...

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Dhaka & Western Zone Transmission Grid
Expansion Project

Record Number: 27.21.0000.453.14.05.22.374 Date: 5/4/2023

Subject: **Approval of Construction Environment and Social Management Plan (CESMP)**

Reference: CET/PGCB/P5/2023/019; Date: 25/03/2023

Project: Design, Supply, Installation, Testing & Commissioning of 400/230 kV GIS Substation at Kaliganj on Turnkey Basis
(Contract No.
PGCB/ADB/L3853/AIIB/L8374/DWZTGEP/GIS/P5;Date:03/11/2022)

Dear Sir,

The Construction Environment and Social Management Plan (CESMP) submitted vide letter referred above has been reviewed and approved by the competent authority of PGCB.

You are therefore requested to take necessary actions based on the above approval.

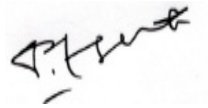
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Record Number:
27.21.0000.453.14.05.22.374/1(4) Date: 5/4/2023

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2) Deputy Project Director (Superintending Engineer), DWZTGE Project, PGCB Ltd.
3) Manager, Environment & Social Unit, PGCB Ltd.
4) Office Copy



06-04-2023
Md. Abul Kashem
Project Director (Chief Engineer)

শেখ হাসিনার উদ্যোগ ঘরে ঘরে বিদ্যুৎ

ISO 9001: 2015 CERTIFIED

পাওয়ার গ্রিড কোম্পানি অব বাংলাদেশ লিঃ
POWER GRID COMPANY OF BANGLADESH LTD.
(An Enterprise of Bangladesh Power Development Board)

মুজিব শতবর্ষ MUJIB 100

স্মারক নং- ২৭. ২১. ০০০০.৪০২.১৪.১০১.২২. ১৫৮৬

তারিখঃ ০৩/০৪/২০২৩ ইং

প্রকল্প পরিচালক
DWZTGE প্রকল্প,
পিজিসিবি, ঢাকা।

বিষয়:-**"Design, Supply, Installation, Testing & Commissioning of new 400/230/132 kV GIS Substation at Kaliganj on turnkey basis under Dhaka and Western Zone Transmission Grid Expansion Project" (Package-5) শীর্ষক প্রকল্পের Revised CESMP Report এর উপর মতামত প্রদান প্রসঙ্গে।**

উপর্যুক্ত বিষয়ের আলোকে জানানো যাচ্ছে যে, বর্ণিত কাজের ঠিকাদার প্রতিষ্ঠান China Electric Power Equipment and Technogy Co. Ltd. কর্তৃক ২৫/০৩/২০২৩ইং তারিখে দাখিলকৃত (প্রকল্প দপ্তরে) "Design, Supply, Installation, Testing & Commissioning of new 400/230/132 kV GIS Substation at Kaliganj on turnkey basis under Dhaka and Western Zone Transmission Grid Expansion Project" (Package-5) শীর্ষক প্রকল্পের Revised CESMP Report পিজিসিবি'র পরিবেশ ও সামাজিক ইউনিট এর মতামত সংযোজন করে প্রেরণ করা হয়েছে বিধায় তা গ্রহণযোগ্য এবং অনুমোদন করা যায়।

এমতাবস্থায়, পরবর্তী প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য সুপারিশ করা হলো।

Adil 03/04/23

মোঃ আদিল চৌধুরী
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৫. দপ্তর নথি।

Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGE)

Asian Infrastructure Investment Bank (AIIB) project with Power Grid Company of Bangladesh Ltd (PGCB)

on

Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS Substation at Kaliganj on turnkey basis (Package-5)

[Contract No.: PGCB/ADB/L3853/AIIB/L8374/DWZTGEP/GIS/P5]

Revised CONSTRUCTION ENVIRONMENT & SOCIAL MANAGEMENT PLAN (CESMP)

