction works to sensitive receptors to confirm if the noise standards can be met. If any properties are within 100m of the substation site boundary[79] then baseline measurements must be carried out during detailed design (refer to EMoP) by the contractor who will also undertake quantitative noise assessment using internationally recognized noise modelling software of (i) the detailed design considering low frequencies associated with transformer hum and (ii) construction methods to confirm that noise standards per Appendix X, and ECP 11 can be achieved for the substation alone without additional noise mitigation – industrial levels must be achieved at the site boundary with residential levels at the nearest properties with silent levels achieved when schools or other silent zone receptors are present. If residential properties or other sensitive receptors are near the substation						

[79] Per the EIA/IEE general construction impacts and operational noise exceedance in silent zone might be possible up to 100m. However, if the louder types of piling (impact or vibratory hammers) that generate over 85 dBA are intended to be used by the contractor baseline measurements must be carried out at substation sites with any properties present in 50m due to the increased impact area that will result.

New Substations and Bay Extensions								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contractor	
		boundary, then measurements must be carried out during detailed design and baseline noise calculations (modelling) considering low frequencies associated with transformer hum will be undertaken by the Contractor to demonstrate that the noise standards/guidelines can be met. If background noise levels already exceed the standards/guidelines the design must ensure that noise levels result in a <3dBA increase in background. – Given transformers are generally in the range 60-80 dBA at 1m if outdoors they are to be located at least 5 m inside the substation site boundary but this distance will need to be increase to between 20m – 100m depending on the land use adjacent to the substation for noise limits to be met without additional attenuation. The quietest available equipment with manufacturer-supplied noise mitigation will be installed. If noise levels cannot be met through siting and design alone detailed design to incorporate acoustic barrier designed to international good practice around either the noise source and/or substation site boundary to attenuate noise to level such that noise levels at the receptors will be met. As operational noise is permanent the acoustic noise barrier will need to be a permanent installation as part of the detailed design						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Contractor to avoid soil compaction, piling, blasting and other vibration inducing activities as much as possible. If needed a management plan will be prepared for approval. The quietest equipment available will be used, noise attenuation measures will include, (i) fitting of high efficiency mufflers to the noise generating equipment; and (ii) keeping acoustic enclosures around piling/drilling equipment. For piling it will not be possible to use the louder types of piling (impact or vibratory hammers) that generate over 85 dBA without resulting in a significant impact because noise from piling equipment of 120 dBA at 1m would exceed 85dBA, the level at which hearing damage is caused at adjacent properties if found within 100m. If noise levels are still exceeded a temporary acoustic noise barrier will be provided or alternatively temporary relocation of occupants during works to a rented property. In locations where soil compaction, piling, blasting and other vibration inducing activities are unavoidable Contractor to identify properties within the zone of influence and undertake pre-construction structural surveys to identify level of risk with reference to the guideline vibration levels per Appendix X, ECP 11. If there is a risk of structural damage to properties due to their current condition, consider alternative construction						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		methods or temporary relocation of occupants during works if at risk to a rented property. Consider the need to install monitors to monitor structural movement. Structural or cosmetic damage to be repaired by Contractor to at least pre-project condition at their own cost.						
	Impacts to surface and groundwater resources	– Construction activities must be planned not to limit the availability of or restrict access to water sources (e.g., groundwater wells) used by local communities; natural flow of any surface water or drains must not be obstructed or if not possible diverted through a drainage system to another direction. – Any piling or excavation works within 500m of groundwater wells used as a drinking water source by local communities will require pre-construction and post construction water quality monitoring against drinking water standards to ensure there is no contamination of the water supply. – Construction water to be sourced from an existing licensed commercial supplier (preferred option especially for potable water supplies), where available, or rainwater harvesting. If using an existing surface water or an existing borewell for construction water, permissions to be obtained from the relevant authorities together with the agreement of local communities.	– Monitoring data demonstrates compliance with national standards – No unresolved grievances regarding water resources	Prior to mobilization and site establishment and for implementation during construction	√	√	√	Contract cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Prior agreement is required from local community users to use any existing surface water/borewell or local piped water either temporarily during construction or permanently for substations; in cases where use of local water source is not agreed, contractor to import tanked water to the project area. – No groundwater will be used in locations without additional groundwater capacity – in other locations groundwater will only be used after it has been confirmed through assessment that there will be no additional stress on groundwater resources as a result. – Permissions for any new borewell installation (for construction of permanent supply to substation) to be obtained together with agreement of local communities before abstraction, include water meter for monitoring of water abstracted. – Contractor to avoid piling activities as much as possible. If needed a management plan will be prepared for approval. Oil will not be used for drilling or piling fluid. The piling management plan will include measures to avoid water pollution from the use of any bentonite clay slurry - adequate bunding must be provided around piling activities to contain piling mud and decanting ponds will need to be fully enclosed to avoid spills or leaks to adjacent land. Piling fluid must not be intentionally						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		or unintentionally disposed of to surface water untreated or be allowed to damage adjacent land. Sediment laden surface water runoff and discharges must be disposed of to open ground for percolation or passed through a sedimentation tank having adequate settlement tank, to obtain at least 50 mg/l TSS, before being allowed to enter surface water. Use of piling mud treatment equipment to be considered where space constraints exist preventing adequate settlement.						
	Impacts of temporary access roads	– All substations will be accessed via the existing road network and no new access road will be constructed, although new entranceways of up to 35m length will need to be created onto main roads. Entrances ways will be asphalt or concrete surfaced. Junctions between new entrances and existing roads will not impede or damage the latter nor any associated drainage channels, public utilities, etc. Adequate sight lines will be provided for safe entrance and exit of vehicles during both construction and O&M. – A photographic record will be made of the pre-construction condition of access roads to inform the reinstatement works. After completion of the construction work access roads will be restored to their original condition. – In a few substations, the people during the consultation pointed out that proper approach road	– Access roads reinstated to their former condition as compared to photographic record. – No grievances regarding reinstatement of access roads to their former condition.	Prior to mobilization and site establishment and for implementation during construction	√	√	√	Contract cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		with streetlight facility to the proposed substation is needed to deal with emergency situations.						
Construction Phase								
Onsite construction activities	Emissions of SF6, a potent greenhouse gas, to the atmosphere	– Careful installation of SF6 insulated equipment (e.g., switchgear) at substations following international norms and standards for handling, storage, and management of SF6 to avoid damage/ruptures/leakages of SF6 gas. – Provision of SF6 awareness raising to construction workers and training of O&M staff on the operation of the SF6 LDS and emergency response procedures during the commissioning stages.	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Throughout construction	√	√	√	Contract cost
	Impacts due to dust from earthworks	– Plan the construction site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible. – Erect solid screens or barriers around the dusty activities or the site boundary that are at least as high as any stockpiles on site to fully enclose operations. – Contractors to undertake quantitative air quality monitoring as per the EMoP. In addition to quantitative monitoring (as per EMoP) contractors will undertake weekly dust soiling checks of surfaces of adjacent properties during earthworks and help with cleaning of external surfaces of property if dust is evident. – If air quality levels are exceeded, an increase in existing background air pollution is recorded	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No exceedance of air quality levels (Appendix X, and ECP 10) or increase in baseline air pollution levels where they are already exceeded. – No outstanding grievances related to impacts from dust and air pollution.	Throughout construction	√	√	√	Contract cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		where they were already exceeded, or complaints are received contractor will be required to implement additional dust mitigation e.g., barricading/isolating sources of dust, use of wheel wash, adjusting working methods, to ensure the levels are met.						
	Impacts due to construction noise	– During night (6am to 10pm) no works will be permitted at substations. – Contractor's maximum working hours (including the movement of heavy vehicles for construction on off-site access roads) will be 7 am – 7 pm. – Residents within 500m will be informed well in advance of the construction schedule for noisy activities taking place on-site. Noisy construction activity at substations (especially demolition and piling works) will only take place between the hours of 10 am - 4 pm. No noisy work and heavy vehicle movements will take place on Saturdays and during school/college/university exam periods. No work on holidays and festival days. Sensitive receptors to be consulted with any other special days when they would wish noise levels to be minimized. – For substations with properties in 50m, loud construction noise must be limited to only very short periods of activity to minimize disturbance, or by installations of temporary acoustically designed noise barriers.	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No exceedance of noise levels (Appendix X, and ECP 11) or increase in baseline noise levels where they are already exceeded. – No outstanding grievances related to impacts from noise and vibration.	Throughout construction	√	√	√	Contract cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Layout substations to keep nosiest construction works the furthest distance possible from adjacent receptors and adopt construction methods that ensure noise generated from construction is minimized. If the noise levels at the site boundary or receptors will exceed the required noise levels, are more than 3dBA above background when already exceeded, or there are complaints then a temporary acoustically designed noise barrier will need to be installed around the substation perimeter to be able to meet required noise level. – Sound levels received by workers must not be over 85 dB(A) during continuation of 8 working hours without wearing PPE. – Contractors to undertake quantitative noise monitoring as per the EMoP. If noise levels are exceeded, an increase in existing or noise levels >3dBA recorded where they were already exceeded, or complaints are received contractor will be required to implement additional noise mitigation e.g., adjusting working methods, or placing of temporary acoustically designed noise barriers to ensure met.						
	Impacts due to infilling works.	– No borrow area or quarry will be opened by the contractor to obtain land fill material. No dredging will be undertaken by the contractor. Ensure sand and gravel for substation land filling is from an existing government licensed sand and gravel	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during infilling of the low-laying land	√	√	√	Contract cost

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		supplier operating legally permitted sites i.e. ensure no illegally extracted sand and gravel is used for the project. Copies of licenses of the supplier to be obtained by contractor prior to the commencement – The adjacent properties to be informed at least one month prior that the infill work is to be commenced. – Conduct infilling during the dry season when the site is not waterlogged to minimize the risk of sediment laden runoff. – Ensure land fill works are commenced at the start of the dry season – To avoid cumulative impact on the road network since a large number of trucks will be needed to import material, plan the import of material in a staggered manner to reduce the number of daily traffic movements ensuring no congestion is allowed to build up at the site entrance; parking area for trucks is to be provided off the access road. – Consider the option for sand[80] to be pumped to site from existing licensed sources using a pipeline. Since the route will be determined by the contractor an environmental assessment will need to be submitted to demonstrate that this will not	No outstanding grievances related to impacts from landfilling activities.					

[80] There are low-lying areas around some substations, which might get waterlogged during the monsoon period. Height of these lands will be raised up to the standard height of the main access road during the construction.

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		have adverse impact, and the IEE will need to be updated. – Removal of all dumped waste from the site for disposal to a suitably licensed waste management facility prior to infilling – no waste must be buried under the infill. – Erection of a robust bund or wall (e.g. sheet pile or earthen bund) to contain the mud sand whilst the water evaporates or discharges to ground. – Given the adjacent waterbodies the condition of the bund or wall must be checked daily to ensure no leak. – There should be no discharge of water to the adjacent land or drainage channels; no waterlogging of adjacent land and no sedimentation of waterbodies adjacent. – Photographic record of the access road and adjacent land and properties to be taken before the start of infill works. – Water quality baseline monitoring data to be taken from the adjacent waterbodies before the start of infill works. – If any damage occurs to the adjacent land or waterbodies due to the infill activity, then this must be rectified or compensated by the contractor. – The water quality (pH, turbidity, TDS, TSS, DO) of the adjacent waterbodies will be monitored daily during the infill activity and works must halt						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		immediately upon any deterioration with corrective action taken to bring the water quality back to baseline before continuing works. No exceedance of the water quality standards as are mentioned in Appendix X. – Following infill, the dry raised land must be seeded, and the slopes planted with native grass species, short water tolerant plants and reeds at the base to prevent soil erosion whilst the landfill settles for construction. – PGCB to ensure their environmental specialist or SIC supervises and monitors infilling activities on a daily basis and in doing so ensures works are undertaken following national laws and regulations and the EMP requirements.						
	Site restoration	– Rehabilitate any disturbed areas beyond the substation infrastructure footprint to through revegetation and landscaping using native species. – All spoils, construction waste and material scrap after erection of substation/terminal gantries must be removed. The substation boundaries to be cleared of construction waste, footpaths and surrounding to be cleared and restored satisfactorily to the community staying near the substation.	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	On the completion of construction works prior to handover to PGCB	√	√	√	Contract cost
O&M Phase (Measures to be Implemented by PGCB)								

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Operation and maintenance activities	EHS impacts and risks in general; biodiversity impacts	– Update operational SOP for substations covering pollution control, solid and hazardous waste management, health and safety risk assessments and management plans addressing both occupational and community risks and including permit to work system of critical activities such as electrical or work at height and emergency preparedness and response provisions (content will be similar to those of construction phase but tailored to reflect operational aspects) – Substation workers will need to be trained in update SOP/OR (Appendix X, and ECP 16 & 18) and good housekeeping practices including how to clean up oil/fuel spills and dispose of contaminated sorbent material which would be treated as hazardous waste etc. – During maintenance activities mitigation measures applicable to the construction phase are also applicable to PGCB maintenance workers or contractors and are to be followed – Material Safety Data Sheets for all fuel/oil/chemical kept on site to be posted – Records volumes of all type of wastes generated and keep transfer records at the substation with copies of the waste management company's licenses on file. – Defunct solar PV (if any) and also batteries (e.g., lead acid) installed at the substations at their end-	– Compliance with GOB regulations – No fatalities or lost time incidents 100% of H&S incidents including near miss recorded, immediately investigated, and corrective action taken to prevent repeat. – Compliance with noise levels: 1- hour LAeq 70 dB(A) at the site boundary, 60dB(A) within mixed zones, 55 dB(A) at the nearest residential properties including those in commercial zones and 50dB(A) within 100m of silent zones – Compliance with ICNRP occupational/community EMF exposure levels (reference and peak values) at substations – EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No outstanding grievances from local communities or other interested stakeholders	Throughout the O&M Phase	√			PGCB

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		of-life will need to be disposed of as hazardous waste. – During O&M, internal audits will be undertaken by the PGCB ESU Environment Officer, and Health and Safety Officer – Record any mortality of wildlife, local or migratory birds within and near the substation boundary.						
	Gas insulated equipment– release of SF6 as GHG	– Inventory to be maintained of all SF6 containing equipment at SS, their make and model, volume of SF6 contained, details of repair works undertaken, dates of SF6 replenishment, leakage incidents etc. – Inventory to be used to monitor SF6 leakage from SS. If trend of lowering gas pressure is observed investigate the cause and rectify any leak per the manufacturer's instruction. – If SF6 used on site carry out regular inspections and periodic preventative maintenance to minimize SF6 leakages; monitor SF6 leakage rates using leak detection equipment – SOP to define a safe SF6 retrieval arrangement with appropriate handling, storage, disposal process for end-of-life circuit breakers by a certified industrial waste management company who will need to remove SF6 and treat the equipment prior to disposal in accordance international good practice International Electrotechnical Commission (IEC) standard 61634 to ensure SF6 not released to atmosphere.						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	Occupational health safety of maintenance staff - accident risk	– Maintain incident logbook and medical tests / health check-up of staff – Provide everyone who enters the SS with an OHS induction – Keep vents/windows unblocked and replace defunct bulbs/lights immediately – Ensure all SS workers receive basic first aid and firefighting training with annual refreshers – Ensure that at least one staff at SS is fully trained as a first aider and fire marshal – Maintain fully stocked, in-date first aid kit, keep first aid posters and emergency contact lists that are posted up to date – Maintain firefighting systems including in-date fire extinguishers and full sand buckets and keep fire safety posters up Carry out regular inspections and periodic maintenance to ensure electrical standards are being upheld – Keep emergency exits clear at all times and maintain emergency exit signs Maintain written warning signages including the ISO 7010 Hazard Type: Electrical Symbol warning of the risk of electrocution. – Collect, segregate, and store in the designated and labelled storage areas all wastes including food wastes for onward disposal as per construction.						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Undertake regular pest control using integrated pest management approach Maintain vegetation at the SS that poses a health and safety hazard Prohibit the use of herbicides, pesticides or burning to control any vegetation growth or to manage vegetation waste. – O&M to be performed only by suitably qualified and experienced workers who are regularly trained staff of PGCB or a contactor under supervision of a Health and Safety Officer following the SOP for H&S. – O&M workers to be given required PPE and other requisite safety equipment, provide sufficient PPE spares available on site for visitors etc. – Sanitation and welfare facilities as per construction will also be required for O&M workers. – Continue to provide potable drinking water supply meeting GoB and WHO drinking water standards (regular testing of drinking water is included in EMoP scope). – Cleaning of toilets on daily basis, use of disinfectant and floor cleaners; keep toilets/septic tank/soakaway maintained periodic spot monitoring using mobile phone app of noise levels and ambient EMF for substations at the boundary fence/near transformers to ensure they are below the occupational/community noise levels and						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		ICNRP occupational/community EMF exposure levels						
	Community H&S risks – impact on surrounding community, noise, EMF, accidents etc.	– Maintain security and prevent entry by the local community by maintaining adequate boundary fencing or wall, always keeping control room doors and gates shut, and having security persons present 24x7 to prevent unauthorized public access and trespass. – In a few substations, the people during the consultation pointed out that proper approach road with streetlight facility to the proposed substation is needed to deal with emergency situations. – Maintain written warning signages including the ISO 7010 Hazard Type: Electrical Symbol warning of the risk of electrocution. – Regular checks and periodic maintenance of equipment like transformers and capacitors to minimize corona noise emissions. – PGCB in conjunction with local municipalities and the media with the support of CSOs to continue to organize health and safety campaigns on electrical safety community awareness raising activities in local communities and schools within 500 m of the substations						
	Use of mineral oil for transformers – accidental spillage	– Maintain inventory of transformers on site, make, model, risk of PCBs and other details including transformer test report, details any maintenance						

New Substations and Bay Extensions								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	contaminating both land and water	works undertaken, dates oil changes, leakage incidents etc. – Carry out regular inspections and periodic preventive maintenance to minimize oil leakages; ensure values, nuts and bolts are fully functional and tightly secured, ensure rubber seals of radiators are intact – The acceptance of mineral oil at substation to be accompanied with Material Safety Data Sheet and certification that it is PCB free. – Waste oil to be disposed as hazardous waste using appropriately licensed waste management company with environmentally safe and sound storage, transport, and disposal – Maintain spill management materials (sorbent pads, loose sorbent material, sand, etc.) next to storage areas for immediately soaking up any leaks or spills that do accidentally occur.						

12.7.2.1 Site-specific Mitigation at Substation (SS) Sites

CESMP to include the following measures at the SS as well reflecting the ECPs and all general and SS specific EMP measures;

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
400/230/132KV AIS: Pekua/Chakaria, Cox's Bazar								
Detailed Design and Preconstruction Phase								
Infilling of low-lying land within salt pan area	Environmental and social impacts due to infilling works including on salt pan waterbodies and ecology – no threatened species anticipated, impacts on ecology of the salt pan and 8-10 salt farmers directly or indirectly relying on the salt pan for production of salt.	– Contractor to employ field ecologist to undertake pre-construction including potential for vegetation species and ornithological survey of the substation site per the EMoP including point counts surveys to identify movement of birds across the substation site and transmission line; submit survey report alongside detailed design. – EIA/IEE/EMP to be updated to reflect the results of ecology and bird surveys before detailed design approval and the commencement of construction works. – Site allocated to the substation lies within an area which is used for salt production during summer during monsoon period, land acquisition to be undertaken in accordance with the Resettlement Plan before access is given to the contractor for works providing sufficient time for salt production to cease. – Ensure salt pan canal around the edge of the site is retained as an open channel to enable salt pan activities on the adjacent land to be continued. It is preferable to retain the salt pan canals crossing the site as open channel. If required to accommodate the site layout, salt pan canal that crosses through the site is to be diverted around the edge of the substation site (outside the	EMP/SCAMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to infilling of the low-laying land	√	√	√	Contract Cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		boundary walls) in a salt pan canal of the same dimensions to enable continuous flow of water.						
Detailed design	Low lying land inundated during the monsoon and at risk of waterlogging during heavy rain, waterbody (salt pan canal) is present immediately adjacent to the proposed location	– Detailed design to retain the salt pan canal around the edge of the site as an open channel except for the creation of a site access; in this location bridge or culvert of 1:100-year capacity to be installed with any culvert inverted below bed level to allow natural substrate to reform. – SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of a 2m access entrance from the adjacent road. To avoid altering the local hydrology maintain natural water flow, the entrance design needs to incorporate cross-drainage structures with adequate openings. – Contractor to conduct a flood risk and drainage assessment including modelling of the site layout and drainage design with particular attention to loss of flood storage capacity due to the infill – Detailed design to ensure adjacent flood and salt pan canal levels do not increase due to loss of floodwater storage as a result of the infill e.g., by providing diverted salt pan canal or a shallow attenuation pond that can also provide a wildlife benefit to mitigate the loss of seasonal salt pan.	Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost
	Local and potential migratory bird interaction with substation and connecting LILO	– Substation lighting to be designed to avoid any nighttime lighting spilling outside of the substation compound on the adjacent saltpan habitat using movement detection sensors. – As a good practice, the specification for bird diverters will follow the approved specification/ drawings (samples attached in Appendix XX) from other projects as a good practice. However, the bird divertor to be installed must be approved as suitable by PGCB. – Ensure the substation and any connecting OHL adopt a bird friendly design in accordance with GIIP[81] with adequate separation or insultation between live and ground	– Substation adopts recommendations of the bird survey and a bird friendly design per GIIP	Prior to approval of detailed design	√	√	√	Contract cost

[81] Avian Power Line Interaction Committee (APLIC) 2006 and 2012

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – No loss of nationally or IUCN threatened (VU/EN/CR) vegetation species. – Tree cutting is to be avoided during the bird nesting season.	Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Disturbance to residential properties immediately adjacent, public utilities along highway, local and potential migratory birds, and pollution of salt pan canals from the construction traffic and works	– Construction to be conducted only during the dry season – Schedule works to avoid the monsoon in Bangladesh when the water level in the saltpan is at its highest – No works to be undertaken from 1 hour before sunset to 1 hour after sunrise to minimize impacts on wildlife. – Before land filling any salt pan canal that will be diverted is to be blocked off, then the water pumped out. – Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area" – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix Xat adjacent properties.	– CSEMP and H&S Plan including BMP approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X are to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – No fuel, oil or chemicals are to be stored at this site and stockpiles to be kept to materials required						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		during the day's work due to immediately adjacent to any waterbody. – Land filling and piling is required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbodies are protected, there must be no discharge of sediment laden water or untreated piling mud to the surface water. – Sensitive waterbodies adjacent to be avoided during construction will be flagged for protection. As there may be a risk of workers accidentally straying into these areas then worker training and the code of conduct will cover measures to ensure that wildlife will be protected. – Noise and vibration from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to narrow road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety.						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Overhead distribution lines x2 run parallel to the highway and will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
Associated Facility VRE Hub	Loss of natural habitat and avifauna, area of analysis for VRE hub is critical habitat for migratory birds on the East Asian–Australasian Flyway	– PGCB will work with MPEMR, BPDB and DOE on ecological constraints mapping and to develop guidelines on avifauna assessment and management for solar and wind energy in the VRE Hub so their IEE or EIA studies consider potential impacts on migratory birds (especially spoon billed sandpiper, spotted greenshank, and great knot) in line with GIIP including IFC EHS Guidelines on Wind Energy and its Good Practice Handbook on Post-construction Bird and Bat Fatality Monitoring in consultation with flyway stakeholders; and undertake a series of awareness raising sessions for the IPP so that they understand the critical habitat and the ecological constraints of South Chattogram – Before connecting any project with the Pekua substation and transmission network in South Chattogram, PGCB will need to ensure the private	– VRE Hub as associated facility achieve the same outcome as the project facilities e.g., natural and critical habitat requirements met with no net loss of biodiversity	Prior to O&M of Pekua Substation	√			PGCB

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		sector has obtained ECC and addressed impacts on migratory birds						
230/132/33 KV AIS: Madhabpur, Habiganj								
Detailed Design and Preconstruction Phase								
Infilling of low-lying land	Environmental and social impacts due to infilling works– no threatened species anticipated	– Contractor to employ field ecologist to undertake pre-construction ecology of the substation site per the EMoP - submit survey report alongside detailed design. – EIA/IEE/EMP to be updated to reflect the results of ecology surveys before detailed design approval and the commencement of construction works.	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during infilling of the low-laying land	√	√	√	Contract Cost
Detailed design	Low lying land at risk of waterlogging during heavy rain	– Detailed design to retain the ditch along the highway as an open channel except for the creation of a site access; in this location bridge or culvert of 1:100-year capacity to be installed with any culvert inverted below bed level to allow natural substrate to reform. – SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of a 7m access entrance from the adjacent road. To avoid altering the local hydrology to maintain natural water flow, the entrance design needs to incorporate cross-drainage structures with adequate openings. – Contractor to conduct a flood risk and drainage assessment including modelling of the site layout and drainage design with particular attention to loss of flood storage capacity due to the infill	– Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract Cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Detailed design to ensure adjacent flood levels do not increase due to loss of floodwater storage as a result of the infill						
	Highway Inn and residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Due to proximity of properties to substation site contractor to appropriately locate transformers so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	– Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Disturbance to residential/semi-commercial properties immediately adjacent from the construction traffic and works	– Presence of receptors means that the applicable noise limit at this site is of “residential zone” – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties.	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix Xare to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – No fuel, oil or chemicals are to be stored within 100m of neighboring ponds and stockpiles to be	checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		kept to materials required during the day's work due to immediately adjacent waterbody. – Landfilling and piling is required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbodies are protected, there must be no discharge of sediment laden water or piling mud to surface water. – Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to narrow road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – Overhead distribution line runs parallel to the highway and will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
230/132/33KV AIS: Monohardi, Narshingdi								
Detailed Design and Preconstruction Phase								
Detail Design	Low lying land at risk of waterlogging during heavy rain, culverts are present at both the sides immediately adjacent to the substation land	– SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of a 7m access entrance from the adjacent road. To avoid altering the local hydrology to maintain natural water flow, the entrance design needs to incorporate cross-drainage structures with adequate openings. – Contractor to conduct a flood risk and drainage assessment, attention to be paid to ensure the flow from existing culverts can be maintained	Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract cost
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Disturbance from the construction traffic and solid and hazardous waste management	– No receptors present in 100m of the substation means that the applicable noise limit at this site is of “residential zone” – On the opposite side of the road to the substation is an open dumping site – under no circumstances	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		shall the contractor deposit or allow workers to deposit any waste in this open dumping area. Signage to be installed instructing that the open dumping area is not to be used, training to cover correct procedures for waste management and disposal. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to narrow road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – Overhead distribution line runs parallel to the highway and will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.	complied with during construction works as determined through regular site checks, photographic record etc.					
132/33KV AIS: Tungipara, Gopalganj								
Detailed Design and Preconstruction Phase								

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Infilling of low-lying land	Environmental and social impacts due to infilling works – no threatened species anticipated	– Contractor to employ field ecologist (after mobilization) to undertake pre-construction ecology of the substation site per the EMoP - submit survey report alongside detailed design. – EIA/IEE/EMP to be updated to reflect the results of ecology surveys before detailed design approval and the commencement of construction works.	EMP/SCAMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during infilling of the low-laying land	√	√	√	Contract Cost
Detail Design	Low lying land at risk of waterlogging during heavy rain, river is present immediately adjacent to the substation site	– SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of an access entrance from the adjacent road. – Layout to account for presence of groundwater wells to avoid pollution from septic tanks etc. – Contractor to conduct a flood risk and drainage assessment including modelling of the site layout and drainage design with particular attention to loss of flood storage capacity due to the infill, attention to be paid to ensure the flow from existing culverts can be maintained – Detailed design to ensure adjacent flood levels do not increase due to loss of floodwater storage as a result of the infill	Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract cost
	Loss of mature trees with 114 trees to be cut	– 114 trees are supported by the site as well as mature trees along the access road; detailed design is to avoid the loss of mature trees on the site and along the existing highway adjacent to the substation site; permission to be obtained by the	Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.						
Substation construction activities	Disturbance from the construction traffic and works	– No receptors present in 50m of the substation means that the applicable noise limit at this site is of "residential zone" – No fuel, oil or chemicals are to be stored at this site and stockpiles to be kept to materials required during the day's work due to immediately adjacent waterbody – risk of surface water pollution and groundwater wells present. – Landfilling and piling is required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbodies are protected, there must be no discharge of sediment laden water or piling mud to surface water. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to narrow road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety.	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. .	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Overhead distribution lines run along the highway and through the site and will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
132/33KV AIS: Dupchanchia, Bogura								
Detailed Design and Preconstruction Phase								
Detail Design	Low lying land at risk of waterlogging during heavy rain, waterbody is present immediately adjacent to the boundary wall	– Contractor to conduct a flood risk and drainage assessment – SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of access road from the adjacent highway.	– Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract cost
	Properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Presence of buildings within 100m of substation means that the applicable noise limit at this site is of “residential zone” – Due to proximity of properties to substation site contractor to appropriately locate transformers so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix Xcan be achieved	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		for the substation alone without additional noise mitigation.						
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	– Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Disturbance to ponds, residential properties immediately adjacent from the construction traffic and works	– Before land filling ponds that will be lost are to have the water pumped out and fish trapped translocated by the contractor's ecologist to nearby ponds. – Presence of buildings within 100m of substation means that the applicable noise limit at this site is of "residential zone" – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix Xare to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – No fuel, oil or chemicals are to be stored within 100m of the adjacent pond at this site and stockpiles to be kept to materials required during the day's work due to immediately adjacent to any waterbody. – Landfilling and piling is required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbodies are						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		protected, there must be no discharge of sediment laden water or piling mud to surface water. – Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to narrow road.. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – Overhead distribution line runs parallel to the highway and if disturbed by works will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
132/33KV AIS: Matlab (N), Chandpur								
Detailed Design and Preconstruction Phase								

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Detail Design	LGED's Narrow access route is to be used for construction traffic to avoid temporary relocation	– No temporary access is to be formed from the adjacent wide road; access must be through the narrow residential route to avoid temporary relocation impact. The main road is 3 m in width to substation from the nearest village. The main road will need to be strengthened to avoid heavy construction material/equipment traverse as well as the turn corners are very narrow for long trailers to traverse the stretch. – PGCB will need to consult with LGED to strengthen the approach road to connect to LGED road prior to finalization of detailed design.	– No temporary relocation is required for construction – No damage to local or community infrastructure. – LGED to be approached for permissions for approach road as well as transportation of heavy machinery	Prior to access of the substation location	√	√	√	Contract Cost
	Low lying land at risk of waterlogging during heavy rain	– Detailed design to retain the drainage canal along the highway as an open channel except for the creation of a site access; in this location bridge or culvert of 1:100-year capacity to be installed with any culvert inverted below bed level to allow natural substrate to reform. – SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of a 6m access entrance from the adjacent road. To avoid altering the local hydrology to maintain natural water flow, the entrance design needs to incorporate cross-drainage structures with adequate openings. – Contractor to conduct a flood risk and drainage assessment	– Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract Cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Presence of several houses at the opposite side of the substation means that the applicable noise limit at this site is of "residential zone" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	– Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Disturbance to residential properties immediately adjacent from the construction traffic and works	– Presence of several houses at the opposite side of the substation means that the applicable noise limit at this site is of "Residential Area" – CSEMP to include the following measures as well reflecting the ECPs and all the general EMP measures: – Ensure water suppression is used during construction works and do not conduct dusty work	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and	checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		photographic record in case of vibration impact during construction. – No fuel, oil or chemicals are to be stored within 100m of the drainage canal at this site and stockpiles to be kept to materials required during the day's work due to immediately adjacent to any waterbody. – Landfilling and piling is required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbodies are protected, there must be no discharge of sediment laden water or piling mud to surface water. – Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to narrow road. – Flagmen to be used at entry points and along access road to control the construction traffic flow and ensure pedestrian and vehicular safety						
132/33KV AIS: Kumarkhali, Kushtia								
Detailed Design and Preconstruction Phase								

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Land supporting pump house	Environmental and social impacts due to loss of small pump house for irrigation	– Land supports pump house with land acquisition to be undertaken in accordance with the Resettlement Plan before access is given to the contractor for works providing sufficient time for alternative irrigation water supply to be installed – Pump house will need to be demolished, contractor to confirm no asbestos present (e.g., roofing material) prior to demolition	– EMP/SCAMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during infilling of the low-laying land	√	√	√	Contract Cost
Detailed design	Low lying land at risk of waterlogging during heavy rain, ponds are supported	– SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of an access entrance from the adjacent road. – Contractor to conduct a flood risk and drainage assessment.	– Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract Cost
	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Presence of residential property at the side of the substation means that the applicable noise limit at this site is of “residential zone” – Due to proximity of properties to substation site contractor to appropriately locate transformers so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Property is to be consulted one-on-one regarding the layout of the substation and their views to be accommodated – Design is to include vegetation screening of the substation between the residential property and the boundary fence; including planting of trees to screen views.						
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	– Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Disturbance to residential properties immediately adjacent from the construction traffic and works	– Presence of residential property at the side of the substation means that the applicable noise limit at this site is of “residential zone” – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards.	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – Landfilling and piling is required at the site and a method statement for landfilling and management of piling mud is to be prepared. Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – No fuel, oil or chemicals are to be stored within 100m of nearby ponds on adjacent land	– No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to busy road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – Overhead distribution lines run parallel to the highway and will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
132/33KV AIS: Chatkhil, Noakhali								
Detailed Design and Preconstruction Phase								
Infilling of low-lying land within ponds	Environmental and social impacts due to infilling works– no threatened species anticipated	– Contractor to employ field ecologist to undertake pre-construction ecology (after mobilization) of the substation site per the EMoP - submit survey report alongside detailed design. – EIA/IEE/EMP to be updated to reflect the results of aquatic ecology surveys before detailed design	– EMP/SCAMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during infilling of the low-laying land	√	√	√	Contract Cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		approval and the commencement of construction works.						
Detail Design	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Presence of households near the substation means that the applicable noise limit at this site is of "residential zone" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost
	Low lying land at risk of waterlogging during heavy rain, ponds are supported	– Detailed design to retain the drainage canal along the highway as an open channel except for the creation of a site access; in this location bridge or culvert(s) of 1:100-year capacity to be installed with any culvert inverted below bed level to allow natural substrate to reform. – SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of a 35m access entrance from the adjacent road. To avoid altering the local hydrology to maintain natural water flow, the entrance design needs to incorporate cross-drainage structures with adequate openings.	– Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Contractor to conduct a flood risk and drainage assessment including modelling of the site layout and drainage design with particular attention to loss of flood storage capacity due to the infill – Detailed design to ensure adjacent flood levels do not increase due to loss of floodwater storage as a result of the infill						
	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m	– Presence of residential properties by the substation means that the applicable noise limit at this site is of "residential zone" – Due to proximity of properties to substation site contractor to appropriately locate transformers so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	– Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Substation construction activities	Disturbance to ponds and residential properties immediately adjacent from the construction traffic and works	– Before land filling ponds that will be lost are to have the water pumped out and fish trapped translocated by the contractor's ecologist to nearby ponds. – Presence of households near the substation means that the applicable noise limit at this site is of "residential zone" – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – No fuel, oil or chemicals are to be stored at this site and stockpiles to be kept to materials required during the day's work due to immediately adjacent waterbody. – Landfilling and piling is required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbodies are protected, there must be no discharge of sediment laden water or piling mud to surface water. – Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		congestion due to narrow road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – Overhead distribution line runs parallel to the highway and will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
132/33KV AIS: Paikgacha, Khulna								
Detailed Design and Preconstruction Phase								
Infilling of low-lying land	Environmental and social impacts due to infilling works including and ecology – no threatened species anticipated, impacts on ecology	– Properties will need to be demolished, the contractor to confirm no asbestos present (e.g., roofing material) prior to demolition – Existing tube well to be decommissioned, disinfected and plugged with grout prior to landfilling - this in order to prevent surface water ingress and prevent water from different levels in the subsurface from mixing since an unsealed well can be a potential pathway for land contamination reaching the groundwater – Contractor to employ field ecologist to undertake pre-construction ecology survey including potential	– EMP/SCAMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to infilling of the low-laying land	√	√	√	Contract Cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		for threatened vegetation species to be supported and migratory ornithological survey of the substation site per the EMoP including point counts surveys to identify movement of birds across the substation site and transmission line - submit survey report alongside detailed design. – EIA/IEE/EMP to be updated to reflect the results of ecology and bird surveys before detailed design approval and the commencement of construction works. – Site allocated to the substation lies within an area which is used for fish production, land acquisition to be undertaken in accordance with the Resettlement Plan before access is given to the contractor for works providing sufficient time for fish production to cease.						
Detail Design	Low lying land at risk of waterlogging during heavy rain, waterbody is present immediately adjacent to the boundary wall	– Detailed design to retain a drainage canal around the edge of the site as an open channel except for the creation of a site access; in this location bridge or culvert of 1:100-year capacity to be installed with any culvert inverted below bed level to allow natural substrate to reform. – Layout to account for presence of groundwater wells to avoid pollution from septic tanks etc. – SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of access roads (distance of about 10m) from the nearby roads. To avoid altering the	– Substation design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		local hydrology maintain natural water flow, the entrance design needs to incorporate cross-drainage structures with adequate openings. – Contractor to conduct a flood risk and drainage assessment including modelling of the site layout and drainage design with particular attention to loss of flood storage capacity due to the infill						
	Loss of mature trees with 7 to be cut	– 7 trees are supported by the site (around the pond perimeter) as well as mature trees along the access road; detailed design is to avoid the loss of mature trees on the site and along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – No loss of any nationally or IUCN threatened species (VU, EN and CR) of vegetation – Tree cutting is to be avoided during the bird nesting season.	– Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
	School and Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be	– Presence of school beside the substation means that the applicable noise limit at this site is of "silent zone" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	possible up to 100m and residential zone around 50m distant	modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. – Site entrance must be sited off the main road and be located at least 50m from the school entrance – Zebra crossing and solid safety barriers to be provided outside of the school to prevent children running into the road in front of construction traffic						
	Local and potential migratory bird interaction with substation and connecting TL	– Substation lighting to be designed to avoid any nighttime lighting spilling outside of the substation compound on the adjacent fish pond habitat using movement detection sensors. – -Adopt a bird-friendly design in accordance with GIIP[82] with adequate separation of insulation between live and ground	– Substation adopts recommendations of the bird survey and a bird friendly design per GIIP	Prior to approval of detailed design	√	√	√	Contract cost
Demolition and substation construction activities	Disturbance to school and residential properties immediately adjacent, local and potential migratory birds, and pollution from the construction traffic and works	– Construction to be conducted only during the dry season – Schedule works to avoid the monsoon in Bangladesh when the water level in the fish ponds is at its highest – No works to be undertaken from 1 hour before sunset to 1 hour after sunrise to minimize impacts on wildlife.	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost

[83] https://www.icnirp.org/cms/upload/publicatio ns/ICNI RPemfgdl.pdf

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Presence of school beside the substation means that the applicable noise limit at this site is of "silent zone" – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – School to be consulted regarding other periods to avoid the noisy activity to be undertaken e.g. exam periods and their requests accommodated by the contractor – Daily one-hour "spot check" of noise levels at the school boundary during noisy activities to confirm compliance and the results (min, 1hr LAeq, max) shared with the head teacher – additional	– No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		monitoring will be undertaken if head teacher raises concerns about the noise levels – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – No fuel, oil or chemicals are to be stored at this site and stockpiles to be kept to materials required during the day's work due to immediately adjacent waterbody and groundwater wells also present. – Land filling and piling required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbody is protected, there must be no discharge of sediment laden water or untreated piling mud to surface water.						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Sensitive waterbodies adjacent to be avoided during construction will be flagged for protection. As there may be a risk of workers accidentally straying into these areas then worker training and the code of conduct will cover measures to ensure that wildlife will be protected. – Noise and vibration from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to narrow road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – Trucks must be routed from the east and no trucks must use the section of road passing in front of the school premises – No truck movements will be permitted 1 hour before school starting and 1 hour after school ending times; contractor must provide a school crossing patrol during these times for the duration – Contractor must provide road and construction safety awareness sessions to the school children						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		before the start of construction and then on a regular basis – Overhead distribution lines run parallel to the highway and will need to be relocated or sufficiently raised in consultation with the distribution utility before works commence on site. – H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
132/33KV AIS: Mathbaria, Pirojpur								
Detailed Design and Preconstruction Phase								
Detail Design	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Presence of households near the substation means that the applicable noise limit at this site is of "residential zone" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	Low lying land at risk of waterlogging during heavy rain	– Detailed design to retain the drainage canal along the highway as an open channel except for the creation of a site access; in this location bridge or culvert(s) of 1:100-year capacity to be installed with any culvert inverted below bed level to allow natural substrate to reform. – SS site is situated in low-lying areas, necessitating the elevation of the ground level and the construction of an access entrance from the adjacent road. To avoid altering the local hydrology to maintain natural water flow, the entrance design needs to incorporate cross-drainage structures with adequate openings. – Contractor to conduct a flood risk and drainage assessment	–					
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees along the existing highway adjacent to the substation site; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – No loss of nationally or IUCN threatened (VU/EN/CR) vegetation species. – Tree cutting is to be avoided during the bird nesting season.	– Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Disturbance to residential properties immediately adjacent	– Presence of households near the substation means that the applicable noise limit at this site is of “residential zone”	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	from the construction traffic and works	– Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and	and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		photographic record in case of vibration impact during construction. – No fuel, oil or chemicals are to be stored within 100m of the drainage canal and stockpiles to be kept to materials required during the day's work due to immediately adjacent waterbody. – Landfilling and piling is required at the site and a method statement for the landfilling and management of piling mud is to be prepared to ensure the immediate adjacent waterbody is protected, there must be no discharge of sediment laden water or piling mud to surface water. – Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – Site-specific traffic management plan to be developed and implemented given the large number of vehicles required to import infill material as well as to transport equipment, materials and construction waste which is likely to result in congestion due to busy road. Provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – Overhead distribution line runs parallel to the highway and will need to be relocated or						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		sufficiently raised in consultation with the distribution utility before works commence on site. H&S risk assessment and management plan to address risk from presence of distribution lines; safety clearances must be maintained at all time and safety protection installed to avoid workers or machinery coming into accidental contact with them.						
Bay Extensions								
2× 132 kV AIS Bay Extension at Bajitpur Substation								
Detailed design	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Obtain confirmation no PCB are present at the existing substation – No works will be undertaken outside the existing boundary wall of the substation and no landfilling conducted – Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone and cumulatively with the existing SS without additional noise mitigation.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Soil testing including SS related contamination tests will be undertaken in the construction area given current status of housekeeping at the SS – Layout to account for presence of groundwater wells to avoid pollution.						
Substation construction activities	Impacts from interaction with existing substation	– PGCB to ensure no other construction contractor is working on the site before giving access to the contractor, that all boundary walls are complete and security gates and guards are in operation – Contractor will clearly demarcate an access route to and their working area within the existing substation, in that area they will be fully responsible for the H&S of all persons including PGCB staff – In the remainder of the substation PGCB will have primary responsibility for the H&S of all persons; contractor will ensure that their workers do not enter areas outside of the demarked area unless under PGCB supervision	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost
	Disturbance to residential properties immediately adjacent from the construction traffic and works	– Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area" – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties.	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the bay extension alone and cumulatively with existing SS noise without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – If piling is required, method statement for management of piling mud is to be prepared to	checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		ensure the immediate adjacent waterbody is protected, there must be no discharge of piling mud to surface water. – Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – No fuel, oil or chemicals are to be stored within 100m of the adjacent pond – Site-specific traffic management plan to be developed and implemented, provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – H&S risk assessment and management plan to address risk from presence of existing SS electrical infrastructure and distribution lines across the SS entrance; safety clearances must be maintained at all time and safety protection installed beneath distribution lines to avoid workers or machinery coming into accidental contact with them.						
2× 132kV AIS Bay Extension at Gopalganj (Old) Substation								
Detailed design	Residential properties are located within 100m – per the IEE operational noise	– No works will be undertaken outside the existing boundary wall of the substation *and no landfilling conducted* – Obtain confirmation no PCB are present at the existing substation	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone and cumulatively with the existing SS without additional noise mitigation. – Contractor to conduct a flood risk and drainage assessment including modelling of the site layout and drainage design with particular attention to loss of flood storage capacity due to the infill – Detailed design to ensure adjacent flood levels do not increase due to loss of floodwater storage as a result of the infill e.g., by providing a pond that can also provide wildlife benefit to mitigate the loss of the existing ponds ~~– Due to loss of ponds the substation design is to have the input of a landscape architect/biodiversity expert and to follow the recommendations of the pre-construction aquatic ecology survey to provide biodiversity enhancement e.g., creation of a wildlife pond etc.~~	communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Soil testing including SS related contamination tests will be undertaken in the construction area given current status of housekeeping at the SS						
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees within the substation site; demarcation of the construction access route and area in the SS to avoid accidental damage	– No loss of mature trees from inside the existing substation site	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Impacts from interaction with existing substation	– PGCB to ensure no other construction contractor is working on the site before giving access to the contractor, that all boundary walls are complete and security gates and guards are in operation – Contractor will clearly demarcate an access route to and their working area within the existing substation, in that area they will be fully responsible for the H&S of all persons including PGCB staff – In the remainder of the substation PGCB will have primary responsibility for the H&S of all persons; contractor will ensure that their workers do not enter areas outside of the demarked area unless under PGCB supervision	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost
	Disturbance to residential properties immediately adjacent from the construction traffic and works	– Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area" – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone and cumulatively with existing SS noise without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction.	construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– No fuel, oil or chemicals are to be stored within 100m of the adjacent pond – Site-specific traffic management plan to be developed and implemented, provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – H&S risk assessment and management plan to address risk from presence of existing SS electrical infrastructure and distribution lines across the SS entrance; safety clearances must be maintained at all time and safety protection installed beneath distribution lines to avoid						
2× 132kV AIS Bay Extension at Kachua 230/132kV Substation								
Detailed design	Mosque in 50m and residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Obtain confirmation no PCB are present at the existing substation – Presence of collage and mosque in 0-50m of the substation means that the applicable noise limit at this site is of “Silent Area” – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone and	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		cumulatively with the existing SS without additional noise mitigation. – Soil testing including SS related contamination tests will be undertaken in the construction area given current status of housekeeping at the SS – Layout to account for presence of groundwater wells to avoid pollution.						
	Loss of mature trees	– Detailed design is to avoid the loss of mature trees within the substation site; demarcation of the construction access route and area in the SS to avoid accidental damage	– No loss of mature trees from inside the existing substation site	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Impacts from interaction with existing substation	– PGCB to ensure no other construction contractor is working on the site before giving access to the contractor, that all boundary walls are complete and security gates and guards are in operation – Contractor will clearly demarcate an access route to and their working area within the existing substation, in that area they will be fully responsible for the H&S of all persons including PGCB staff – In the remainder of the substation PGCB will have primary responsibility for the H&S of all persons; contractor will ensure that their workers do not enter areas outside of the demarked area unless under PGCB supervision	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost
	Disturbance to residential properties immediately adjacent	– Presence of collage and mosque in 50m of the substation means that the applicable noise limit at this site is of “Silent Area”	– CSEMP/H&S/BMP Plan approved before commencement of construction	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	from the construction traffic and works	– Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – No noisy activities will be permitted during prayer times; – Collage to be consulted regarding other periods to avoid the noisy activity to be undertaken e.g. exam periods and their requests accommodated by the contractor – Daily one-hour “spot check” of noise levels at the collage boundary during noisy activities to confirm compliance and the results (min, 1hr LAeq, max) shared with the collage principal – additional monitoring will be undertaken if collage principal raises concerns about the noise levels	works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– No truck movements will be permitted 1 hour before collage starting and 1 hour after collage ending times – Contractor must provide road and construction safety awareness sessions to the collage pupils before the start of construction and then on a regular basis – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the substation alone and cumulatively with existing SS noise without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – If piling is required, method statement for management of piling mud is to be prepared to ensure the immediate adjacent waterbody is protected, there must be no discharge of piling mud to surface water.						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Noise from Piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – No fuel, oil or chemicals are to be stored within 100m of the adjacent canal and ponds and the groundwater wells – Site-specific traffic management plan to be developed and implemented, provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – H&S risk assessment and management plan to address risk from presence of existing SS electrical infrastructure and distribution lines across the SS entrance; safety clearances must be maintained at all time and safety protection installed beneath distribution lines to avoid						
2×132kV AIS Bay Extension at Satkhira Substation								
Detailed design	Poor drainage at the existing substation	– Improve capacity of the storm drainage at Satkhira SS to prevent waterlogging of switchyard (this needs to be done in parallel with drainage design for the project) – Contractor to conduct a flood risk and drainage assessment including modelling of the site layout and drainage design with particular attention to loss of flood storage capacity due to the infill	–					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Detailed design to ensure adjacent flood levels do not increase due to loss of floodwater storage as a result of the infill e.g., by providing a pond that can also provide wildlife benefit to mitigate the loss of the existing pond						
	Residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– *If the inundated section nof substation is to be used and landfilling of it is required:* – – Obtain confirmation that no PCB present in the existing substation – Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone and cumulatively with the existing SS without additional noise mitigation. – Soil testing including SS related contamination tests will be undertaken in the construction area given current status of housekeeping at the SS – Layout to account for presence of groundwater wells to avoid pollution.	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	Loss of mature trees with 37 to be cut	– Detailed design is to avoid the loss of mature trees – 37 trees are supported by the site; detailed design is to avoid the within the substation site; demarcation of the construction access route and area in the SS to avoid accidental damage; permission to be obtained by the contractor for any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	– No more than 37 trees lost from inside the existing substation site – Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity Management Plan and Tree Protection Plan	Prior to approval of detailed design	√	√	√	Contract cost
Substation construction activities	Impacts from interaction with existing substation	– PGCB to ensure no other construction contractor is working on the site before giving access to the contractor, that all boundary walls are complete and security gates and guards are in operation – Contractor will clearly demarcate an access route to and their working area within the existing substation, in that area they will be fully responsible for the H&S of all persons including PGCB staff – In the remainder of the substation PGCB will have primary responsibility for the H&S of all persons; contractor will ensure that their workers do not enter areas outside of the demarked area unless under PGCB supervision	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost
	Disturbance to residential properties immediately adjacent	– Presence of houses near the substation means that the applicable noise limit at this site is of "Residential Area"	– CSEMP/H&S/BMP Plans approved before commencement of construction works minimizes EHS impacts	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	from the construction traffic and works	– Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the bay extension alone and cumulatively with existing SS noise without additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc.	and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc. – No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – If landfilling or piling is required, method statement for landfilling and the management of piling mud is to be prepared to ensure the immediate adjacent waterbody is protected, there must be no discharge of sediment laden water or piling mud to surface water. – Noise from piling will be contained to stipulated levels using quietest available piling methods and attenuating screens around piling equipment and site. – No fuel, oil or chemicals are to be stored within 100m of the adjacent waterbodies and groundwater wells – Site-specific traffic management plan to be developed and implemented, provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – H&S risk assessment and management plan to address risk from presence of existing SS electrical infrastructure and distribution lines across the SS entrance; safety clearances must be maintained at all time and safety protection installed beneath distribution lines to avoid						