Submitted to

Power Grid Power Grid Company of Bangladesh Ltd

Submitted by

China Electrical Power Equipment and Technology Co., Ltd

January (Revised March) 2023

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Abbreviation

ASTM	American Society for Testing and Materials
AAS	Atomic Adsorption Spectrophotometer
AHs	affected households
ARIPO	Acquisition and Requisition of Immovable Property Ordinance
BAB	Bangladesh Accreditation Board
BOD_5	Biological Oxygen Demand for five days
BCSIR	Bangladesh Council for Scientific Industrial Research
BWDB	Bangladesh Water Development Board (BWDB)
BLL	Bangladesh Labour Law
BNBC	Bangladesh National Building Code
BLR	Bangladesh Labour Rule (BLR)
BS	British Standard
BDT	Bangladesh Taka
BMPs	Biodiversity Management Plans
BSRM	Bangladesh Steel Rolling Mills
CESMP	Construction Environmental and Social Management Plan
CESMMP	Construction Environmental Management and Monitoring Plan
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen

DG	Director General
DPHE	Department of Public Health & Engineering
DWZTGEP	Dhaka and Western Zone Transmission Grid Expansion Project
DoE	Department of Environment
DOF	Department of Forest
DEPC	Department of Environmental Pollution Control
DSC	Design and Supervision Consultant
EQS	Environmental Quality Standard
ECA	Environment Conservation Act
ECR	Environmental Conservation Rules
EC	Electrical Conductance
EHS	Environment Health & Safety
ECP	Environmental Compliance Program
ECOP	Environmental Code of Practice
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Field
EMP	Environmental Management Plan
ESU	Environmental and Social Unit
EHSMS	Environment, Health and Safety Management System
ESHS	Environment, Social, Health, and Safety
FIDC	Forest Industries Development Corporation
GIS	Geographic Information System
GDP	Gross Domestic Product
GRC	Grievance Redress Committee
GBV	Gender-Based Violence

GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GVWR	Gross Vehicle Weight Rating
GMTL	Gross Minimum Threshold Level
HH	**Household**
HFO	Heavy Fuel Oil
HSE	Health and Safety Executive
IoL	Intraocular Lens
IRRI	International Rice Research Institute
INGO	International Non-Governmental Organization
IVM	Integrated Vegetation Management
IFC	International Finance Corporation
ISO	International Organization for Standardization
KPIs	Key Performance Indicators
LAR	Land Acquisition and Resettlement
LILO	Line in Line Out
LGI	Local Government Institutions
LTI	Lost Time Incident
LFO	Light Fuel Oil
$\mu g/m^3$	Micro-gram per cubic meter
MDGs	Millennium Development Goals
MoEFCC	Ministry of Environment, Forest & Climate Change
MSR	Monthly Safety Report
MOHFW	Ministry of Health and Family Welfare
MTI	Medical Treatment Injury

MTL	Minimum Threshold Level
NC	Non-conformity
NEMAP	National Environment Management Action Plan
NEP	National Energy Policy
NCS	National Conservation Strategy
NIOSH	National Institute of Occupational Safety & Health
NEDA	N-(1– naphthyl)-ethylenediamine di-hydrochloride
NAAQS	National Ambient Air Quality Standard
NGOs	Non-Governmental Organizations
NTS	Non-Technical Summery
OHSA	Occupational Health & Safety Administration
OHTL	Overhead Transmission Line
OHS	Occupational Health & Safety
OP	Operation Policy
PD	Project Director
PM10	Particulate Matter 10 micron
PAPs	Project Affected Persons
PM2.5	particulate matter 2.5 micron
PDB	Power Development Board
PGCB	Power grid company of Bangladesh
ppm	Parts per million
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
ROW	Right of way
REB	Rural Electrification Board

SPM	Suspended Particulate Matter
SEP	Stakeholder Engagement Plan
SWMS	Standard Work Method Statement
SST	Site Safety Tours
SS	Substation
TDS	Total Dissolved Solid
TSP	Total Suspended Particulate
TSS	Total Suspended Solid
TL	Transmission Line
TBT	Tool Box Talk
USEPA	United States Environmental Protection Agency
USD	United States Dollar
UNO	Upazila Nirbahi officer
WB	World Bank
WFMP	Work Force management Plan
WM	Winch Machine
WHS	Workplace Health and Safety
WHO	World Health Organization