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		workers or machinery coming into accidental contact with them.						
132kV AIS Bay Extension at Bhandaria								
Detailed design	Mosque in 50m and residential properties are located within 100m – per the IEE operational noise exceedance in silent zone might be possible up to 100m and residential zone around 50m distant	– Obtain confirmation no PCB is present at the existing substation – Presence of mosque in 25m of the substation means that the applicable noise limit at this site is of "Silent Area" – Due to proximity of properties to substation site contractor to appropriately locate transformers if possible so they are screened by the control building and undertake quantitative noise assessment using internationally recognized noise modelling software of the detailed design to confirm that noise standards per Appendix X can be achieved for the substation alone and cumulatively with the existing SS without additional noise mitigation. – Soil testing including SS related contamination tests will be undertaken in the construction area given current status of housekeeping at the SS	– No breaches of compliance with noise standards during O&M. – No outstanding noise grievances from local communities or other interested stakeholders.	Prior to approval of detailed design	√	√	√	Contract cost
	Loss of mature trees with 8 to be cut	– Detailed design is to avoid the loss of mature trees – 8 trees are supported by the site; detailed design is to avoid the within the substation site; demarcation of the construction access route and area in the SS to avoid accidental damage; permission to be obtained by the contractor for	– No more than 8 trees lost from inside the existing substation site – Trees cut are compensated for at 1:3 (no net loss of biodiversity) as per Biodiversity	Prior to approval of detailed design	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		any trees to be cut and replacement planting at 1:3 ratio to be undertaken. – Tree cutting is to be avoided during the bird nesting season.	Management Plan and Tree Protection Plan					
Substation construction activities	Impacts from interaction with existing substation	– PGCB to ensure no other construction contractor is working on the site before giving access to the contractor, that all boundary walls are complete and security gates and guards are in operation – Contractor will clearly demarcate an access route to and their working area within the existing substation, in that area they will be fully responsible for the H&S of all persons including PGCB staff – In the remainder of the substation PGCB will have primary responsibility for the H&S of all persons; contractor will ensure that their workers do not enter areas outside of the demarked area unless under PGCB supervision	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost
	Disturbance to residential properties immediately adjacent from the construction traffic and works	– Presence of mosque in 25m of the substation means that the applicable noise limit at this site is of “Silent Area” – Ensure water suppression is used during construction works and do not conduct dusty work on windy days; dust levels not to exceed ambient air quality standards per Appendix X at adjacent properties. – Provide adjacent properties with cleaning service for external surfaces and windows on a weekly	– CSEMP and H&S Plan approved before commencement of construction works minimizes EHS impacts and risks and is subsequently complied with during construction works as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		basis during the construction due to buildup of dust. – Construction to be conducted only during the daytime between 10am-4pm with noisy activity such as piling only between 10am-12pm and 2-4pm to minimize disturbance and is not to be conducted on weekends or on festivals or holidays; noise limits per Appendix X to be achieved at the adjacent properties. – To inform CSEMP and any piling management sub-plan due to proximity of properties to substation site contractor to undertake quantitative noise assessment of construction works using internationally recognized noise modelling software to confirm that noise standards per Appendix X can be achieved for the bay extension alone and cumulatively with existing SS noisewithout additional noise mitigation. If required to meet noise standards contractor to install noise barrier etc. – Properties adjacent are to be consulted one-to-one and subject to structural survey and photographic record in case of vibration impact during construction. – If piling is required, method statement for management of piling mud is to be prepared to ensure the immediate adjacent waterbody is	– No breaches of compliance with regulatory requirements or GIIP including ambient air quality and noise standards. – No outstanding dust, noise and general disturbance and disruption grievances from local communities or other interested stakeholders.					

Site-specific Mitigation at Substation (SS) Sites								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		protected, there must be no discharge of piling mud to surface water. – Noise from piling will be contained to stipulated levels using using quietest available piling methods and attenuating screens around piling equipment and site. – No fuel, oil or chemicals are to be stored within 100m of the adjacent waterbodies – Site-specific traffic management plan to be developed and implemented, provision of flag men at entry points and along the access road to control the traffic flow and ensure pedestrian and vehicular safety. – H&S risk assessment and management plan to address risk from presence of existing SS electrical infrastructure and distribution lines across the SS entrance; safety clearances must be maintained at all time and safety protection installed beneath distribution lines to avoid workers or machinery coming into accidental contact with them.						

12.7.3 Part 3 – Transmission Lines

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Detailed Design and Pre-Construction Phase								
Overhead Line detailed design and installation EHS management planning during pre-construction	Environmental and social impacts of construction and O&M phase -- lack of management of Detailed design, construction and O&M leading to environmental degradation, H&S risks for construction and O&M workers as well the local community from construction of the 400/230/132 kV lines	– Designs to reflect the requirements of the EMP and international engineering best practice/good EHS practices – Identify presence of any unstable land/steep slopes and avoid these during the detailed design. – Identify presence of floodplain or depressions that get waterlogged in the rainy season and avoid these during detailed design. – If the passing of waterlogged area is required in the first instance seek to avoid placement of towers within the area, if it is not possible then the foundation is to be installed only during the dry season when no water is present with the stub raised 0.5m above highest flood level accounting for climate change. – For all TL/LILO except reconductoring contractor to conduct a flood risk and drainage assessment for each tower location and ensure that all towers are raised on foundations located above the flood level including an allowance for climate change plus freeboard. – Detailed design to ensure works will only take place on modified habitat – Drilling and piling mud must be managed to avoid it being discharged to adjacent land.	– Disclosed IEE update reflects final line routes before detailed design is cleared – Detailed Design cleared and approved reflects EMP requirements to minimize impacts and risks on EHS during subsequent stages of the project	Prior to line routes being approved by PGCB	√	√	√	Contract and SIC Cost

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Transmission towers to be set back from the banks of rivers ideally by 50m, this may require micro siting of towers along the indicative route – No towers will be located in ponds or drains; the micro siting towers along the indicative route will be required – Towers that are in proximity to waterbodies need to ensure drilling or piling noise and mud is managed to avoid adverse effects on water quality, ecology and the adjacent community. – Construction to be conducted only during the dry season – Construction activities must be planned not to limit the availability of or restrict access to water sources (e.g., groundwater wells) used by local communities; natural flow of any surface water or drains must not be obstructed or if not possible diverted through a drainage system to another direction. – Construction water to be sourced from an existing licensed commercial supplier (preferred option especially for potable water supplies), where available, or rainwater harvesting. If using an existing surface water or an existing borewell for construction water, permissions to be obtained from the relevant authorities together with the agreement of local communities. – Prior agreement is required from local community users to use any existing surface water/borewell or						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		local piped water temporarily during construction; in cases where use of local water source is not agreed, contractor to import tanked water to the project area. – No groundwater will be used in locations without additional groundwater capacity – in other locations groundwater will only be used after it has been confirmed through assessment that there will be no additional stress on groundwater resources as a result. – Any piling or excavation works within 500m of groundwater wells used as a drinking water source by local communities will require pre-construction and post construction water quality monitoring against drinking water standards to ensure there is no contamination of the water supply. – Contractor to avoid piling activities as much as possible. It is anticipated piling will however be needed in most cases so a management plan will be prepared for approval. Oil will not be used for drilling or piling fluid. The piling management plan will include measures to avoid water pollution from the use of any bentonite clay slurry - adequate bunding must be provided around piling activities to contain piling mud and decanting ponds will need to be fully enclosed to avoid spills or leaks to adjacent land. Piling fluid must not be intentionally or unintentionally disposed of to surface water untreated or be allowed to damage adjacent land.						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		Sediment laden surface water runoff and discharges must be disposed of to open ground for percolation or passed through a sedimentation tank having adequate settlement tank, to obtain at least 50 mg/l TSS, before being allowed to enter surface water. Use of piling mud treatment equipment to be considered where space constraints exist preventing adequate settlement. – Use manual construction to minimize soil compaction from vehicle movements. – All transmission lines will be accessed via the existing road network and no new permanent access road will be constructed. If temporary access roads are required the Contractor will make the access suitable for use and shall take all reasonable precautions to avoid damage, including, if required, the erection of temporary fences or gates where permanent fences, hedges or gates have been removed. Access roads will be graded and sloped with drainage either side to prevent unnecessary flow of water across the road and to minimize soil erosion. – A photographic record will be made of the pre-construction condition of land and access roads to inform the reinstatement works. After completion of the construction work land and access roads will be restored to their original condition.						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Transmission lines to be laid to avoid resettlement of structures as well as any forest land and natural wetland. – Contractor to employ field ecologist to undertake ROW walkover of all transmission line routes, map habitat and species encountered, and enumerate the number and species of trees requiring to be cut and lopped, submit survey report alongside detailed design. Adaptive management measures to be applied according to the findings of the surveys, e.g., realignment of routing to avoid tree roots, etc. – Detailed design to minimize the need to cut mature trees. Towers to be placed in open land where tree cutting is not needed. Cutting or trimming of trees will only be planned when required to meet safety clearance requirements and no alternative route with less impact is available. Only trees >5m in height will be cut. – Towers to be placed so they do not block the road or footpath, and to avoid visual clutter. – Route alignments to be designed to have minimal impact on private land holdings and any informal settlements. – Careful selection of route alignments to avoid encroachment on socially, culturally, and archaeological sensitive areas (e.g., graveyards, religious worship place, monuments etc.)						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		– No properties must be present within the safety clearance of overhead lines per GoB requirements and IFC EHS guidelines. – Any resettlement or temporary disturbance to be compensated per the resettlement plan and the 1:3 compensatory tree plantation by will be done as per the Tree Plantation Plan. – Alignment to avoid or minimize crop disturbance where lines cross private land by being undertaken outside the cropping season to the extent possible – Alignment to avoid impacting on rivers/ponds and groundwater sources especially water sources including springs/wells/pumps used by local communities. – During route survey identify and inventory presence of any surface waterbodies including rivers/ponds and groundwater sources including springs/wells/pumps within and adjacent the ROW and confirm if any are used by local communities for drinking water or other purposes documenting distance to the center line. – Carefully select route alignments to avoid bisecting lakes, ponds and wetland areas – Given greater vulnerability of children to health and safety risk, the crossing of school compounds and playgrounds and any other similar community facilities will be avoided by overhead lines routes.						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		– Detailed design to ensure EMF levels at the edge of the safety clearance are within international good practice levels as per International Commission on Non-Ionizing Radiation Protection (ICNIRP) (reference and peak values) for community exposure[83] – Photographic record of land condition to be undertaken before any work. – IEE to be updated to reflect the final route alignment. Contractor to provide plans (kmz of route and tower locations) for the Project Description and inventory of receptors and ecological survey results of the route alignment selected for the Baseline Setting/Environment Assessment sections of the IEE. Contractor to ensure has no greater impact than that assessed in the disclosed IEE and make adjustments to the route alignment as requested. PGCB and contractors to conduct consultations to inform the IEE (consulting with potentially affected persons and local communities within 500m of RoW and other stakeholders including local authorities and public utilities during design in order that any concerns raised during consultations can be reflected in the choice of route alignment, siting and construction method. Contractors' information including receptors and ecology findings to be						

[83] https://www.icnirp.org/cms/upload/publicatio ns/ICNI RPemfgdl.pdf

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		verified by SIC in the field and submitted for inclusion by PGCB in IEE update to ensure line routes avoid sensitive receptors etc. Prior to PGCB approval of the detailed designs and commencement of construction PGCB will seek ADB clearance of the updated IEE, confirming no change from the impacts and risks described and assessed in the IEE, or undertaking site-specific assessment and developing a site-specific EMP if required, seeking ADB clearance of any updated IEE before works start.						
Overhead line installation	Impacts on sensitive receptors from the installation of overhead lines	– Contractor to avoid soil compaction, piling, blasting and other vibration inducing activities as much as possible. If needed a management plan will be prepared for approval. The quietest equipment available will be used, noise attenuation measures will include, (i) fitting of high efficiency mufflers to the noise generating equipment; and (ii) keeping acoustic enclosures around piling/drilling equipment. For piling it will not be possible to use the louder types of piling (impact or vibratory hammers) that generate over 85 dBA without resulting in a significant impact because noise from piling equipment of 120 dBA at 1m would exceed 85dBA, the level at which hearing damage is caused at adjacent properties if found within 100m. If noise levels are still exceeded a temporary acoustic noise barrier will be provided or alternatively temporary relocation	– Detailed Design cleared and approved reflects EMP requirements and minimizes impacts and risks during subsequent stages of project implementation – Local communities and other concerned stakeholders kept informed throughout project implementation, and aware of construction etc. – No significant impacts to sensitive receptors – Any residual impacts in compliance with national regulations	Prior to line routes being approved by PGCB	√	√	√	Contract and SIC Cost

Transmission Lines								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contract or	
		of occupants during works to a rented property. In locations where soil compaction, piling, blasting and other vibration inducing activities are unavoidable Contractor to identify properties within the zone of influence and undertake pre-construction structural surveys to identify level of risk with reference to the guideline vibration levels per Appendix X. If there is a risk of structural damage to properties due to their current condition, consider alternative construction methods or temporary relocation of occupants during works if at risk to a rented property. Consider the need to install monitors to monitor structural movement. Structural or cosmetic damage to be repaired by Contractor to at least pre-project condition at their own cost. – H&S plan for line works to include a Traffic Management sub-plan considering both the safety of pedestrians and vehicles and need to avoid traffic congestion; it is to be developed in consultation with relevant local authorities to ensure proper execution of traffic controls including where temporary blockage of one lane of the road or footpath is needed for installation. – Contractors will dedicate enough health and safety supervision staff to overhead line section (at least one health and safety steward per overhead line section, each steward will supervise a maximum of 50 workers) and develop a work plan to ensure						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		each stretch is completed and the road restored before moving onto the next. – Route alignment and location of tower line to avoid tree crowns especially mature trees. Root damage to trees is to be avoided so unstable trees do not present a public safety hazard. – Minimum horizontal clearance of 50 m from any river alignment will be maintained while traversing parallel to it. – Horizontal and vertical safety clearances will be maintained for all overhead lines to the nearest buildings etc. Contractor to undertake ROW walkover and enumerate any structures within the ROW and if safety clearances can be met, submit survey report alongside detailed design. – To prevent live shock to person against conductor break incident of tower lines the system is designed to detect this and stop sending electricity immediately by automatically opening switchgear. – Final surface level of tower foundations will be at least 0.5 m above the existing ground level or highest flood level including an allowance for climate change (whichever is higher) – Foundations to be constructed in such a way as to be adequately drained to prevent washouts and flooding impacts to adjacent land. – Contractor to ensure structural safety of towers especially in the event of high winds/cyclones (allowing for climate change) or an earthquake by						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		designing for maximum loadings and following GoB codes; select an appropriate foundation design considering both climatic and seismic risks present. Design to include adequate towers foundation in order that all towers remain vertical during operation, and that the lines are tensioned. Install on all towers a visual and written warning signages to the public to include the ISO 7010 Hazard Type: Electrical Symbol warning of the risk of electrocution. – Install lighting arrestors along all tower lines. Install anti-climbing deterrents on all the towers and suitable means of ensuring security of the conductor to avoid vandalism.						
	Impacts due to damage to property and public utilities	– Contractor will check with relevant local authorities (electric, water, telecoms) whether there are known pipes, cables, or other utility lines and carry out a scan using avoidance tool to identify any unknown underground utilities prior to excavation. – Contractors to identify in consultation with service providers appropriate measures to minimize period of disruption to utilities and reduce health and safety risks during installation. If services must be disrupted contractors (via service providers if appropriate) to notify affected communities well in advance of any power outage etc. – In relation to cumulative impact liaise with other developers and utilities regarding the timing and						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		extent of other construction works in the same area and ensure plans for construction works are coordinated so emissions/disruption/ disturbance are minimized. – Contractors to conduct an inventory of property / ecology / water resources / physical cultural resources / utilities / street lighting fixtures in and adjacent to the RoW prior to the start of any works. For any at risk of damage during construction, including from potential breaking/drilling vibration damage (buildings, roads, drains etc.) photographic and/or structural pre-condition surveys are to be completed and agreed with PGCB prior to any works, including site establishment. To be documented in a pre-project condition report, which will serve as baseline in case any inadvertent damage or vibration impact to property occurs. If risk of structural damage to adjacent properties from vibration identified due to current condition, consider alternative construction methods or temporary relocation of occupants during works if at risk. – Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions at least one week before the disruptions.						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
	Health and safety risks related to overhead lines	– Designs to comply with the ICRNP limits of electromagnetic interference – All electrical hazards will feature written and visual warning signs that meet the IEEE standards to include the ISO 7010 "Hazard Type: Electrical Symbol" warning of the risk of electrocution. – Contractors will also ensure that ICNRP occupational/community EMF exposure levels (reference and peak values) will be achieved						
Construction Phase								
	Impacts due to dust and soil erosion	– Soil scattered on pavements and roads shall be immediately swept up to avoid windblown dust. – Vehicle movements will be restricted to defined access routes. – Erect solid screens or barriers around the dusty activities that are at least as high as any stockpiles on site to fully enclose operations. – Piling generates fine particles which require suitable dust suppression techniques such as water sprays etc. – Minimize removal of existing vegetation and topsoil. – Excavation of foundations will be conducted during the dry season to minimize soil erosion and sedimentation of watercourses although it has potential to exacerbate dust impact. – If air quality levels are exceeded, an increase in existing background air pollution is recorded where they were already exceeded, or complaints	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No exceedance of air quality levels (Appendix X, ECP 10) or increase in baseline air pollution levels where they are already exceeded. – No outstanding grievances related to impacts from dust and air pollution.	Throughout construction	√	√	√	Contract cost

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		are received contractor will be required to implement additional dust mitigation e.g., barricading/isolating sources of dust, adjusting working methods, to ensure the levels are met.						
	Impacts due to construction noise	– During night (6am to 10pm) no works will be permitted – Contractor's maximum working hours (including the movement of heavy vehicles for construction on off-site access roads) will be 7 am – 7 pm. – Residents within 500m will be informed well in advance of the construction schedule for noisy activities taking place on-site. Noisy construction activity (especially piling works) will only take place between the hours of 10 am - 4 pm. No noisy work and heavy vehicle movements will take place on Saturdays and during school/college/university exam periods. No work on holidays and festival days. Sensitive receptors to be consulted with any other special days when they would wish noise levels to be minimized. – Noise generating construction-related activities will be avoided during evenings, school hours, exam periods, prayer times, religious or cultural events near the sensitive receptors in consultation with receptors on days they would wish noise levels to be minimized. – Where properties in 50m, loud construction noise must be limited to only very short periods of	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No exceedance of noise levels (Appendix X,) or increase in baseline noise levels where they are already exceeded. – No outstanding grievances related to impacts from noise pollution.	Throughout construction	√	√	√	Contract cost

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		activity to minimize disturbance, or by installations of temporary acoustically designed noise barriers. – Sound levels received by workers must not be over 85 dB(A) during continuation of 8 working hours without wearing PPE. – If piling is required, method statement for management of piling mud is to be prepared to ensure the immediate adjacent waterbody is protected, there must be no discharge of piling mud to surface water. – Noise from piling will be contained to stipulated levels – Loud construction noise, breaking and drilling activities in particular, must be limited to very short periods of activity adjacent to receptors to minimize disturbance. Contractor to use suitably designed mufflers or sound reduction equipment on breakers/drills and ensure all leaks in the air line are sealed on them. – Contractors to undertake quantitative noise monitoring as per the EMoP. If noise levels are exceeded, an increase in existing or noise levels >3dBA recorded where they were already exceeded, or complaints are received contractor will be required to implement additional noise mitigation e.g., adjusting working methods, or placing of temporary acoustically designed noise barriers to ensure met.						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
	Piling fluid	– Contractor to avoid piling activities as much as possible. If needed a management plan will be prepared for approval. Oil will not be used for drilling or piling fluid. The piling management plan will include measures to avoid water pollution from the use of any bentonite clay slurry - adequate bunding must be provided around piling activities to contain piling mud and decanting ponds will need to be fully enclosed to avoid spills or leaks to adjacent land. Piling fluid must not be intentionally or unintentionally disposed of to surface water untreated or be allowed to damage adjacent land. Sediment laden surface water runoff and discharges must be disposed of to open ground for percolation or passed through a sedimentation tank having adequate settlement tank, to obtain at least 50 mg/l TSS, before being allowed to enter surface water. Use of piling mud treatment equipment to be considered where space constraints exist preventing adequate settlement. – Water quality baseline monitoring data to be taken from the adjacent waterbodies before the start of tower foundation works as per Appendix X. – The water quality will be monitored daily during the foundation works (e.g., pH, TDS, TSS, DO in addition to quarterly analysis of full suite) and works must halt immediately upon any deterioration with corrective action taken to bring the water quality back to baseline before continuing works.	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No outstanding grievances related to impacts from soil or water pollution.	Throughout construction	√	√	√	Contract cost

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		– PGCB to ensure their environmental specialist or SIC supervises and monitors all foundation works adjacent to waterbodies on a daily basis (with photographic record) and in doing so ensures works are undertaken following national laws and regulations and the EMP requirements.						
	Impacts due to access and blocking of road	– Follow design drawings and implement careful construction practices to avoid damage to existing public and private property outside the working area. All unanticipated damage to existing public and private property shall be restored immediately to pre-project condition and/or compensated at the cost of the contractor. – In dense urban areas or on busy roads installation works affecting footpaths and roads to avoid rush hours e.g., 6am to 8am and 4pm to 6 pm; the construction period will be kept to the absolute minimum to reduce the period of road narrowing. – Stockpiling of spoil and any new equipment (conductor reels) shall be away from properties and only in designated areas where no access or road use will be blocked. – The construction site is to be cordoned off, clearly signposted and marked by warning lights. Additional nighttime warning lights are to be installed. – Pedestrian pathway to be clearly marked and signposted. In order to enable access to the roadside shops and other buildings, concrete or	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No outstanding grievances related to impacts from access restrictions.	Throughout construction	√	√	√	Contract cost

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		wooden bridges with side protection will be laid at regular intervals and in front of key locations for pedestrians to be able to cross over unimpeded. – Robustly fence with solid barrier and sign/light open foundations with security presence to prevent public access during construction works. Planks to be placed in the trenches to allow any animals to climb out of them. – Do not allow children to play in or adjacent to the construction site – Do not leave hazardous conditions (e.g., unsigned, unfenced, no unlit open excavations without means of escape, emergency contacts posted in case of accident) overnight unless no access by public can be ensured. – Damage to roads must be immediately repaired to ensure that local communities can continue to safely use the public highways. On completion of construction works roads must be left by the contractors in no poorer condition than when construction started. – PGCB will ensure roads will be resurfaced in conjunction with RHD/LGED immediately on completion of each section to minimize disruption. – The final surfacing works for the roads will be paid for by PGCB but done by RHD/LGED. However, immediately following completion of EPC works, the contractors will infill the roads to the extent that they can be safety reused again by people and						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		vehicles and will continue to maintain them to ensure safe travel whilst avoiding dust and erosion up until the final surfacing works are completed by the city corporation.						
	Occupational and community health and safety	– Implement agreed traffic management plan. Traffic management will need to be done in consultation with the affected communities to ensure they are aware of likely disruption. – Wherever traffic diversions, warning signs, traffic control signals, barriers and the like are required, the contractor will install them to the satisfaction of the SIC and local authority prior to commencing the work. – A designated person, traffic controller, wearing colored vest will be engaged for traffic management. – Where the execution of the works requires single-lane operation/beside public road the contractor will provide and maintain all necessary barriers, warning signs and traffic control signals to the satisfaction of the SIC and local authority. – Safe access to property and roads should be maintained and safe alternative routes and access provided where there are temporary diversions or blockages, safe alternative routes to be clearly signed where there are temporary diversions or blockages. – Safety guides should be provided where works are on footpaths or in locations of pedestrian	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No outstanding grievances related to occupational or community health and safety	Throughout construction	√	√	√	Contract cost

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		crossings to help guide pedestrians, especially vulnerable persons, safely around the working area. For congested and narrow roads flagmen should be utilized to warn road users of the situation. – Implement traffic management controls during construction works with advance warning signs or flag persons to ensure health and safety of construction workers and road users. Road safety and warning signs must be posted at 500m, 100m, and immediately in advance of the works at least one week prior to the works commencing to inform the public of the temporary blockage of one lane of the road. – Diversion works to be immediately dismantled on completion of works and the footpath and roads restored to their original condition. – For removal of any existing lines/conductor scaffolds and safety nets will be used to protect pedestrians and vehicles (and the conductor itself) from potential injury/damage – this will be used wherever stringing crosses over roads and securing a road closure is not possible, presenting a possible risk to traffic, waterbodies, or is in settlement presenting a possible risk to local communities where access cannot be completely prevented, especially where buildings have encroached into the safety clearances and in the vicinity of schools.						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		– Ensure proper grounding and deactivation of live power lines during construction /decommissioning work or before any work near the lines and this will be checked and certified by Health and Safety Officer in advance. – Require workers to observe WBG EHS Guideline on T&D requirements for working at height. Require workers to test the structural integrity of towers prior to proceeding with the work. Use fall protection measures when working on towers, i.e., mobile elevated working platform, all workers are required to wear body harness. – For the transient works provide workers with access to an existing functional toilet facility with hand washing facilities (e.g., public toilets) or provide a self-contained portable toilet with hand washing facilities (one toilet per six workers) that do not allow untreated disposal of sewage to adjacent water bodies e.g., sewage enclosed in a container and will later be taken offsite for wastewater treatment and disposal. Open defecation and use of pit latrines to be prohibited.						
	Site restoration	– Contractor to avoid damage to field boundaries and repair any damaged during the construction works. – Rehabilitate any disturbed areas beyond the substation infrastructure footprint to through revegetation and landscaping using native species.	– EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	On the completion of construction works prior to handover to PGCB	√	√	√	Contract cost

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contract or**	
		– All spoils, construction waste and material scrap after erection of tower and line must be removed. Each erection site to be repaired back to its natural condition i.e. construction waste, footpaths and surrounding to be cleared and restored to the satisfaction of the community users.						
O&M Phase (Measures to be Implemented by PGCB)								
Operation and maintenance activities	EHS impacts and risks of the project during O&M in general including occupational and community health and safety risks Community H&S risks due to presence of overhead lines – hazards of electrocution, lightning strike, strong winds snapping live conductor etc. People can climb towers and get electrocuted	– During maintenance activities mitigation measures applicable to the construction phase are also applicable to PGCB maintenance workers or contractors and are to be followed – Carry out regular inspections (at least monthly) on lines and periodic maintenance to ensure that integrity of the towers and line is in good condition including possible conductor snapping and de-energizing of the line within three cycles to avoid the potential for electrocution from a breakage, the clearances are maintained, and electrical standards are being upheld. – Inspection protocol should confirm electrical safety warning signs and lighting arrestors in place and identify any missing or corroded parts for immediate replacement. – If property is found to be encroaching into the safety clearances notification is to be immediately issued to the owner/occupier by PGCB along with awareness raising materials with respect to the importance of maintaining the horizontal and vertical clearance from buildings and the matter	– No fatalities or lost time incidents 100% of H&S incidents including near miss recorded, immediately investigated, and corrective action taken to prevent repeat. – Compliance with safety clearances along transmission lines – Compliance with ICNRP occupational/community EMF exposure levels (reference and peak values) along transmission lines – EMP requirements successfully implemented as determined through regular site checks, photographic record etc. – No outstanding grievances from local communities or other interested stakeholders	Throughout the O&M Phase	√			PGCB

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		will be taken up further in consultation with the appropriate authorities. – Regular pruning or lopping of trees ensure the integrity and safety of the lines – Prohibit the use of herbicides, pesticides or burning to control any vegetation growth or to manage vegetation waste. – Maintain written warning signages including the ISO 7010 Hazard Type: Electrical Symbol warning of the risk of electrocution. – For all maintenance works undertake risk assessment and prepare H&S plan in accordance with EHS Guidelines, considering occupational and community H&S and including adherence to electrical safety standards and emergency preparedness and response plan with communication systems and protocols to report an emergency. – O&M to be performed only by suitably qualified and experienced workers who are regularly trained staff of PGCB or a contactor under supervision of a Health and Safety Officer with an appropriately equipped first aid kit and appropriate fire extinguishers immediately available for use – Restricting working at height and with electricity only by workers who are trained and certified to do so. – O&M workers to be given required PPE and other requisite safety equipment						

Transmission Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Workers to observe guidelines to minimum approach distances for excavations, tools, vehicles, pruning, and other activities when working around power lines. – Testing of structural integrity prior to proceeding with the work and the use of fall protection measures such as harnesses, tool bags, ropes etc. – Proper grounding and deactivation of live power lines during maintenance work or when working near the lines. – In the event of an incident such as conductor break PGCB staff/community must immediately notify the nearest PGCB incident coordinator for handling measures: power cuts, technical O&M staffing to inspect and repair. – PGCB in conjunction with local municipalities and the media with the support of CSOs to continue to organize health and safety campaigns on electrical safety community awareness raising activities in local communities and schools within 500 m of the ROWs – In case of fire events and other related situations, given the PGCB may not be available immediately the community should be educated with respect to emergency response with 24/7 emergency contact numbers for PGCB included on signs; PGCB will need to ensure this is manned 24/7 to ensure that it is effective reporting route.						

Transmission Lines								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contract or	
		– During O&M, internal audits will be undertaken by the PGCB ESU Environment Officer, and Health and Safety Officer regarding corona noise near the lines, EMF under the tower lines and resolve any community grievances. – Record any mortality of wildlife, local or migratory birds on or under the transmission line during the maintenance walkovers.						

12.7.3.1 Site-specific Mitigation for Transmission Lines/LILO Lines

CSEMP to include the following measures for the TL as well reflecting the ECPs and all general and TL specific EMP measures;

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contractor	
Transmission Lines at Pekua/Chakaria, Cox's Bazar (3no. LILO) **(LILO of Existing Matarbari PP- Bashkhali PP 400 kV Line, LILO of Anwara-Cox's Bazar 230kV Line & LILO of Existing Matarbari (132/33)-Chakaria 132kV line at Pekua)**								
Detailed Design and Preconstruction Phase								

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
Towers on low-lying land within salt pan area	Environmental and social impacts due to towers on salt pan with waterbodies	– Contractor to employ field ecologist to undertake pre-construction overwintering season ornithological surveys of the entire transmission line route including point counts and vantage point surveys identifying flight lines and height per Scottish Natural Heritage or equivalent methods (sufficient number to cover the entire route) to identify movement of birds across the transmission line along the entire route classifying birds as to being resident/breeding/migratory/ congregatory/ threatened and pre-construction aquatic vegetation and fish surveys where towers will be located in inundated land (salt pan) with particular attention to potential for threatened species, submit survey report alongside detailed design. Adaptive management measures to be applied according to the findings of the surveys to ensure no net loss of biodiversity can result. – No loss of nationally or IUCN threatened (VU/EN/CR) vegetation species. – Ensure minimum number of towers in salt pan or permanently inundated land – Transmission line towers to be set back from the banks of main drainage channels within the salt panarea by 50m – this will require micro siting of some towers on the indicative transmission line alignment – Maintain at least a 1.5 meter spacing between all energized components and grounded hardware or, where this spacing is not feasible, covering all	EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during tower foundation works	√	√	√	Contract Cost

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contractor	
		energized parts and hardware to avoid birdlife electrocution. – Contractor to install bird divertors on the entire TL length – all three routes. As a good practice, the specification for bird diverters will follow the approved specification/ drawings (samples attached in Appendix XX) from other projects. However, the bird divertor to be installed will be approved as suitable by PGCB. Bird divertors are to be provided and installed by the contractor immediately following stringing and before commissioning/energizing of the transmission line – For towers in salt pan arrangement to be made with the owner to time and/or drain the installation area and adjacent plots during the dry season so that the tower can be constructed in dry conditions; no construction of tower foundations to take place in the water. – Conduct works during the dry season when the water level on the route through salt pan is at its lowest and request owners of salt pans in which towers will be constructed and the immediately adjacent salt pans to keep the land dry to minimize the risk of sediment laden runoff. – Water quality baseline monitoring data to be taken from the adjacent inundated land/nearest drainage channel before the start of tower foundation works as per Appendix X. – The water quality of the adjacent inundated land/nearest drainage channel will be monitored						

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		daily during the foundation works (e.g., pH, turbidity, TDS, TSS and DO in addition to quarterly monitoring of full suite) and works must halt immediately upon any deterioration with corrective action taken to bring the water quality back to baseline before continuing works. – PGCB to ensure their environmental specialist or SIC supervises and monitors foundation works in the salt pan on a daily basis and in doing so ensures works are undertaken following national laws and regulations and the EMP requirements.						
Construction Phase								
Transmission line construction activities	Disturbance to local and migratory birds and impacts on salt pan	– Piling is required at the site and an additional method statement for management of piling mud when working in salt pans area is to be prepared to ensure the immediate adjacent waterbodies are protected, there must be no discharge of untreated piling mud to surface water. – Sensitive waterbodies adjacent to be avoided during construction will be flagged for protection. As there may be a risk of workers accidentally straying into these areas then worker training and the code of conduct will cover measures to ensure that wildlife will be protected – No fuel, oil or chemicals are to be stored in the salt pan areas and stockpiles to be kept to materials required during the day's work due to risk of sediment entering immediately adjacent saltpan or drainage channel	– EMP/CSEMP/BMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√	√	√	Contract cost

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Schedule works to avoid the monsoon season in Bangladesh when the water level in the saltpan is at its highest – No works to be undertaken from 1 hour before sunset to 1 hour after sunrise to minimize impacts on wildlife.						
Detailed Design and Preconstruction Phase								
Detailed design	Low lying land at risk of waterlogging during heavy rain, waterbodies are present, impacts on birdlife	– Contractor to install bird divertors on the TL for a length of 500m either side of river crossings or large waterbodies and any additional locations recommended as a result of the surveys. As a good practice, the specification for bird diverters will follow the approved specification/ drawings (samples attached in Appendix XX) from other projects. The bird divertors must be an internationally accepted, robust design of contrasting color, that reflects UV light, glows in the dark, and guaranteed for at least 5 years – the bird divertor to be installed must be approved as suitable by PGCB. Bird divertors are to be provided and installed by the contractor immediately following stringing and before commissioning/energizing of the transmission line	Tower design is climate resilient.	Prior to approval of detailed design	√	√	√	Contract cost
Transmission Lines at Monohardi (2no.) **LILO of Sripur-Ashuganj 230KV double circuit line at Monohordi** **Monohardi-Bajitpur 132kV Double Circuit Line** **Gopalganj -Tungipara 132kV Double Circuit Line** **Kachua- Matlab(N) 132kV Double Circuit Line**								

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
LILO of Chowmuhani-Ramganj 132kV double circuit line at Chatkhil								
Detailed Design and Preconstruction Phase								
Towers on agricultural and low land area	Environmental and social impacts due to towers on agricultural and low land area, impacts on birdlife	– Contractor to avoid waterbodies in locating the towers – towers that based on the indicative route have been located in waterbodies are to be micro-sited in order to avoid impacts on the ponds. – Contractor to employ field ecologist to undertake pre-construction overwintering season ornithological surveys of the transmission line route including point counts and vantage point surveys to identify movement of birds across the transmission line 500m either side of river crossings, large waterbodies and other locations of interest identified following a walkover survey/consultations classifying birds as to being resident/breeding/migratory/ congregatory/ threatened, submit survey report alongside detailed design. Adaptive management measures to be applied according to the findings of the surveys to ensure no net loss of biodiversity can result. – Contractor to install bird divertors on the TL for a length of 500m either side of river crossings or large waterbodies and any additional locations recommended as a result of the surveys. Bird divertors to be installed on the earth wire; at a spacing of 10m. As a good practice, the specification for bird diverters will follow the approved specification/ drawings (samples attached in Appendix XX) from other projects. The bird divertors must be an internationally accepted, robust design of contrasting color, that reflects UV light, glows in the dark, and guaranteed for at least 5 years – the bird divertor to be installed must be	EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during tower foundation works	√	√	√	Contract Cost

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		approved as suitable by PGCB. Bird divertors are to be provided and installed by the contractor immediately following stringing and before commissioning/energizing of the transmission line						
Satkhira- Paikgacha 132kv Double Circuit Line								
Detailed Design and Preconstruction Phase								
Towers in agricultural and low land area	Environmental and social impacts due to towers on permanently inundated areas	– Contractor to employ field ecologist to undertake pre-construction ornithological survey of the transmission line route including point counts and vantage point surveys along the entire length but particularly where the TL crosses over permanently inundated areas and 500m either side of river crossings, large waterbodies and other locations of interest identified following a walkover survey/consultations to identify movement of birds across the transmission line and pre-construction vegetation with particular attention to potential for threatened species, submit survey report alongside detailed design. Adaptive management measures to be applied according to the findings of the surveys to ensure no net loss of biodiversity can result. – No loss of nationally or IUCN threatened (VU/EN/CR) vegetation species. – Ensure minimum number of towers in fish pond or permanently inundated land – Maintain at least a 3 meter spacing between all energized components and grounded hardware or, where this spacing is not feasible, covering all energized parts and hardware to avoid birdlife electrocution.	EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during tower foundation works	√		√	√	Contract Cost

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	Impact or Risk	Mitigation/ Compensation/ Contingency/ Enhancement Measures	Performance Indicator	Timing	Responsibilities (implementation, supervision and monitoring)			Budget Source
					PGCB	SIC	Contractor	
		– Contractor to install bird divertors on the entire TL length with a focus on where it crosses permanently inundated areas plus 500m either side of river crossings and large waterbodies and any additional locations recommended as a result of the surveys. Bird divertors to be installed on the earth wire; at a spacing of 10m. As a good practice, the specification for bird diverters (yet to be specified) will follow the approved specification/ drawings (samples attached in Appendix XX) from other projects. The bird divertors must be an internationally accepted, robust design of contrasting color, that reflects UV light, glows in the dark, and guaranteed for at least 5 years – the bird divertor to be installed must be approved as suitable by PGCB. Bird divertors are to be provided and installed by the contractor immediately following stringing and before commissioning/energizing of the transmission line – In permanently inundated areas contractor to make arrangements with the owner to time and/or drain the installation area and adjacent plots during the dry season so that the tower can be constructed in dry conditions; no construction of tower foundations to take place in the water. – Conduct works during the dry season when the water level on the route permanently inundated areas is at its lowest and request owners of fish ponds in which towers will be constructed and the immediately adjacent fish ponds to keep the land dry to minimize the risk of sediment laden runoff. – Water quality baseline monitoring data to be taken						

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		from the adjacent inundated land/nearest wet fish pond before the start of tower foundation works as per Appendix X. – The water quality of the adjacent inundated land/nearest wet fish pond (e.g., pH, turbidity, TDS, TSS, DO in addition to quarterly analysis) will be monitored daily during the foundation works and works must halt immediately upon any deterioration with corrective action taken to bring the water quality back to baseline before continuing works. – PGCB to ensure their environmental specialist or SIC supervises and monitors foundation works in fish ponds on a daily basis and in doing so ensures works are undertaken following national laws and regulations and the EMP requirements.						
Construction phase								
Transmission line construction activities	Disturbance to local and migratory birds	– Piling is required at the site and an additional method statement for management of piling mud when working in fish ponds is to be prepared to ensure the immediate adjacent waterbodies are protected, there must be no discharge of untreated piling mud to surface water. – Sensitive waterbodies adjacent to be avoided during construction will be flagged for protection. As there may be a risk of workers accidentally straying into these areas then worker training and the code of conduct will cover measures to ensure that wildlife will be protected – No fuel, oil or chemicals are to be stored in the stockpiles to be kept to materials required during the day's work due to risk of sediment entering immediately adjacent saltpan or drainage channel	– EMP/CSEMP/BMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and then for implementation during construction	√		√	√	Contract cost

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		– Schedule works to avoid the monsoon season in Bangladesh when the water level in the fish ponds is at its highest – No works to be undertaken from 1 hour before sunset to 1 hour after sunrise to minimize impacts on wildlife.						
Bhandaria-Mathbaria 132kV Double Circuit Line								
Detailed Design and Preconstruction Phase								
Towers on agricultural and low land area	Environmental and social impacts due to towers on agricultural and low land area	– Contractor to employ field ecologist to undertake pre-construction ornithological survey of the transmission line route including point counts and vantage point surveys across the transmission line 500m either side of river crossings, large waterbodies and any other areas of interest identified following walkover/consultations to identify movement of birds across the transmission line, submit survey report alongside detailed design. Adaptive management measures to be applied according to the findings of the surveys to ensure no net loss of biodiversity can result. – Maintain at least a 3 meter spacing between all energized components and grounded hardware or, where this spacing is not feasible, covering all energized parts and hardware to avoid birdlife electrocution. – Contractor to install bird divertors on the TL 500m either side of river crossings or large waterbodies and any additional locations recommended as a result of the surveys. Bird divertors to be installed on the earth wire; at a spacing of 10m. The bird divertors must be an internationally accepted, robust design of contrasting color, that reflects UV	EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during tower foundation works	√		√	√	Contract Cost

Site-specific Mitigation for Transmission Lines/LILO Lines								
Project Activity	**Impact or Risk**	**Mitigation/ Compensation/ Contingency/ Enhancement Measures**	**Performance Indicator**	**Timing**	**Responsibilities (implementation, supervision and monitoring)**			**Budget Source**
					PGCB	**SIC**	**Contractor**	
		light, glows in the dark, and guaranteed for at least 5 years – the bird divertor to be installed must be approved as suitable by PGCB. Bird divertors are to be provided and installed by the contractor immediately following stringing and before commissioning/energizing of the transmission line						
LILO of Cumilla(N) – Shahjibazar PP 230KV double circuit line at Madhabpur LILO of Shahjibazar – Brahmanbaria 132KV double circuit line at Madhabpur LILO of Bogura(S) -Naogaon 132kV line at Dupchanchia LILO of Bheramara-Rajbari, 132 kv line at Kushtia								
Detailed Design and Preconstruction Phase								
Towers on agricultural and low land area	Environmental and social impacts due to towers on agricultural and low land area	– Contractor to avoid waterbodies in locating the towers – towers that based on the indicative route have been located in waterbodies are to be micro-sited in order to avoid impacts on the ponds.	EMP/CSEMP requirements successfully implemented as determined through regular site checks, photographic record etc.	Prior to and during tower foundation works	√		√	√	Contract Cost

12.8 Environmental Monitoring Plan (EMoP)

The Environmental Monitoring Plan (EMoP) sets out the minimum requirements for quantitative monitoring and performance standards to be complied with during construction. The main purpose of this EMoP is to ensure that the various tasks detailed in the EMP, particularly the mitigation measures, are implemented in an effective manner and any unanticipated impacts on environment and social parameters can be promptly addressed.

Quantitative monitoring activities may be modified during project implementation, depending on the contractors' performance and analytical results obtained. If performance is worse than expected, corrective action/s will be identified, and environmental monitoring activities will be adjusted accordingly by PGCB and their Contractors during pre-construction, construction or the Operations and Maintenance (O&M) phase to help resolve any unsatisfactory performance.

In addition to quantitative monitoring there will also be supervision and monitoring of EMP implementation. Monitoring of this qualitative compliance with the EMP will be carried out with the help of checklists prepared based on the mitigation measures detailed in the Mitigation Plan.

Table 12.5: Environment Monitoring Plan (EMoP)

12.8.1 Part 1 – General (All Works)

General Works								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
Construction Phase								
Water resources	All construction sites, including construction stores and labor camps	Ongoing throughout construction, monthly reporting of records kept by the contractor	- Water volume used and source (construction and drinking water).	- No grievance received during construction or operation regarding conflict with other water users	PMU to ensure record keeping by contractor and to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to keep records and report to PMU in monthly progress reports	Part of contract cost, include costs of implementing EMoP as BOQ line
Water pollution	All construction sites, including construction stores and labor camps	Ongoing throughout construction, monthly reporting of records kept by the contractor	- Monitor all effluent discharges as per GoB standards or other internationally accepted levels whichever is stringent.	- No grievance received during construction or operation regarding water pollution	PMU to ensure record keeping by contractor and to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to keep records and report to PMU in monthly progress reports	Part of contract cost, include costs of implementing EMoP as BOQ line
Air Pollution	All construction sites, including construction stores and labor camps	Ongoing throughout construction, monthly reporting of records kept by the contractor	- Air quality monitoring as per the SS/TL EMP and EMoP requirement	- No grievance received during construction or operation regarding air pollution	PMU to ensure record keeping by contractor and to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to keep records and report to PMU in monthly progress reports	Part of contract cost, include costs of implementing EMoP as BOQ line
Noise Pollution	All construction sites, including construction stores and labor camps	Ongoing throughout construction, monthly reporting of records kept by the contractor	- Noise monitoring as per the SS/TL EMP and EMoP requirement	- No grievance received during construction or operation regarding noise pollution	PMU to ensure record keeping by contractor and to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to keep records and report to PMU in monthly progress reports	Part of contract cost, include costs of implementing EMoP as BOQ line
Construction materials and	All construction sites, including	Ongoing throughout	- Keep records of all types of materials used	Use of materials and transfer of all construction wastes	PMU to ensure record keeping by	SIC to supervise	Contractor to keep records	Part of contract cost, include costs

General Works								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
waste management: record keeping	construction stores and labor camps	construction, monthly reporting of records kept by the contractor	and waste produced by type, volume/weight. Document waste handling full-cycle through transfer notes (including type, volume, source, transport, intermediaries if any, and final treatment or disposal facility with its license and capacity	documented with all wastes disposed of in an environmentally safe and sound manner.	contractor and to report in EMR to ADB and DOE	contractor and support PMU in checking compliance	and report to PMU in monthly progress reports	of implementing EMoP as BOQ line
Soil (earthworks)	Construction sites involving earthworks/cut and fill activities	Ongoing throughout construction, monthly reporting of records kept by the contractor	- Volume of soil disturbed during construction - Keep records of earthworks involved, including total volume in m3 of soil excavated and reused (any disposed of as spoil off site to licensed waste disposal facilities recorded as per waste generation)	- Earthworks documented, and all excavated and cut and fill volumes accounted for, either reused on-site or disposed of off-site to licensed waste disposal facilities	- PMU to ensure record keeping by contractor and to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	- Contractor to keep records and report to PMU in monthly progress reports	Part of contract cost, include costs of implementing EMoP as BOQ line
Hazardous materials– incidents	All construction sites, including construction stores and labor camps	Ongoing throughout construction, monthly reporting of records kept by the contractor	- Records of pollution incidents (e.g., type of material spilled, amount in kg or m^3 and action taken to clean up)	- No pollution incident affecting soil of water quality - zero major incidents occurred. - Minor incidents responded to in accordance with EMP response plan procedures	- PMU to ensure record keeping by contractor and - to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	- Contractor to keep records and report to PMU in monthly	Part of contract cost, include costs of implementing EMoP as BOQ line

General Works								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
			- Carry out visual inspection and interviews with workers and the community to identify if any unrecorded incidents occurred	with lessons learnt for future if they occur.	- Any pollution incident to be reported within 24 hours to ADB and DOE as per the EC requirements.		progress reports - Any pollution incident to be reported within 24 hours to PIU and SIC	
Occupational and community health and safety incidents: record keeping	All construction sites, including construction stores and labor camps	Ongoing throughout construction, monthly reporting of records kept by the contractor	- Keep records of near misses, minor, lost time, and fatal health and safety incidents related to the project, compile records from construction sites; carry out interviews with workers and the community to identify if any unrecorded incidents occurred. - During the COVID-19 pandemic, temperature checks to be carried out at entrance of the work site at start of shift, and records of all suspected and confirmed cases to be kept.	- Zero lost time incidents or fatalities (among workers and community) - All near miss, minor, lost time, and fatal incidents as well as suspected/confirmed COVID-19 instances having adequate response plan, with lessons learnt for future if they occur.	- PMU to ensure record keeping by contractor and to report in EMR to ADB and DOE - Any lost time incident or fatality to be reported within 24 hours to ADB and DOE as per the EC requirements	SIC to supervise contractor and support PMU in checking compliance	- Contractor to keep records and report to PMU in monthly progress reports - Any lost time incident or fatality to be reported within 24 hours to PMU and SIC	For COVID-temperature checks frontal thermometer. Part of contract cost, include costs of implementing EMoP as BOQ line

General Works								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
Health and Safety: construction drinking water supplies	All construction sites, including construction stores and labor camps	Ongoing throughout construction, monthly testing or reporting of records kept by the contractor	- Water sample is to be taken in a clean, non-contaminated, well-sealed container and tested within the next 48 hours. Drinking water quality tests against Bangladesh drinking water standards by accredited laboratory (physical, chemical, and bacteriological tests including arsenic levels) where the contractor provides a surface or groundwater drinking water supply or sources where supplier is unable to provide water quality test results. - Alternatively, documentary evidence that drinking water meeting national standards is being imported for workers consumption.	Drinking water provided meets national drinking water standards	PMU to ensure monitoring undertaken by contractor and to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Water quality tests by accredited laboratory. - Part of contract cost, include costs of implementing EMoP as BOQ line
Operation and Maintenance								

General Works								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
Hazardous materials–incidents	All substations, transmission and lines	Daily checks for pollution incidents and record keeping during O&M	- Records of pollution incidents (e.g., type of material spilled, amount in kg or m^3 and action taken to clean up) - Carry out visual inspection and interviews with workers and the community to identify if any unrecorded incidents occurred	- No pollution incident affecting soil of water quality - zero major incidents occurred. - Minor incidents responded to in accordance with O&M response plan procedures with lessons learnt for future if they occur.	- Substation In-charge to keep records and report to ESU in monthly progress reports - Any pollution incident to be reported within 24 hours to ESU by substation /line manager - PGCB ESU to report to ADB	NA	NA	PGCB O&M budget
Health and safety: accident records	All substations, transmission and lines	Daily checks and record keeping during O&M	Keep records of health and safety incidents, compile records from substations and carry out interviews with workers and the community to identify if any unrecorded incidents occurred	- Zero lost time incidents or fatalities (among workers and community) - All near miss, minor, lost time, and fatal incidents as well as suspected/confirmed COVID-19 instances having adequate response plan, with lessons learnt for future if they occur.	- Substation In-charge to keep records and report to ESU in monthly progress reports - Any lost time incident or fatality to be reported within 24 hours to ESU by substation /line manager - PGCB ESU to report to ADB - Any lost time incident or	NA	NA	PGCB O&M budget

General Works								
Environmental Parameters to be Monitored	Location	Time/Frequency/ Duration	Method of Measurements	Performance Standard / Quantitative Targets	Responsibilities			Equipment and Monitoring Cost (Million BDT)
					PMU	SIC	Contractor	
					fatality to be reported within 24 hours to ADB			

12.8.2 Part 2 – New Substations and Bay Extensions at Existing Substations

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	Location	Time/Frequency/ Duration	Method of Measurements	Performance Standard / Quantitative Targets	Responsibilities			Equipment and Monitoring Cost (Million BDT)
					PMU	SIC	Contractor	
Detailed Design and Pre-Construction Phase								
Ecology	Substation sites and any temporary facility areas used	Once prior to construction – baseline monitoring prior to the start of any activity onsite	Ecological survey of substation site and any temporary facility areas used to include presence flora and fauna (include avifauna) and tree enumeration (numbers, species, size etc.)	No net loss of biodiversity following construction. Only types of habitats and number of trees documented in IEE are lost, any trees lost are compensated for, 1:3 replacement with native tree species in suitable alternative location as per Tree Plantation Plan, Target: 100% survival rate. No damage to other habitats/trees/vegetatio	- Ensure survey undertaken by contractor - Report in EMR to ADB and DOE	SIC to supervise survey in the field and support PIU in checking compliance	Contractor to undertake survey and report to PIU	- Ecological survey by qualified and experienced ecologists - Part of contract cost, include costs if implementing EMP as BOQ line.

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
				n outside the substation.				
	Pekua, Mathbaria and Paikgacha substation site	Once prior to construction – baseline monitoring prior to the start of any activity onsite (given that the Contractor is mobilized during land development)	Migratory Ornithology survey including point counts on a monthly basis from October to March of the substation site and surroundings	No net loss of biodiversity following construction.	- Ensure survey undertaken by contractor - Report in EMR to ADB and DOE	SIC to supervise survey in the field and support PMU in checking compliance	Contractor to undertake survey and report to PMU	- Migratory Bird survey by qualified and experienced ornithologists - Part of contract cost, include costs if implementing EMP as BOQ line.
Air Quality: PM10, PM2.5, SOX, NOX, CO & Pb	Nearest sensitive receptor within 500 m of substations on each boundary – all substations	Once prior to construction – baseline monitoring prior to the start of any activity onsite.	- To be measured as 1-hour and 24- hour averages along with meteorological data- temperature humidity, wind speed, and wind direction-during the dry season. - Record details as required by the EC.	Compliance with ambient air quality standards to be applied to the project (see Appendix X– Applicable Standards for EMP) or no increase above baseline if already exceeded	PMU to - ensure monitoring undertaken by contractor - report in EMR to ADB and DOE	SIC to support PMU in recruitment ensuring that ai quality monitoring is carried out	Contractor to undertake measurements and report to PMU	- Professional, calibrated, portable outdoor air quality monitoring sensors to be used. - Part of contract cost,

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
								include costs of implementing EMoP as BOQ line
Noise level: dB(A)	Site boundary and nearest sensitive receptor within 50m of substations on each boundary – all substations	Once prior to construction – baseline monitoring prior to the start of any activity onsite.	1hr LAeq over a 48-hour period including workday and weekend using professional, calibrated portable monitoring devices. Noise levels to be measured outdoors in free field conditions. Record details as required by the EC.	Compliance with ambient noise standards to be applied to the project (see Appendix XI– Applicable Standards for EMP) or <3dBA increase above baseline if already exceeded	PMU to - ensure monitoring undertaken by contractor - report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	Portable, professional, real-time calibrated Type 1 or 2 sound level meter meeting all appropriate IEC standards to be used with a tripod. - Part of contract cost, include costs of implementing EMoP as BOQ line
Water quality Surface Water Quality:	Nearest surface waterbodies (excluding those to be infilled or lost on the site) and groundwater sources (wells) unless >100m distant from the substation	Once prior to construction – baseline monitoring prior to the start of any activity onsite	- Water sample is to be taken in a clean, non-contaminated, well-sealed container and tested within the next	No pollution incident affecting surface or groundwater quality and compliance with ambient water quality	- ensure monitoring undertaken by	SIC to supervise measurements in the field and support	Contractor to undertake measurements and	- Water quality tests by accredited laboratory.

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
pH, BOD5, COD, TDS, TSS, DO, NH3-N, PO4, Turbidity, Odor, Chloride, Total Coliform (TC), Ammonia-Nitrogen, Oil & Grease, Polychlorinated Biphenyls (PCBs) Ground Water/Drinking Water Quality: pH, Mn, Fe, As, Electrical Conductivity (EC), Chloride (Cl), Total Coliform (TC), Fecal Coliform (FC), Turbidity, Odor, Polychlorinated Biphenyls (PCBs) If used by local community as a source of drinking water to also test			48h. Water quality tests by accredited laboratory (physical, chemical, and bacteriological tests) - Record details as required by the EC.	standards to be applied to the project (see Appendix X– Applicable Standards for EMP) or no increase above baseline if already exceeded.	contractor \ - report in EMR to ADB and DOE	PMU in checking compliance	report to PMU	- Part of contract cost, include costs of implementing EMoP as BOQ line

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
against GOB drinking water standards (full suite of parameters)								
Soil quality: pH, Texture Organic Contents, Lead (Pb), Copper (Cu), Chromium (Cr), Cadmium (Cd), Polychlorinated Biphenyls (PCBs)	For existing substation sites	One time for baseline establishment prior to the start of any activity onsite	Soil samples to be taken from across the substation area at various locations at surface and at depth in clean, non-contaminated, well-sealed containers and tested within the next 48h following international good practice for contaminated land investigation.[84] Soil quality tests by accredited laboratory to include pH, Texture Organic Contents, Lead (Pb), Copper (Cu), Chromium (Cr), Cadmium (Cd), Polychlorinated Biphenyls (PCBs)and any other contaminants indicated by contaminated land professional	- No soil contamination was present prior to construction work. If present this is to be treated as an unanticipated impact and contaminated land remedial action plan developed and implemented by the contractor before the start of any other on-site activity. - No pollution incident affecting soil quality and compliance with soil quality standards to be applied to the project e.g.,	- ensure monitoring undertaken by contractor - report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Soil quality tests by accredited laboratory. - Part of contract cost, include costs if implementing EMP as BOQ line.

[84] There are various good practice guidelines that can be followed, such as: https://www.health.vic.gov.au/sites/default/files/migrated/files/collections/policies-and-guidelines/h/hs680_land_contam--pdf.pdf

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
				international good practice guidelines.[85]				
Health and Safety: operational drinking water supplies	All sources that will be developed by contractor for use as an operational drinking water supply	One time for baseline establishment prior to the start of any activity onsite	Water sample is to be taken in a clean, non-contaminated, well- sealed container and tested within the next 48h. Drinking water quality tests against Bangladesh drinking water standards by accredited laboratory (physical, chemical, and bacteriological tests including arsenic levels) per Appendix X, and ECP 3.	Drinking water provided for operational substations meets national drinking water standards or appropriate level of water treatment is incorporated into the project design	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Water quality tests by accredited laboratory. - Part of contract cost, include costs of implementing EMoP as BOQ line
Health and safety/physical cultural resources: condition surveys in relation to property damage from construction	All substations; include surveys of all properties located immediately adjacent all boundaries (including informal settlements) at substations for which piling works are being required, plus properties immediately adjacent to the access entrance to substation sites	One time for baseline establishment prior to the start of any activity onsite	- Photographic and/or structural precondition surveys of existing - property condition including utilities, structures, drains etc. Risk - assessment of potential damage to structures and additional	- Damages to property avoided but if caused, to be paid for by the contractor. - National Building Code to be referred to in relation to ensuring structural	PMU to - ensure surveys undertaken by contractor and - to report in EMR to	SIC to supervise surveys in the field and support PMU in checking compliance	Contractor to undertake surveys and report to PMU	Part of construction cost, include costs of implementing EMP as BOQ line.

[85] There are various soil quality guidelines that can be followed to determine if land is contaminated such as those from Australia: https://www.nepc.gov.au/nepms/assessment-site-contamination/toolbox

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
			- recommendations for structural and vibration monitoring condition where there is a risk of property damage	safety of property during works.	ADB and DOE			
Construction Phase								
Ecology Conservation	Substation sites and any temporary facility areas used	- Ongoing throughout construction, monthly reporting of records kept by the contractor. - Ecological survey once on commissioning and prior to handover of substation to PGCB	- Upon commissioning ecological survey of substation site and any temporary facility areas used to include presence flora and fauna and tree enumeration (numbers, species, size etc.) - Keep records of all compensatory tree plantation undertaken (numbers, species, size etc.) including survival and replacement of trees during defect liability period	No net loss of biodiversity following construction. Only types of habitats and number of trees documented in IEE are lost, including minimum number of trees, any trees lost are compensated for, 1:3 replacement with native tree species in suitable alternative location,[86] 100% survival rate. No damage to other habitats/trees/vegetation outside the substation.	PMU to - ensure record keeping by contractor and - to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to undertake surveys, keep records and report to PMU in monthly progress reports	Ecological survey by qualified and experienced ecologists Part of contract cost, include costs of implementing EMoP as BOQ line

[86] Tree plantation to be done by contractor considering native plant species as appropriate for the substation site in the vacant spaces to be kept as per BNBC 2020 – if there is not space at the substation then a suitable site in the neighborhood is to be identified for this tree plantation to be completed.

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
	Pekua, Mathbaria and Paikgacha substation site	Once on commissioning and prior to handover of substation to PGCB	Overwintering bird survey of PAI of substation site following methodology used for baseline survey in the IEE.	No net loss of biodiversity following construction compared to baseline survey reported in the IEE.	PMU to - ensure record keeping by contractor and - to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to undertake surveys, keep records and report to PMU in monthly progress reports	- Migratory Bird survey by qualified and experienced ornithologists - Part of contract cost, include costs of implementing EMoP as BOQ line
Air Quality: PM10, PM2.5, SOX, NOX, CO & Pb	- Nearest sensitive receptor within 500 m of substations on each boundary - Additional locations at request of PMU/SIC in the event of visible dust pollution or grievance received during construction.	Quarterly during active construction involving demolition and earthworks, and then as requested by PMU/SIC in event of visible dust pollution or grievance received during construction.	- To be measured as 1-hour and 24- hour averages along with meteorological data- temperature humidity, wind speed, and wind direction-during the dry season. - Record details as required by the EC.	- No exceedance of ambient air quality standards (see Appendix X – Applicable Standards for EMP) or no worsening if already exceeded (as per the baseline)	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Professional, calibrated, portable outdoor air quality monitoring sensors to be used. - Part of contract cost, include costs of implementing

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
								EMoP as BOQ line
Noise level: dB(A)	1m from noisy equipment within substation in respect of commissioning Site boundary and nearest sensitive receptor within 500 m of substations on each boundary. Additional locations at request of PMU/SIC in the event of noise pollution concerns or grievance received during construction	- Monthly during active demolition and construction involving noisy activities such as piling, and then as requested by PMU/SIC in event of noise pollution concerns or grievance received during construction. - One time during commissioning (at substations)	- 1hr LAeq over a 48-hour period including workday and weekend using professional, calibrated portable monitoring devices. Noise levels to be measured outdoors in free field conditions. - Record details as required by the EC.	No exceedance of ambient noise standards (see Appendix X – Applicable Standards for EMP) or <3dBA increase if already exceeded (as per the baseline)	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Portable, professional, real-time calibrated Type 1 or 2 sound level meter meeting all appropriate IEC standards to be used with a tripod. - Part of contract cost, include costs of implementing EMoP as BOQ line
Water quality Surface Water Quality: pH, BOD5, COD, TDS, TSS, DO, NH3-N, PO4,	Nearest surface waterbodies and groundwater sources (wells) unless > 100m distant from the substation. Additional locations at request of PMU/SIC in the event of water pollution concerns or	Quarterly during active construction involving earthworks, and then only required if requested by PMU/SIC in event of water pollution concerns or	Water sample is to be taken in a clean, non-contaminated, well- sealed container and tested within the next 48h. Water quality tests by accredited	No pollution incident affecting surface or groundwater quality and compliance with ambient water quality standards to be applied	PMU to - ensure monitoring undertaken by	SIC to supervise measurements in the field and support PMU in	Contractor to undertake measurements and	- Water quality tests by accredited laboratory.

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
Turbidity, Odor, Chloride, Total Coliform (TC), Ammonia-Nitrogen, Oil & Grease, Polychlorinated Biphenyls (PCBs) Ground Water/Drinking Water Quality: pH, Mn, Fe, As, Electrical Conductivity (EC), Chloride (Cl), Total Coliform (TC), Fecal Coliform (FC), Turbidity, Odor, Polychlorinated Biphenyls (PCBs) If used by local community as a source of drinking water to also test against GOB drinking water standards (full	grievance received during construction	grievance received during construction. Daily during infill and piling works adjacent to waterbodies using handheld meter for pH, turbidity, TDS, TSS and DO	laboratory (physical, chemical, and bacteriological tests). Record details as required by the EC.	to the project (see Appendix X – Applicable Standards for EMP) or no increase above baseline if already exceeded.	contractor and - to report in EMR to ADB and DOE	checking compliance	report to PMU	- Part of contract cost, include costs of implementing EMoP as BOQ line

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
suite of parameters mentioned in Appendix X)								
Soil: pH, Texture Organic Contents, Lead (Pb), Copper (Cu), Chromium (Cr), Cadmium (Cd), Polychlorinated Biphenyls (PCBs)	All substation sites with earthworks/cut and fill, and piling works	Ongoing throughout construction, monthly reporting of records kept by the contractor Semi-Yearly laboratory test is required.	Keep records of earthworks involved, including total volume in m3 of soil excavated and reused (any disposed of as spoil off site to licensed waste disposal facilities recorded as per waste generation)	Earthworks documented, and all excavated and cut and fill volumes accounted for, either reused on-site or disposed of off-site to licensed waste disposal facilities	PMU to - ensure record keeping by contractor and - to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to keep records and report to PMU in monthly progress reports	- Part of contract cost, include costs of implementing EMoP as BOQ line
Health and Safety: operational drinking water supplies	All sources that will be developed for use as an operational drinking water supply as part of substation construction (pre- and post-treatment samples are to be taken)	Once on commissioning and prior to handover of substation to PGCB to confirm operational substation meets drinking water quality standards	Water sample is to be taken in a clean, non-contaminated, well- sealed container and tested within the next 48h. Drinking water quality tests against Bangladesh drinking water standards by accredited laboratory (physical, chemical, and bacteriological tests including arsenic levels) per (Appendix X).	Drinking water provided for operational substations meets national drinking water standards or appropriate level of water treatment is incorporated into the project design	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Water quality tests by accredited laboratory. - Part of contract cost, include costs of implementing EMoP as BOQ line

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
			Record details as required by the EC.					
Health and safety: electromagnetic field (EMF)	Substation sites	- Substation boundary and adjacent to electrical equipment - Once on commissioning and prior to handover of substation to PGCB to confirm operational substation meets EMF reference levels	EMF levels to be monitored using professional, calibrated portable monitoring devices	No exceedance of ICNIRP reference levels	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Portable but professional, calibrated EMF detector - Part of contract cost, include costs of implementing EMoP as BOQ line
Health and safety/physical cultural resources: condition surveys in relation to property damage	Adjacent properties at risk (ongoing survey of properties flagged at risk during pre-construction)	- Ongoing throughout construction, daily site checks and additional monitoring of condition as per the recommendation of the pre-construction surveys - Once on commissioning and prior to handover of substation to PGCB to confirm no residual damage occurred	- Ongoing photographic and/or structural condition surveys of existing property condition including utilities, structures, drains etc. - Structural condition monitoring of properties at risk as recommended during the pre-construction surveys	- Damages to property avoided but if caused, to be paid for by the contractor. - National Building Code to be referred to in relation to ensuring structural safety of property during works.	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	Part of contract cost, include costs of implementing EMoP as BOQ line
Operation and Maintenance								

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
GHG emissions: SF6 leakage	All substations	Daily checks and record keeping during O&M	Record of all SF6 leakage and any SF-6 related maintenance activities in substations	Leakage <0.1% and records of undertaking a regular maintenance	- PGCB substation in-charge (supported by third party if needed) to undertake monitoring and report monthly to the ESU - PGCB ESU to report to ADB	NA	Contractor to supply monitoring equipment for use by PGCB SS in-charge during O&M	- Portable but professional, calibrated SF6 leakage detector, to be provided by the contractor one per substation / include for equipment provision as a BOQ line - PGCB O&M budget
Wastewater discharge: pH, BOD5, COD, TDS, TSS, DO, NH3-N, PO4, Turbidity, Odor, Chloride, Total Coliform (TC), Ammonia-Nitrogen, Oil & Grease,	All substations not connected to existing sewerage system, substations having septic tank with soak away	Semiannually or as may be required by DOE during O&M	- Treated water sample is to be taken in a clean, non-contaminated, well- sealed container and tested within the next 48h. Water quality tests against Bangladesh drinking water standards by accredited laboratory (physical, chemical, and bacteriological tests)	No pollution incident affecting surface or groundwater quality and compliance with effluent discharge standards to be applied to the project (see Appendix X, and ECP 3)– Applicable Standards for EMP) or no increase above	PGCB ESU to appoint third-party laboratory to undertake monthly testing and report the results to ADB.	NA	NA	- Water quality tests by accredited laboratory. - PGCB O&M budget

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
Polychlorinated Biphenyls (PCBs)			- Record details as required by the EC.	baseline if already exceeded.				
Health and safety: drinking water supplies	All substations	Monthly testing or reporting of records kept	- Water sample is to be taken in a clean, non-contaminated, well- sealed container and tested within the next 48h. Drinking water quality tests against Bangladesh drinking water standards by accredited laboratory (physical, chemical, and bacteriological tests including arsenic levels) where a surface or groundwater drinking water supply was provided by the contractor or sources where supplier is unable to provide water quality test results. - Alternatively, documentary evidence that drinking water meeting national standards is being imported for O&M workers consumption.	Drinking water provided for operational substations meets national drinking water standards or appropriate level of water treatment is being maintained	Substation manager to keep records and report to ESU in monthly progress reports PGCB ESU to appoint third-party laboratory to undertake monthly testing and report the results to ADB.	NA	NA	- Water quality tests by accredited laboratory. - PGCB O&M budget

New Substations and Bay Extensions at Existing Substations								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
			- Record details as required by the EC.					
Health and safety: electromagnetic field (EMF)	All substations	Semiannually or as may be required by DOE during O&M Daily checks and record keeping during O&M for workers in close contact with EMF	- EMF levels to be monitored using professional, calibrated portable monitoring devices - Continuous checks for substation workers in close contact with EMF through use of personal EMF monitor carried by workers at all times while working on or near live electrical equipment	No exceedance of ICNIRP reference levels and records of EMF checking	- PGCB substation manager (supported by third party if needed) to undertake monitoring and report monthly to the ESU - PGCB ESU to report to ADB.	NA	Contractor to supply monitoring equipment for use by PGCB substation manager and staff during O&M	- Portable but professional, calibrated EMF detector, to be provided by the contractor one per substation along with personal EMF radiation exposure monitoring equipment for substation workers / include for equipment provision as a BOQ line - PGCB O&M budget

12.8.3 Part 3- Transmission Lines/LILO Lines

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	Location	Time/Frequency/ Duration	Method of Measurements	Performance Standard / Quantitative Targets	Responsibilities			Equipment and Monitoring Cost (Million BDT)
					PMU	SIC	Contractor	
Detailed Design and Pre-Construction Phase								
Ecology	ROW and any temporary facility areas used	Once prior to construction – baseline monitoring prior to the start of any activity onsite	Ecological survey along ROW and any temporary facility areas used to include presence flora and fauna (include avifauna) and tree enumeration (numbers, species, size etc.)	No net loss of biodiversity following construction. Only types of habitats and number of trees documented in IEE are lost, any trees lost are compensated for, 1:3 replacement with native tree species in suitable alternative location as per Tree Plantation Plan, Target: 100% survival rate. No damage to other habitats/trees/vegetation outside the ROW.	- Ensure survey undertaken by contractor - Report in EMR to ADB and DOE	SIC to supervise survey in the field and support PIU in checking compliance	Contractor to undertake survey and report to PIU	- Ecological survey by qualified and experienced ecologists - Part of contract cost, include costs if implementing EMP as BOQ line.
	Pekua transmission lines entire length, Paikgacha transmission line entire length, selected locations along with TLs as per EMP	Once prior to construction – baseline monitoring prior to the start of any activity onsite (after the contractors are mobilized)	- Migratory Ornithology survey including point counts and vantage points (sufficient number to cover survey length, following Scottish Natural Heritage method[87] or similar to obtain flight line and height information) on a monthly basis from October to March of the transmission line route	No net loss of biodiversity following construction.	- Ensure survey undertaken by contractor - Report in EMR to ADB and DOE	SIC to supervise survey in the field and support PMU in checking compliance	Contractor to undertake survey and report to PMU	- Bird survey by qualified and experienced ornithologists - Part of contract cost, include costs if implementing EMP as BOQ line.
Air Quality:	Nearest sensitive	Once prior to construction –	- To be measured as 1-hour and 24- hour	Compliance with ambient air quality standards to be applied to	PMU to	SIC to support PMU in	Contractor to undertake	- Professional, calibrated, portable

[87] https://www.nature.scot/doc/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
PM10, PM2.5, SOX, NOX, CO & Pb	receptor within 500 m of towers	baseline monitoring prior to the start of any activity onsite.	averages along with meteorological data-temperature humidity, wind speed, and wind direction-during the dry season. - Record details as required by the EC.	the project (see Appendix X, and ECP 10– Applicable Standards for EMP) or no increase above baseline if already exceeded	- ensure monitoring undertaken by contractor - report in EMR to ADB and DOE	recruitment ensuring that ai quality monitoring is carried out	measurements and report to PMU	outdoor air quality monitoring sensors to be used. - Part of contract cost, include costs of implementing EMoP as BOQ line
Noise level: dB(A)	Nearest sensitive receptor within 500m of towers	Once prior to construction – baseline monitoring prior to the start of any activity onsite.	1hr LAeq over a 48-hour period including workday and weekend using professional, calibrated portable monitoring devices. Noise levels to be measured outdoors in free field conditions. Record details as required by the EC.	Compliance with ambient noise standards to be applied to the project (see Appendix X, and ECP 11– Applicable Standards for EMP) or <3dBA increase above baseline if already exceeded	PMU to - ensure monitoring undertaken by contractor - report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	Portable, professional, real-time calibrated Type 1 or 2 sound level meter meeting all appropriate IEC standards to be used with a tripod. - Part of contract cost, include costs of implementing EMoP as BOQ line
Water quality Surface Water Quality: pH, BOD5, COD, TDS, TSS, DO, NH3-N, PO4, Turbidity, Odor, Chloride, Total Coliform (TC), Ammonia-Nitrogen, Oil &	Nearest surface waterbodies and groundwater sources (wells) unless >100m distant from the towers	Once prior to construction – baseline monitoring prior to the start of any activity onsite	- Water sample is to be taken in a clean, non-contaminated, well-sealed container and tested within the next 48h. Water quality tests by accredited laboratory (physical, chemical, and bacteriological tests) - Record details as required by the EC.	No pollution incident affecting surface or groundwater quality and compliance with ambient water quality standards to be applied to the project (see Appendix X, and ECP 3– Applicable Standards for EMP) or no increase above baseline if already exceeded.	- ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Water quality tests by accredited laboratory. - Part of contract cost, include costs of implementing EMoP as BOQ line

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
Grease, Polychlorinated Biphenyls (PCBs) Ground Water/Drinking Water Quality: pH, Mn, Fe, As, Electrical Conductivity (EC), Chloride (Cl), Total Coliform (TC), Fecal Coliform (FC), Turbidity, Odor, Polychlorinated Biphenyls (PCBs) If used by local community as a source of drinking water to also test against GOB drinking water standards (full suite of parameters)								
Soil quality: pH, Texture Organic Contents, Lead (Pb), Copper (Cu),	For towers in existing substations	One time for baseline establishment prior to the start of any activity onsite	Soil samples to be taken from ROW at various locations at surface and at depth in clean, non-contaminated, well-sealed	- No soil contamination was present prior to construction work. If present this is to be treated as an unanticipated impact and contaminated land	- ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in	Contractor to undertake measurements and report to PMU	- Soil quality tests by accredited laboratory.

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	Location	Time/Frequency/ Duration	Method of Measurements	Performance Standard / Quantitative Targets	Responsibilities			Equipment and Monitoring Cost (Million BDT)
					PMU	SIC	Contractor	
Chromium (Cr), Cadmium (Cd), Polychlorinated Biphenyls (PCBs)			containers and tested within the next 48h following international good practice for contaminated land investigation.[88] Soil quality tests by accredited laboratory to include pH, Texture Organic Contents, Lead (Pb), Copper (Cu), Chromium (Cr), Cadmium (Cd), Polychlorinated Biphenyls (PCBs)and any other contaminants indicated by contaminated land professional	remedial action plan developed and implemented by the contractor before the start of any other on-site activity. - No pollution incident affecting soil quality and compliance with soil quality standards to be applied to the project e.g., international good practice guidelines.[89]		checking compliance		- Part of contract cost, include costs if implementing EMP as BOQ line.
Health and Safety: operational drinking water supplies	All sources that will be developed by contractor for use as an operational drinking water supply	One time for baseline establishment prior to the start of any activity onsite	Water sample is to be taken in a clean, non-contaminated, well- sealed container and tested within the next 48h. Drinking water quality tests against Bangladesh drinking water standards by accredited laboratory (physical, chemical, and	Drinking water provided for operational substations meets national drinking water standards or appropriate level of water treatment is incorporated into the project design	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Water quality tests by accredited laboratory. - Part of contract cost, include costs of implementing EMoP as BOQ line

[88] There are various good practice guidelines that can be followed, such as: https://www.health.vic.gov.au/sites/default/files/migrated/files/collections/policies-and-guidelines/h/hs680_land_contam--pdf.pdf

[89] There are various soil quality guidelines that can be followed to determine if land is contaminated such as those from Australia: https://www.nepc.gov.au/nepms/assessment-site-contamination/toolbox

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
			bacteriological tests including arsenic levels) per Appendix X, and ECP 3.					
Health and safety/physical cultural resources: condition surveys in relation to property damage from construction	Detailed ROW surveys of all properties located immediately adjacent (including informal settlements) where piling works are being required,	One time for baseline establishment prior to the start of any activity onsite	- Photographic and/or structural precondition surveys of existing - property condition including utilities, structures, drains etc. Risk - assessment of potential damage to structures and additional - recommendations for structural and vibration monitoring condition where there is a risk of property damage	- Damages to property avoided but if caused, to be paid for by the contractor. - National Building Code to be referred to in relation to ensuring structural safety of property during works.	PMU to - ensure surveys undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise surveys in the field and support PMU in checking compliance	Contractor to undertake surveys and report to PMU	Part of construction cost, include costs of implementing EMP as BOQ line.
Construction Phase								
Ecology Conservation	ROW and any temporary facility areas used	- Ongoing throughout construction, monthly reporting of records kept by the contractor. - Ecological survey once on commissioning	- Upon commissioning ecological survey of substation site and any temporary facility areas used to include presence flora and fauna and tree enumeration (numbers, species, size etc.) - Keep records of all compensatory tree	No net loss of biodiversity following construction. Only types of habitats and number of trees documented in IEE are lost, including minimum number of trees, any trees lost are compensated for, 1:3 replacement with native tree species in suitable alternative	PMU to - ensure record keeping by contractor and - to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to undertake surveys, keep records and report to PMU in monthly progress reports	Ecological survey by qualified and experienced ecologists Part of contract cost, include costs of implementing EMoP as BOQ line

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	Location	Time/Frequency/ Duration	Method of Measurements	Performance Standard / Quantitative Targets	Responsibilities			Equipment and Monitoring Cost (Million BDT)
					PMU	SIC	Contractor	
		and prior to handover of Line to PGCB	plantation undertaken (numbers, species, size etc.) including survival and replacement of trees during defect liability period	location,[90] 100% survival rate. No damage to other habitats/trees/vegetation outside the substation.				
	- Pekua and transmission lines entire length, Paikgacha transmission line entire length	Upon commissioning monthly during defects liability period and prior to handover of TL to PGCB	- Point count, vantage points and monthly carcass survey during the 1.5 year defects liability period of entire transmission line using internationally recognized survey methodology agreed with ADB during the defect liability period. Methodology to refer to IFC guidelines on carcass monitoring[91]	- No net loss of biodiversity following construction compared to baseline survey reported in the IEE.	PMU to - ensure record keeping by contractor and to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to undertake surveys, keep records and report to PMU in monthly progress reports	- Bird and carcass survey by qualified and experienced ornithologists - Part of contract cost, include costs of implementing EMoP as BOQ line
Air Quality: PM10, PM2.5, SOX, NOX, CO & Pb	- Nearest sensitive receptor within 500 m of towers - Additional locations at	Quarterly during active construction as requested by PMU/SIC in event of visible dust pollution or grievance	- To be measured as 1-hour and 24- hour averages along with meteorological data-temperature humidity, wind speed, and wind	- No exceedance of ambient air quality standards (see Appendix X, and ECP 10) – Applicable Standards for EMP) or no worsening if already exceeded (as per the baseline)	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Professional, calibrated, portable outdoor air quality monitoring sensors to be used.

[90] Tree plantation to be done by contractor considering native plant species as appropriate for the substation site in the vacant spaces to be kept as per BNBC 2020 – if there is not space at the substation then a suitable site in the neighborhood is to be identified for this tree plantation to be completed.

[91] https://www.ifc.org/en/insights-reports/2023/bird-bat-fatality-monitoring-onshore-wind-energy-facilities

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
	request of PMU/SIC in the event of visible dust pollution or grievance received during construction.	received during construction.	direction-during the dry season. - Record details as required by the EC.					- Part of contract cost, include costs of implementing EMoP as BOQ line
Noise level: dB(A)	- Nearest sensitive receptor within 500 m of towers. Additional locations at request of PMU/SIC in the event of noise pollution concerns or grievance received during construction	- Monthly during active demolition and construction involving noisy activities such as piling, and then as requested by PMU/SIC in event of noise pollution concerns or grievance received during construction.	- 1hr LAeq over a 48-hour period including workday and weekend using professional, calibrated portable monitoring devices. Noise levels to be measured outdoors in free field conditions. - Record details as required by the EC.	No exceedance of ambient noise standards (see Appendix X, and ECP 11) – Applicable Standards for EMP) or <3dBA increase if already exceeded (as per the baseline)	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Portable, professional, real-time calibrated Type 1 or 2 sound level meter meeting all appropriate IEC standards to be used with a tripod. - Part of contract cost, include costs of implementing EMoP as BOQ line
Water quality Surface Water Quality: pH, BOD5, COD, TDS, TSS, DO,	- Nearest surface waterbodies and groundwater	Quarterly during active construction involving earthworks, and then only required	Water sample is to be taken in a clean, non-contaminated, well- sealed container and tested within the next 48h. Water	No pollution incident affecting surface or groundwater quality and compliance with ambient water quality standards to be applied to the project (see	PMU to - ensure monitoring undertaken by contractor and	SIC to supervise measurements in the field and support PMU in	Contractor to undertake measurements and report to PMU	- Water quality tests by accredited laboratory.

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
NH3-N, PO4, Turbidity, Odor, Chloride, Total Coliform (TC), Ammonia-Nitrogen, Oil & Grease, Polychlorinated Biphenyls (PCBs) Ground Water/Drinking Water Quality: pH, Mn, Fe, As, Electrical Conductivity (EC), Chloride (Cl), Total Coliform (TC), Fecal Coliform (FC), Turbidity, Odor, Polychlorinated Biphenyls (PCBs) If used by local community as a source of drinking water to also test against GOB drinking water standards (full suite of	sources (wells) unless > 100m distant from the towers. - Additional locations at request of PMU/SIC in the event of water pollution concerns or grievance received during construction	if requested by PMU/SIC in event of water pollution concerns or grievance received during construction. Daily during infill and piling works adjacent to waterbodies using handheld meter for turbidity etc.	quality tests by accredited laboratory (physical, chemical, and bacteriological tests). Record details as required by the EC.	Appendix X, and ECP 3– Applicable Standards for EMP) or no increase above baseline if already exceeded.	- to report in EMR to ADB and DOE	checking compliance		- Part of contract cost, include costs of implementing EMoP as BOQ line

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	**Location**	**Time/Frequency/ Duration**	**Method of Measurements**	**Performance Standard / Quantitative Targets**	**Responsibilities**			**Equipment and Monitoring Cost (Million BDT)**
					PMU	**SIC**	**Contractor**	
parameters mentioned in Appendix X)								
Soil: pH, Texture Organic Contents, Lead (Pb), Copper (Cu), Chromium (Cr), Cadmium (Cd), Polychlorinated Biphenyls (PCBs)	All TL/LILO construction sites with earthworks/cut and fill, and piling works	Ongoing throughout construction, monthly reporting of records kept by the contractor Semi-Yearly laboratory test is required.	Keep records of earthworks involved, including total volume in m3 of soil excavated and reused (any disposed of as spoil off site to licensed waste disposal facilities recorded as per waste generation)	Earthworks documented, and all excavated and cut and fill volumes accounted for, either reused on-site or disposed of off-site to licensed waste disposal facilities	PMU to - ensure record keeping by contractor and - to report in EMR to ADB and DOE	SIC to supervise contractor and support PMU in checking compliance	Contractor to keep records and report to PMU in monthly progress reports	- Part of contract cost, include costs of implementing EMoP as BOQ line
Health and safety: electromagnetic field (EMF)	Construction sites for towers/lines	- Camps and adjacent to electrical equipment - Once on commissioning and prior to handover of site to PGCB to confirm operational line meets EMF reference levels	EMF levels to be monitored using professional, calibrated portable monitoring devices	No exceedance of ICNIRP reference levels	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in checking compliance	Contractor to undertake measurements and report to PMU	- Portable but professional, calibrated EMF detector - Part of contract cost, include costs of implementing EMoP as BOQ line
Health and safety/physical cultural resources: condition surveys	Adjacent properties at risk (ongoing survey of properties flagged at risk	- Ongoing throughout construction, daily site checks and additional monitoring of	- Ongoing photographic and/or structural condition surveys of existing property condition including	- Damages to property avoided but if caused, to be paid for by the contractor. - National Building Code to be referred to in relation to	PMU to - ensure monitoring undertaken by contractor and - to report in EMR to ADB and DOE	SIC to supervise measurements in the field and support PMU in	Contractor to undertake measurements and report to PMU	Part of contract cost, include costs of implementing EMoP as BOQ line

Transmission Lines, LILO and Reconductoring of Existing Line								
Environmental Parameters to be Monitored	Location	Time/Frequency/ Duration	Method of Measurements	Performance Standard / Quantitative Targets	Responsibilities			Equipment and Monitoring Cost (Million BDT)
					PMU	SIC	Contractor	
in relation to property damage	during pre-construction)	condition as per the recommendation of the pre-construction surveys	utilities, structures, drains etc. - Structural condition monitoring of properties at risk as recommended during the pre-construction surveys	ensuring structural safety of property during works.		checking compliance		

12.9 Supervision, Monitoring and Reporting Arrangements

857. PGCB will submit environmental monitoring reports to ADB on a semi-annual basis up until the completion of construction and on an annual basis during operation, within 15 days from the end of each reporting period i.e., June and December. A template update of IEE report is included in Appendix XI. Submission of environmental monitoring reports will be required from loan effectivity. In between, PGCB will submit quarterly progress reports including an update on environment safeguards implementation following the template in the PAM.

858. The Contractor's EHS management team will establish their own internal systems for supervising, monitoring and reporting their EMP implementation. During the design, pre-construction and construction phases, contractors shall prepare and submit monthly EHS progress reports per an agreed template to the PMU of PGCB which will form part of their quarterly progress reports and the quarterly progress and semi-annual monitoring reports to be submitted to ADB by PGCB. The monthly EHS progress reports shall indicate any design changes made by the Contractor from the project as assessed in the IEE, and the Contractor's performance (including the performance of all their sub-contractors and any third parties) during pre-construction and construction regarding environmental safeguards implementation. The Contractor will also attend monthly meetings convened by PGCB to discuss EHS issues and establish a H&S Committee including worker representation who will also meet on a monthly basis.

859. The environmental monitoring reports of PGCB will describe the physical progress of the project, any scope or design changes, compliance with the loan covenants with regard to safeguards, implementation of mitigating measures described in the EMP, quantitative monitoring data and analysis, GRM implementation, and any noncompliance issue and corresponding corrective actions. Once cleared by ADB's environment specialists, the monitoring reports will be posted on ADB's website as required by its Safeguard Policy Statement (2009) and ADB's Access to Information Policy and disclosed by PGCB on its website and locally to the communities through notices boards, leaflets, brochures, or handouts.

860. In the event of any unanticipated environmental impacts including location, route, design or scope changes during implementation, or if monitoring identifies a breach of performance standards that should be complied with by PGCB and/or their Contractors, Contractors must inform PGCB if they are the ones to become aware of such a situation. PGCB will immediately need to inform ADB, assess the significance of such impacts, evaluate the options available to address the unanticipated impact, and submit to ADB a time-bound and budgeted corrective action plan or updates in the IEE/EMP for review and clearance as required.

861. Complete photographic records and documentary records will be kept by the Contractors covering all activities on the construction site as well as key locations such as receptors adjacent to substations, off-site access roads, construction stores, sanitation and welfare facilities, labor camps, or overnight accommodation etc. Photographs and condition surveys of all key locations will be taken prior to construction activities beginning, to provide the environmental baseline. Copies of all geo-referenced photographs/condition surveys will be submitted to the PMU along with the contractor's monthly EHS progress report. Specifically, the Contractor will be responsible for the documents and reports in Table 12.6. Documentation and records to be kept by all parties in hard copy as well as electronic format are as follows (not an exclusive list):

- Definitive IEE and EMP (as disclosed on the ADB website)
- Legal register (of all applicable national legislation
- National environmental clearance (EC) documentation
- Tree felling permits, vehicle emission test certificates etc.
- Training plan and training records with attendance records and photographs of the trainings
- Stakeholder engagement plan and records of all consultations undertaken with photographs and attendance records

- Records of emergency preparedness and response drills with photographs and attendance records
- Document review and approval records
- CSEMPs/H&S Plans and sub-plans and copies of approval records
- Contractor (subcontractor) certifications and insurances
- Contractor (subcontractor) worker records including documentation of working hours
- Completed site checklists and photographic records
- Non-compliance notifications and corrective action instructions
- Contractor and operational accident record and incident reports
- GRM register

862. PGCB and their contractors will facilitate DOE and ADB to carry out the following monitoring actions to supervise project implementation:

- Conduct periodic site visits during the project implementation to confirm compliance with the national environmental clearance, ADB's Safeguard Policy Statement 2009, the project's loan covenants and EMP requirements.
- Review and comment on the periodic Environmental Monitoring Reports (EMRs) submitted to ensure that adverse impacts and risks of the project are mitigated as was planned and agreed with DOE and ADB, that any corrective actions required have been duly implemented, and that the GRM is fully functional. Sample EMR report is attached in Appendix VII.
- Work with PGCB to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the loan agreement, and exercise remedies to re-establish compliance as appropriate.
- Prepare a project completion report that assesses whether the objective and desired outcomes of the EMP have been achieved, considering the baseline conditions, and monitoring results.

863. For this purpose, PGCB and their contractors will provide DOE and ADB with access to the project site and all requested information on the project. For any ADB supervision missions PGCB or their contractors will provide all ADB staff with a project site health and safety induction and adequate PPE in accordance with Table 2.7.1 of the IFC EHS General Guidelines - Occupational Health and Safety Section and ILO Code of Practice on Safety and Health in Construction.

Table 12.6: Main Documents Required from PGCB and Contractor

Documents	Originator	Destination of the documents	Submission Timing		
			Design and pre-construction period	Construction period	Operation period
Bid and contract documents including EMP requirements	PGCB	ADB	X (Once, prior to the issue and on award)		
Training Plan	SIC	PGCB	X (Once, prior to the design approval)		
Stakeholder Engagement Plan	SIC	PGCB	X (Once, prior to the design approval)		
Health and Safety Risk Assessment	Contractor	PMU and SIC (ESU)	X	X (at minimum annually updated and upon commissioning for handover to PGCB)	

Documents	Originator	Destination of the documents	Submission Timing		
			Design and pre-construction period	Construction period	Operation period
Ecology survey and Pre-construction baseline monitoring reports	Contractor	PMU and SIC (ESU)	X (Once, prior to the start of construction)		
Updated IEE for route alignments and bird survey results	PGCB	ADB	X (Once, prior to the design approval)		
Final design for approval	Contractor	PMU and SIC	X (Once, prior to the start of construction)		
CSEMP, H&S including other subplans for approval (including subplans)	Contractor	PMU and SIC (ESU)	X (Once, prior to the start of construction)	X (Updated through construction as needed/reviewed monthly)	
Environmental, health and safety checklists including worker accommodation	Contractor	PMU and SIC (ESU)		X (Every week, to be completed daily)	
Environmental, health and safety checklists including worker accommodation	SIC	PMU (ESU)		X (Weekly checks of active construction sites, at least monthly visits to each contract package)	
Monthly EHS progress reports including EMoP results and records and record of monthly training and daily toolbox training plus incident records and grievances	Contractor	PMU and SIC (ESU)	X (Every month)	X (Every month)	
Monthly EHS progress reports on status of EMP implementation and observations from site visits, minutes of site EHS meetings, incident records, grievances etc.	SIC	PMU (ESU)	X (Every month)	X (Every month)	
Lost time and fatality incident reports	Contractor PGCB O&M	PMU and SIC (ESU) Onward Submission to ADB		X (24 hours)	)
Environmental Monitoring Report	PMU (ESU)	ADB	X Semi-annually from loan effectiveness	X Semi-annually until PCR issued	
Completion Report	PMU (ESU)	ADB			X

12.10 Implementation Arrangements

12.10.1 Government of Bangladesh

864. The Ministry of Power, Energy and Mineral Resources (MPEMR) is the main Project coordinating body on behalf of government. In addition, the DOE plays the role of environmental regulator - granting and enforcing environmental clearance for the project.

12.10.2 PGCB's Management, PMU, and O&M Staff

865. The overall responsibility for environmental and social performance of the project, implementation of the EMP and approving the detailed designs, CSEMP, H&S Plan, and subplans will rest with PGCB. PGCB has already established a dedicated PMU to lead Project implementation. The PMU is headed by a Chief Engineer (Project Director) with 2 Superintending Engineers (Deputy PD), 4 Executive Engineers, 5 Subdivision Engineers, 5 Assistant Engineers and 20 Sub Assistant Engineers. PMU. Each contract package will have a team of engineers assigned to it for full time supervision, including day to day supervision of environment, health and safety with support of ESU and SIC. A key role of the PMU is to supervise and monitor environmental safeguards compliance and report to ADB. On commissioning of the project components these will be turned over to PGCB O&M staff to operate and maintain. PGCB O&M workers will need to abide, in their behaviour and work, to directives issued by their employer with regards to environmental, health and safety management.

12.10.3 PGCB's Environment and Social Unit (ESU)

866. The Environment and Social Unit (ESU), comprising of 4 qualified environmental staff, who address both environment and social safeguards, will assist the PMU on issues related to environmental and social management and supervise the Safeguards Implementation Consultant and contractors. The ESU will review the regular monthly progress reports of the contractor and SIC on EMP compliance, to be sent to the Project Director of the Project Management Unit (PMU) throughout the construction period. They will also review the semiannual environmental monitoring reports produced by the SIC during construction and be responsible for preparing the annual environmental monitoring reports once operational for submission to ADB.

867. Safeguards Implementation Consultants will support PMUPMU and ESU to supervise and monitor the construction contractors in order to ensure design compliance and quality assurance of the construction activities. The Safeguards Implementation Consultants, comprising of environmental and social development specialists along with gender specialist, will also supervise the contractors for CSEMP and H&S Plan implementation.

868. The contractors in turn will also have environmental, health & safety (EHS) officers and ecologists (as needed) who will be tasked to first develop CSEMP and H&S Plan in accordance with the present ESMP and then responsible for its implementation during construction activities. The ESU will support the PMU to approve these plans.

869. Capacity development will be required to build up the environmental and social management capabilities of the PMU and ESU with help from ADB TA consultants, funded under the capacity building component of the Project.

870. Specifically, for this project, the ESU staff will be delegated to work as part of the PMU (reporting to PD) to support EMP implementation, supervision, monitoring and reporting. A key role of the ESU (E&S Officer) will also be to manage the Grievance Redress Mechanism (GRM) at project level on behalf of the PMU. The ESU Manager will be given authority to instruct the PMU and be given delegated authority to instruct the Contractor to undertake corrective action in relation to any lapses in compliance with national laws and regulations or the EMP implementation.

871. The ESU will assist the PMU on issues related to environment, health and safety, labor and social

management and work together with the SIC and Contractors' EHS staff. Contractors will submit progress reports on environment, health and safety and social issues to the PMU monthly during the pre-construction and construction period. The ESU technical staff and SIC will review them and report any issues to the PMU, compile quarterly environment safeguards implementation updates to be shared with the ADB through the quarterly progress reports, as well as preparing the semi-annual environmental monitoring reports with SIC on behalf of PMU up to the end of construction and then on an annual basis during the operation phase.

872. The ESU will provide facilitation support to the SIC in providing environmental training to the PMU staff and contractors responsible for implementing the EMP during the construction phases of the project.

12.10.4 Safeguards Implementation Consultant (SIC)

873. The PMU will engage a Safeguards Implementation Consultant (SIC) to supervise the construction contractors to ensure compliance with Safeguards documentation – IEE/EMP, CSEMP, H&S Plan and other sub-plans while adhering to detailed design standards and to assure the quality of the construction activities. The SIC will also support with updating of the IEE in response to final route alignments of the contractor before works can be started.

874. The SIC will also include consultants to supervise the contractors on EMP implementation. For this purpose, SIC will engage one Environmental Specialist 30 PM, one Health and Safety Specialist 30 PM, one ecologist 10 PM, one Social Development Specialist (Stakeholder Engagement and Labor) 30 PM on an intermittent basis with weekly checks undertaken. Other technical experts brought into the SIC team as required to address the EMP requirements. The Terms of Reference for SIC is attached in Appendix XIV.

12.10.5 Contractor and Subcontractors (if any)

875. The Contractor is responsible for the implementation of the EMP with supervision and monitoring by the PMU and SIC supported by the ESU staff. The requirement to undertake relevant mitigation and monitoring actions as set out in the EMP applies to the construction site as well as off-site locations such as construction stores and at any labor camps or overnight accommodation provided. The contractor is required to ensure that the EMP requirements are cascaded down to all sub-contractors undertaking works regardless they are formally or informally employed. It is recommended the EMP be included in all subcontracts and the number of subcontractors in the chain be minimized to facilitate compliance with EMP requirements.

876. All construction workers whether formally or informally employed will need to abide, in their behaviour and work, to directives issued by their employer with regards to environmental, health and safety management.

877. Contractors will have a corporate EHS policy and environmental management certification preferably ISO 14001 (or equivalent) and EHS certification such as ISO45001 or equivalent.

878. The Contractors will include the following dedicated, full-time, site-based staff on their EHS team: (i) an Environmental Officer, (ii) Health and Safety (H&S) Officer (iii) Ecologist, and (iv) a Social, Community Liaison and Labor Officer. Other technical experts brought into the EHS team as required to address the EMP requirements. In addition, the contractor will provide one EHS Supervisor for each transmission line under construction and for each substation site. This person will be based on-site full-time to ensure the health and safety of all workers and local communities. The EHS Supervisor will act as the main contact for the EHS Team and act on its advice regarding EMP implementation. If there is more than one active site of a transmission line or the construction team at a site comprises more than 50 persons, each EHS Supervisor will be supported by additional full-time, dedicated, on-site Health and Safety steward(s). There should be at least one full-time on-site supervisor/steward for each active site and construction team of up to 50 persons. For the transmission line works a suitable number of Health and Safety Steward(s) will be required depending on how the contractor undertakes the work since the workers may be more

dispersed compared to substation works. No works should be undertaken without H&S supervision. If a contractor is awarded more than one contract package, then an entirely separate EHS team is to be employed for each of them. Contractor is to also ensure their subcontractors appoint an EHS representative for each construction site.

879. The EHS Team will be tasked to develop the CSEMP, H&S Plan and subplans in accordance with the EMP and be responsible for ensuring its implementation during the construction activities, supported by sufficient numbers of 24-hour onsite EHS Supervisors/H&S stewards. During construction, the EHS team will continually update the CSEMP, H&S Plan and subplans and oversee and report to PMU on the operation of the Project EMP/CSEMP/H&S Plans throughout the contract period.

880. The Environment Officer will be the Contractor's main focal point for all environmental, social, health and safety issues associated with the Project. They will be a suitably qualified and experienced full-time member of staff and must be on site at least five days per week with an alternative available during periods of annual or sick leave of more than 1-2 days. The required qualifications of the role of Environment Officer are as follows:

- BSc and MSc degree in environmental sciences or related subject.
- At least 15 years of experience in environmental assessment and management planning including for electrical infrastructure projects
- At least 10 years of on-site environment supervision, including experience of EMP implementation on at least five construction/electrical infrastructure projects of a similar type, location, size and scale
- Experience of pollution control including oil, PCB and SF6 management.

881. Specifically, the Environment Officer shall be responsible for the following:

- Identifying any areas of environmental sensitivity to be avoided with the support of field ecologists.
- Translate mitigation requirements written in the ECC/Project EMP/CSEMP/H&S Plans and its sub-plans into practical measures on the ground.
- Ensure that all contractor management, subcontractor management, and construction workers are fully aware of the environmental sensitivities of the sites and their responsibilities, as outlined in the Project EMP/CSEMP/H&S/ECC (e.g., through back-to-back contract provisions, formal induction and training provision, daily toolbox talks ahead of construction works etc.).
- Supervise construction works with regular site walkovers and spot-checks (audits) of compliance, take field notes and photographs to demonstrate compliance or non-compliance with the Project EMP/CSEMP/H&S plans and its sub-plans/ECC.
- Participate in monthly meetings with the PMU, SIC and ESU to discuss EMP implementation progress and any EHS concerns,
- Coordinate completion of quantitative environmental monitoring in accordance with the EMoP requirements.
- Maintain environment records e.g., training records, EMoP results, waste records etc.
- Act as the contractor's GRM focal person to keep affected persons informed of works and be available to receive and deal with any grievances at the project site level. The H&S and Social, Community Liaison and Labor Officers will help with managing all social and labor related grievances. They will also act as the GRM focal person for workers receiving and recording grievances in the logbook.
- Prepare weekly environmental checklists and monthly EHS progress reports that shall be submitted to PMU (ESU) for review. The SIC will provide a template of the checklist to the contractor, the monthly reports will also include general progress with the project and EMP implementation with photographs, regular site visits and spot checks (audits) undertaken, training provided, environmental incidents, e.g., spills of liquids, health and safety incidents, progress with any environmental initiatives, e.g., energy savings, recycling, community

awareness etc., records of any environmental monitoring, conclusions and recommendations (corrective action), impacts on unanticipated changes in projects etc.

882. The qualifications for the H&S Officer are:

- BSc and MSc degree in health and safety or related subject.
- National Examination Board in Occupational Safety and Health (NEBOSH) or Institution of Occupational Safety and Health (IOSH) certification or similar.
- At least 10 years of experience in health and safety risk assessment and management planning including for electrical infrastructure projects
- At least at least 5 years on-site H&S supervision experience including risk assessment and management planning for at least five construction/electrical infrastructure projects of similar type, location, size, and scale.

883. The main responsibilities of the H&S Manager will be:

- Facilitate H&S Risk Assessments for detailed design and for specific construction work activities.
- Produce H&S Plans for the construction work with subplans for specific construction work activities.
- Provide H&S training, including effective daily toolbox training sessions at each work site with the support of sufficient numbers of 24-hour onsite EHS Supervisors and H&S Steward(s).
- Participate in monthly meetings with the PMU, SIC and ESU to discuss EMP implementation progress and any EHS concerns,
- Establish a H&S Committee including appropriate representatives from PGCB, SIC, contractor and subcontractor management, and a representative number of construction workers and hold monthly meetings together with the Social, Community Liaison and Labor Officer to address any concerns,
- Conduct routine site inspections and issue internal stop notices, if necessary, for unsafe activities.
- Maintain H&S statistics records for near misses, as well as incidents.
- Keep records of accidents and report them accordingly with lessons learned to avoid future repeats.
- Undertake awareness raising activities to make the community aware of the H&S risks posed by the Project.
- Preparation of weekly H&S checklists and provide H&S input to the Contractor's monthly EHS progress reports.
- Support the Environment Officer as a GRM focal person for workers receiving and recording grievances in the logbook.

884. The qualifications for the Social, Community Liaison Officer are:

- BSc degree in social sciences and related expertise.
- At least 10 years of experience in stakeholder engagement
- At least at least 5 years of on-site stakeholder engagement experience including experience of construction/electrical infrastructure projects of similar type, location, size, and scale.

885. The main responsibilities of the Social, Community Liaison Officer will be:

- Produce stakeholder engagement plans for the construction work
- Develop community awareness raising materials and lead on the delivery of community awareness raising activities.
- Participate in monthly meetings with the PMU, SIC and ESU to discuss community awareness and stakeholder engagement progress and any community concerns,
- Participate in the H&S Committee and hold monthly meetings together with the H&S Officer,
- Support the Environment Officer as a GRM focal person for stakeholders receiving and recording grievances in the logbook.

886. The qualifications for the Labor Officer are:

- BSc degree in social sciences and related expertise.
- At least 10 years of experience in labor management planning
- At least at least 5 years of on-site labor management experience including experience of construction/electrical infrastructure projects of similar type, location, size, and scale.

887. The main responsibilities of the Labor Officer will be:

- Produce labor related management plans for the construction work
- Ensure management of construction workers is per national requirements with labor camps and other contractor provided accommodation meeting international good practice standards of ILO.
- Develop code of conduct and provide code of conduct training, including regular toolbox training sessions at each work site.
- Maintain labor records including copies of insurances, contracts and working hours, eligibility of construction workers for employment etc.
- Participate in monthly meetings with the PMU, SIC and ESU to discuss EMP implementation progress and any labor concerns,
- Participate in the H&S/Labor Committee and hold monthly meetings together with the H&S Officer,
- Preparation of weekly sanitation and welfare facility checklists and provide labor input to contractors monthly EHS progress reports.
- Support the Environment Officer as a GRM focal person for workers receiving and recording grievances in the logbook.

888. The qualifications for the Ecology Officer are:

- Bachelor's degree in Ecology/Zoology/Botany and ability to identify flora and fauna of Bangladesh.
- At least 10 years' experience in surveying ecology with experience in conduct of overwintering bird point counts and vantage point surveys.
- At least at least 5 years of on-site ecological supervision experience including experience of construction/electrical infrastructure projects of similar type, location, size, and scale.

889. The main responsibilities of the Ecology Officer will be:

- Conducting the ecology surveys which are the responsibility of the contractor including bird survey during appropriate periods round the year for the migratory and local birds in the project area and prepare report.
- Identifying any areas of environmental ecological sensitivity to be avoided.
- Preparing the Biodiversity Management Plan/Tree Plantation Plan.
- Ensure that all contractor staff and construction workers are fully aware of the ecological environmental sensitivities of the sites and their responsibilities, as outlined in the Project Biodiversity Management Plan/Tree Plantation Plan.
- Periodically supervise construction works with spot-checks (audits) of compliance, take field notes and photographs to demonstrate compliance or non-compliance with the BMP/Tree Plantation Plans. To issue internal stop notices to construction workers, if necessary, for unsafe activities that adversely impact sensitive ecology of the PIA.
- Participate in monthly meetings with the PMU, SIC and ESU to discuss BMP/Tree Plantation implementation progress and any concerns.

12.10.6 Institutional Arrangements and Roles and Responsibilities

890. The organogram of the PMU, including ESU, is shown in Figure 11.1 with the institutional arrangement in Figure 12.1. Table 12.7 presents the responsibilities of PGCB's PMU (ESU) as well as the SIC and construction contractor(s).

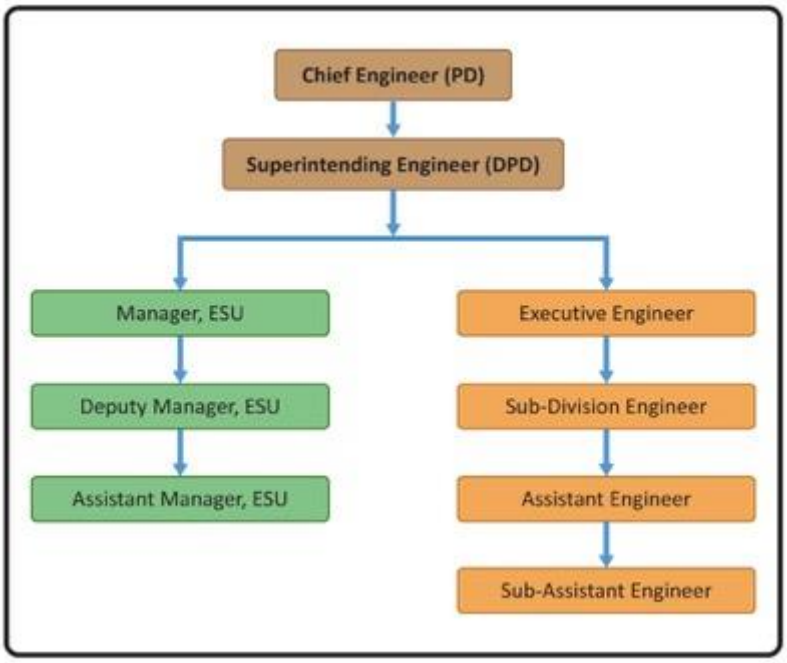

Figure 12.1: Organogram for Environmental and Social Management of Project

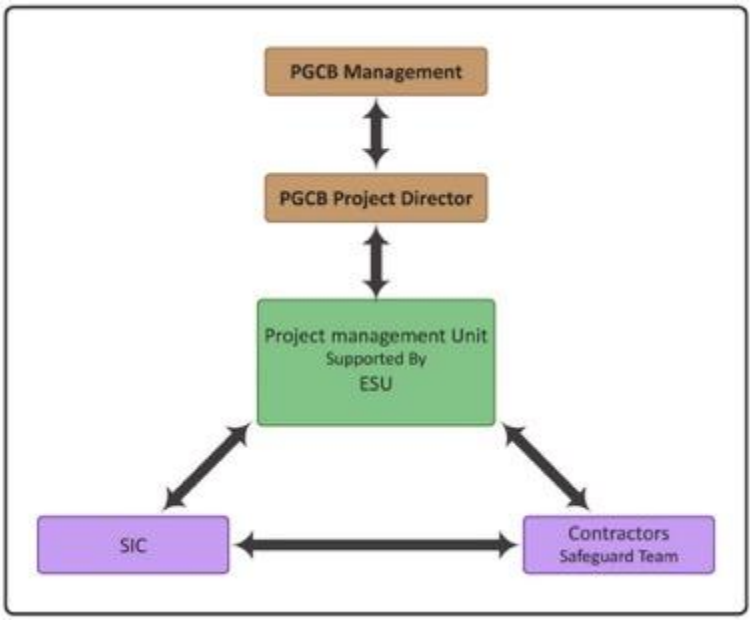

Figure 12.2: Project Implementation Organogram

891. The roles and responsibilities of the PMU, ESU, Consultant Team and contractor for the implementation and monitoring of ESMP have been outlined in the following Table.

Table 12.7: Roles and Responsibilities for EMP Implementation

Organizations	Responsibilities
PGCB Management	• Appointing ESU within PGCB to the project as a constituent part of PMU to support EMP implementation during construction and operation and expanding the staffing inside of two years of loan effectiveness. ESU staff shall be suitably qualified and experienced on environmental, social, and health and safety matters to ensure implementation of safeguards across PGCB operations. Additional staff or consultants may be engaged by the ESU full-time or intermittently, as needed to support.

Organizations	Responsibilities
	• Ensuring adequate management support, budget, staff, and other resources are allocated to satisfactorily implement, supervise, and monitor implementation of the EMP during all phases. • Ensuring that all PMU (ESU) and O&M staff support and attend all capacity development and training activities provided for them. • Adopting a zero-tolerance approach to H&S and developing and adopting systems, institutional arrangements, and guidelines (standard operating procedures) to ensure compliance with national environment, health and safety, social and labor laws and regulations and international good practice across PGCB operations and its projects. • Once operational, any contractors hired for maintenance works or decommissioning will be supervised and monitored by PGCB (ESU) with roles and responsibilities being the same as those of the contractors for the construction. • Ensure that monitoring reports (semi-annual during construction and annual during O&M phase) are submitted to ADB up until the project completion report is issued.
PMU	• Ensure effective implementation of construction of the project in accordance with the definitive EMP. Seek the support of ESU for (i) updating the national EIA for the purposes of Environmental Clearance, and (ii) updating the IEE/EMP subject to ADB review and clearance because of any location, route, design or scope changes.[92] • Ensuring adherence to all applicable national environment, health, safety, and labor laws and regulations in force at the time. • Ensuring adherence to ADB's Safeguard Policy Statement (2009), the related IFC Environment, Health and Safety (EHS), general and power transmission and distribution guidelines (2007) and the ILO Safety and Health in Construction guidelines (2022). • Recruitment and supervision of Safeguards Implementation Consultant (SIC). • Incorporating the EMP into the bidding and contract documents before issuing tenders and contract awards. • Reviewing bids to ensure they are in accordance with the EMP requirements prior to contract award. • Ensuring the IEE with at least the executive summary translated into Bangla is disclosed on the PGCB website with hard copy available at construction sites and full translation free of change into Bangla if it is requested by the public, publishing the key findings and availability through notices boards, leaflets, brochures, or handouts. • Reviewing and approving the contractor's detailed designs as well as CSEMP/H&S Plan and subplans to ensure they incorporate and are in accordance with the EMP requirements. • Implementing the EMP throughout all phases or, if responsibilities are delegated, supervising, and monitoring its implementation by the contractor with support of ESU. • Ensuring all necessary national permits and permissions, and any requirements for renewal, are complied with before the commencement of related work, maintain records with copies of all the clearances, permits, licenses, and insurances obtained. • Ensuring the contractor provides adequate training to their subcontractors and all workers including daily EHS toolbox talks and emergency response drills; suggesting topics for the training based on site observations.

[92] Per national requirement, an Environmental Impact Statement needs to be prepared to secure an Environmental Clearance Certificate. In the context of ADB SPS 2009 requirement, an IEE is required. The EIA constitutes the IEE in this document and given updates since the EC was granted will be resubmitted to DOE as part of renewing the EC for the Project.

Organizations	Responsibilities
	• Undertaking, with the support of ESU and SIC, monthly EHS meetings including site walkover inspection to determine the status of EMP implementation by the contractor during construction as well as random "spot check" site visits to audit their EMP implementation. Minutes of meetings and findings of site walkover inspections will be attached to the EMRs to be submitted to ADB. • Identifying areas for improvement, unsafe acts, and any noncompliance with the EMP by the contractor and/or PGCB staff and instructing corrective actions to be taken by them to bring implementation back on track. • Thoroughly investigating all unanticipated impacts, near-misses, incidents, and chance finds; preparing a detailed incident report where applicable, identifying and instructing on corrective actions particularly to avoid any repetition of near-misses and accidents. • Monitoring and reporting with support of ESU on EMP implementation including reporting on EMP implementation in quarterly progress reports and preparing semi-annual EMRs for submission to ADB up until the completion of construction, reverting to annual up until the ADB project completion report, or for longer period if it is required by the ADB PCR. • Reporting to ADB of any noncompliance or breaches with ADB safeguard requirements in a timely manner and take corrective actions promptly. Developing and taking all requisite corrective action in case of any noncompliance with the EMP including repair of any property damages and financial compensation (insurance) for health and safety incidents. • Reporting any unanticipated impacts, accidents, and chance finds to ADB within 48 hours of them occurring along with a corrective action plan. • Reporting immediately to ADB any grievances submitted to the GRM upon receipt.
ESU	• Supervising Safeguards Implementation Consultant Team for the implementation of ESMP. • Closely coordinate with other concerned agencies, local governments and communities to support implementation of ESMP/CSEMP • Ensure effective implementation of ESMP components not directly tasked to the contractor including components dealing with indirect, induced and cumulative effects, as well as plans and measures for O&M phase. • ESU will review the ES related reports and submit to PMU for approval.
SIC	• Appointing one environmental, one H&S, one ecologist, one social development (stakeholder engagement and labor) specialist as key team members as well as part time technical specialists such as field ecologists, to ensure adequate supervision and monitoring of the contractors and capacity development. • Providing a suite of training activities for PGCB staff and contractors in relation to awareness raising on EMP implementation. • Supporting PMU in reviewing contract documents for inclusion of EMP measures before contract award, detailed designs and CSEMP/H&S Plans in accordance with the EMP requirements. • Supervising contractors for EMP implementation and preparing monthly reports to submit to PMU. • Supporting the ESU in updating the environmental assessment, preparing inputs to quarterly progress reports, semi-annual EMRs for submission to ADB up until the completion of construction.
Contractor	• Preparation and implementation of CSEMP/H&S Plan and subplans which needs to be cleared by PMU and SIC prior to mobilization.

Organizations	Responsibilities
	• Ensuring adequate budget, staff and other resources are allocated to comply with and implement the contractor's responsibilities under the EMP and to supervise and monitor the active construction site to protect the environment and ensure the health and safety of all workers and affected communities. • Recruitment of at least one Environmental Officer, one Health and Safety (H&S) Officer, one Social, Community Liaison and Labor Officer, one ecologist, and sufficient 24-hr EHS Supervisors/H&S Steward(s) for each active construction site and construction team of more than 50 persons to be able to undertake regular on-site supervision and monitoring activities before the commencement of works. • Implementing of all measures and responsibilities allocated to the EPC Contractor under the EMP for the full duration of the contractor's involvement including maintenance period. • Ensuring adherence to all applicable national and state environment, health, safety, and labor laws and regulations in force at the time. • Ensuring adherence to ADB's Safeguard Policy Statement (2009) and the related IFC Environment, Health and Safety (EHS) general and power transmission and distribution guidelines (2007) and the ILO safety and health in construction (2022) and ILO worker accommodation guidelines. • Whilst PGCB will obtain ECC, the Contractor will be required to obtain any necessary outstanding permits and permissions before the commencement of related work. Copies of all clearances, permits, licenses, and insurances to be kept. • Ensuring the detailed design reflects the EMP requirements; seeking to ensure it has the same or no worse impact than the indicative designs which were assessed in the IEE. • Supporting PGCB to update (as required) the IEE in respect of the detailed design by providing sufficient details to inform a revised project description and any subsequent reassessment of impacts and risks. • Undertaking and documenting a facilitated health and safety (H&S) risk assessment considering for all phases. • Adopting a zero-tolerance approach to H&S on the project, enforce all workers to comply with the H&S requirements of the EMP including the wearing of appropriate PPE on the construction site. • Ensuring that all construction workers including all formal and informal employees and subcontractors understand their responsibilities to implement the EMP and mitigate environmental impacts and risks associated with pre-construction and construction activities. • Providing EHS training for subcontractors, formal and informal construction workers and other personnel as required. • Supporting PGCB in undertaking ongoing consultation and implementing the site-level GRM; in particular, the contractor's GRM Focal person shall thoroughly document details of complaints and make its best efforts to resolve the complaints at project site level; all this information is to be included in the contractor's monthly reports to PGCB. • Undertaking environmental monitoring as set out in the Environmental Monitoring Plan (EMoP) during pre-construction and construction and documenting both qualitative and quantitative monitoring results; for quantitative monitoring the contractor is to hire surveyors and accredited, and quality assured, third-party laboratories. • Participating in monthly meetings with the PMU, SIC and ESU to discuss EMP implementation progress and any EHS concerns and establishing a H&S Committee who will also meet monthly.

Organizations	Responsibilities
	• Submitting monthly environmental management reports to PGCB (monthly EMP reports will be stand-alone but included as part of the contractors' monthly progress reports) relating to the work undertaken over the reporting period and documenting the environmental measures including monitoring activities that have been carried out, problems encountered, record data including near misses and accidents, grievances received, and follow-up actions that were taken (or will be taken) to correct the problems. • Informing PGCB immediately in case of any approved detailed design changes or unanticipated environmental impacts occurring during implementation, and as required, provide any information needed to PGCB to enable them to promptly update the national EIA for Environmental Clearance or the IEE/EMP for clearance by ADB before any changes are implemented. • Informing PGCB within 24 hours in case of chance find or accident on site and providing within 48 hours an incident report with corrective action detailing how reoccurrence will be prevented. • Informing PGCB immediately in case of any non-compliance and help them to prepare as necessary a corrective action plan for clearance by ADB. Contractor is required to implement all necessary corrective action requested by PGCB to ensure the project remains in compliance with national and state regulatory requirements, ADB's SPS 2009, the project's loan covenants and EMP requirements.

12.10.7 Capacity Building and Training Requirement

892. The PGCB has a dedicated Environmental and Social Unit (ESU) and has good familiarity with EHS requirements. PGCB's current portfolio of development projects includes 24 on-going projects, 2 upcoming projects and 6 planned projects. These projects are funded by a variety of development partners including ADB, WB, AIIB, JICA, KfW Development Bank, GoB and others. However, with only four staff all of an environment background the capacity of the Environmental and Social Unit (ESU) to fulfil its responsibilities falls short of requirements. Typically, international development partners provide relatively short-term implementation support to the ESU for their projects whilst trying to build inhouse capacity through training and mentoring. However, capacity remains low in both manpower and expertise to properly fulfil their mandate.

893. Support for ESU safeguards implementation in respect of monitoring and reporting is essential during the 5-year implementation period. Such support would include a capacity building component for institutional strengthening of PGCB's ESU. The PGCB will employ Safeguards Implementation Consultant (SIC) who would support PGCB in overall environmental/social management. However, since the overall responsibility of environmental management lies with the PGCB, they need to ensure that the consultants are carrying out their responsibilities properly. For this purpose, it is important that the PGCB engineers/officials receive training on environmental management and monitoring. Such training will assist them in properly overseeing the activities of the consultant engaged in environmental management of the project.

894. PGCB staff who will be working on the project will need to be provided with the appropriate training on environmental safeguards in general and the specifics of management and monitoring requirements. The contractor's staff as well would also need some training and awareness raising to ensure they fully understand the EMP requirements. As such, a preliminary training program is being proposed to equip PGCB staff and contractor with the needed safeguards capacity. The training modules will be delivered through SIC who will bring in technical expertise for any specialized trainings. The exception is the facilitated H&S workshop which will be attended by the SIC but organized by the Contractor. Training modules may be changed during project implementation depending on the needs; ESU will develop a training plan upon loan effectiveness to reconfirm requirements.

895. Separate training and capacity building will be provided in relation to the Project outcome to establish the ESU with ESMF.

Table 12.8: Proposed Trainings

Training Session	Required Attendees/Recipients	Delivery Mode/Duration	Training Conducted by	Budget Source
Introduction to ADB's Safeguard Policy Statement (2009), IFC EHS Guidelines, national requirements, and Project EMP including EMoP	PMU, ESU, Contractors' Management and Environment Safeguards Teams	Lecture session, presentation, and discussion. In Person/ 1 day	SIC	SIC Budget
Corrective action for existing substations (good practices)	SS staff of PGCB, PMU, ESU	Lecture session, presentation, and discussion. In Person/ 2 day	SIC	SIC Budget
EMP implementation for detailed design, development of CSEMP/H&S plans as well as all sub-plans	PMU, ESU, Contractors' Design Teams and Environment Safeguards Teams	Lecture session, presentation, and discussion. In Person/ 3 day	SIC	SIC Budget
Facilitated H&S workshop (detailed design stage)	PMU, ESU, SIC, Contractors' Management, Design, Construction, and Environment Safeguards Teams, SS and O&M representatives of PGCB	Facilitated workshop In Person/ 1 day	Contractor	Contractor Budget
Ecology survey requirements	PMU, ESU, SIC, Contractors' Environment Safeguards Teams	Lecture session, presentation, and discussion. Online/ 0.5 day	SIC	SIC Budget
Bird sensitive design	PMU, ESU, SIC, Contractors' Management, Design, Construction, and Environment Safeguards Teams, SS and O&M representatives of PGCB	Lecture session, presentation, and discussion. Online/ 0.5 day	SIC	SIC Budget
Pollution control and waste management, detailed design considerations for substations	PMU, ESU, SIC, Contractors' Management, Design, Construction, and Environment Safeguards Teams, SS and O&M representatives of PGCB	Lecture session, presentation, and discussion. Online/ 0.5 day	SIC	SIC Budget
PCB and SF6 awareness raising	SS staff of PGCB, PMU, ESU, Contractors' Management, Design Teams and Environment Safeguards Teams	Lecture session, presentation, and discussion. Online/ 0.5 day	SIC	SIC Budget

Training Session	Required Attendees/Recipients	Delivery Mode/Duration	Training Conducted by	Budget Source
GRM operation (initial run at start of project, and then again on handover to operational staff)	PMU GRM Focal Points, ESU, Contractors' Management and Focal Points, and other GRC committee members	Lecture session, presentation, and discussion. In Person/ 1 day	SIC	SIC Budget
EMP implementation for pre-construction and construction, including workshop on CSEMP preparation, review/discussion on implementation of CSEMP/H&S plans as well as all sub-plans	PMU, ESU Contractors' Construction and Environment Safeguards Teams	Lecture session, presentation, and discussion. In Person/ 3 day	SIC	SIC Budget
Managing the environmental impacts of landfilling works including preparation of site-specific management plans	PMU, ESU Contractors' Construction and Environment Safeguards Teams	Lecture session, presentation, and discussion. In Person/0.5 day	SIC	SIC Budget
Managing the EHS impacts and risks of piling works including piling-specific H&S risk assessment workshop	PMU, ESU Contractors' Construction and Environment Safeguards Teams	Lecture session, presentation, and discussion. In Person/1 day	SIC	SIC Budget
Facilitated H&S workshop (construction stage)	PMU, ESU, SIC, Contractors' Management, Design, Construction, and Environment Safeguards Teams, SS and O&M representatives of PGCB	Facilitated workshop In Person/ 1 day	Contractor	Contractor Budget
Environmental quality monitoring requirements; site supervision and monitoring including use of detailed monitoring framework (checklists) and preparing Environmental Monitoring Reports	PMU, ESU Contractors' Management, Construction, and Environment Safeguards Teams	Lecture session, presentation, and discussion. In Person/ 2 days	SIC	SIC Budget
Facilitated H&S workshop (commissioning stage)	PMU, ESU, SIC, Contractors' Management, Design, Construction, and Environment Safeguards Teams, SS and O&M representatives of PGCB	Facilitated workshop In Person/ 1 day	Contractor	Contractor Budget
EMP implementation at handover upon commissioning (site restoration and O&M)	PMU, ESU, Contractors' Management and Environment Safeguards Teams, SS and O&M representatives of PGCB	Lecture session, presentation, and discussion. In Person/ 1 day	SIC	SIC Budget

12.10.8 Implementation Schedule

896. Strictly no contracts will be awarded before the EMP cleared by ADB as disclosed on the ADB website has been incorporated into the contract documentation. Further, no site establishment or construction activity is to take place before PGCB has received and approved the contractor's CSEMP/H&S Plan including all subplans. Environmental clearance has already been obtained for the Project from DoE. The tentative implementation schedule of the project is listed in Table 12.9. The contractors will submit a more detailed implementation schedule for the detailed design, pre-construction, and construction once the contract is awarded.

897. PGCB will need to ensure all detailed design and pre-construction requirements including obtaining statutory clearances and permissions are complied with by the contractors prior to allowing them to commence construction, including site establishment and any site clearance work. If there are any changes to the scope, sites or routings during detailed design, PGCB must inform ADB and provide an addendum to the IEE providing the updated project description and an assessment of any differential impacts and risks to those already assessed in the IEE with the EMP updated as required. The addendum to the IEE, including any EMP update, prepared by SIC and submitted by PMU must be reviewed and cleared by ADB and disclosed before detailed designs are approved and any works commence on site including site clearance work. If any other unanticipated impacts occur during project implementation, these shall be reported to ADB and, if required, the IEE and EMP updated accordingly, reviewed and cleared by ADB, and disclosed before any related works start or are cleared to continue work. Close supervision and monitoring of all components is needed during the implementation with a zero-tolerance approach to health and safety risk management.

Table 12.9: Key EMP Milestones in Implementation Schedule

	Description	Indicative Time Frame
1	**Project Implementation**	
A	Bidding Documents Approval	Tbc
B	Procurement (Contract Award)	Tbc
C	Construction commencement	Tbc
D	Construction Completion	Tbc
E	Defects Liability Period	1.5 years from construction completion
2	**Pre-Construction Phase**	
A	Implementation of mitigation measures and conduct environmental monitoring for which PGCB is responsible	Upon loan effectiveness or earlier if advanced contract
B	Establishment of GRM	Upon loan effectiveness or earlier if advanced contract
D	Appointment of the ESU staff to the project, nomination of PMU focal persons for EHS on site	Upon loan effectiveness or earlier if advanced contract
E	Appointment of Safeguards Implementation Consultant	Upon loan effectiveness or earlier if advanced contract, the latest date for appointment is before the approval of detailed design
F	Implementation of mitigation measures and conduct of environmental monitoring for which contractor is responsible	Upon award of the contract

	Description	Indicative Time Frame
G	Updating the national EIA and ADB IEE/EMP to reflect detailed design and obtaining DoE and ADB clearance of the updates	Prior to approval of the detailed design
H	Submission and approval of the Contractor's Specific Environmental Management Plan (CSEMP), H&S Plan	One month before the start of works including any site establishment, site preparation, demolition, and earthworks
3	**Construction Phase**	
A	Implementation of mitigation measures and conduct of environmental effects monitoring following the EMP and EMoP.	After award of the contract
B	Monthly Progress Report (EHS)	5th day after effective month (covering the month prior)
C	Semi-Annual EMR during construction for submission to ADB	15th day after end of first June or December once loan has been effective for at least one full quarter, the last construction EMR will be submitted after the commissioning and DLP of all works documenting in depth how all pre-construction and construction activities were complied with
D	Restoration of construction sites	Before demobilization of contractor
4	**Operation Phase**	
A	Implementation of mitigation measures and monitoring activities for operational period	Upon commissioning and the handover to PGCB
B	Annual EMR during construction for submission to ADB	First operational EMR will be submitted 12 months after the last construction EMR was submitted up until the ADB PCR is issued.