Glossary

Adverse impact: *An impact that is considered undesirable.*
Ambient air: *Surrounding air.*
Aquatic*: Growing or living in or near water.*
Bangla*: Bengali language.*
Baseline (or existing) conditions*: The 'baseline' essentially comprises the factual understanding and interpretation of existing environmental, social and health conditions of where the business activity is proposed. Understanding the baseline shall also include those trends present within it, and especially how changes could occur regardless of the presence of the project, i.e. the 'No-development Option'.*
Bazar: *Market.*
Beel: *A 'back swamp' or depression. Can be either perennial or seasonal.*
Beneficial impacts: *Impacts, which are considered to be desirable and useful.*
Biological diversity: *The variety of life forms, the different plants, animals and microorganisms, genes they contain and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecological diversity.*
Char: *Newly accreted land: Land, sometimes islands, within main river channels and nearby mainland or in the estuary, subject to erosion and accretion.*
Ecosystem: *A dynamic complex of plant, animal, fungal and microorganism communities and associated non-living environment interacting as an ecological unit.*
Emission: *The total amount of solid, liquid or gaseous pollutant emitted into the atmosphere from a given source within a given time, as indicated, for e.g., in grams per cubic meter of gas or by a relative measure, upon discharge from the source.*
Endangered species*: Species in danger of extinction and whose survival is unlikely if the existing conditions continue to operate. Included among those are species whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to suffer from immediate danger of extinction.*
Environmental effects*: The measurable changes, in the natural system of productivity and environmental quality, resulting from a development activity.*
Environmental impact assessment (EIA) / Environmental assessment: *The systematic, reproducible, and interdisciplinary identification, prediction and evaluation, mitigation and management of impacts from a proposed development and its reasonable alternatives, sometimes known as environmental assessment.*
Environmental Impact: *An estimate or judgment of the significance and value of environmental effects for natural, socio-economic and human receptors.*
Environment Management Plan (EMP): *A Plan to undertake an array of follow-up activities which provide for the sound environmental management of a project/ intervention so that adverse environmental impacts are minimized and mitigated; beneficial environmental effects are maximized; and sustainable development is ensured.*
Environmental Management: Managing the productive use of natural resources without reducing their productivity and quality.
Erosion*: Process in which wind and water removes materials from their original place; for instance, soil washed away from an agricultural field.*
Evaluation: *The process of looking back at what has been really done or accomplished.*

Fauna: *A collective term denoting the animals occurring in a particular region or period.*

Field Reconnaissance: *A field activity that confirms the information gathered through secondary sources. This field study is essentially a rapid appraisal.*

Flora: *All of the plants found in a given area.*

Habitat: *The natural home or environment for a plant or animal.*

Household: *A household is identified as a dwelling unit where one or more persons live and eat together with common cooking arrangement. Persons living in the same dwelling unit having separate cooking arrangements constitute separate household.*

Important Environmental Component (IEC): *These are environmental components of biophysical or socio-economic importance to one or more interested parties. The use of important environmental components helps to focus the environmental assessment.*

Initial Environmental Assessment / Evaluation: Preliminary analysis undertaken to ascertain whether there are sufficient likely significant adverse impacts to warrant a 'full' EIA. In some countries, use of initial assessment forms a meaning of "screening" proposed projects.

Khal: Small Channel, canal.

Land use: Types include agriculture, horticulture, settlement, pisciculture and industries.

Mauza*: A Bangla word for the smallest government administrative area corresponding to village revenue unit.*

Mitigation: *An action, which may prevent or minimize adverse impacts and enhance beneficial impacts.*

Negative Impact: *Negative change from the existing situation due to the project.*

Public involvement / Public consultation: A range of techniques that can be used to inform, consult or interact with stakeholders' affected / to be affected by a proposal.

Reversible impact: *An environmental impact that recovers either through natural process or with human assistance (e.g. cutting off fish migration by an embankment might be reversible at a later stage if a proper regulator is built).*

Stakeholders*: Those who may be potentially affected by a proposal, e.g. Local people, the proponent, government agencies, NGOs, donors and others, all parties who may be affected by the project or to take an interest in it.*

Taka: *Unit of Bangladeshi currency.*

Terrestrial: *Living on land.*

Thana: *Sub-district level of government administration, comprising several unions under district.*

Union: *Smallest unit of local self-government comprising several villages.*

Upozila: *Sub-district name. Upozila introduced in 1982.*

Zila: *Bengali word of district.*

Power: *supply (a device) with mechanical or electrical energy*

Executive Summery

The project entitles "Design, Supply, Installation, Testing and Commissioning of 400/230kV GIS Substation at Kaliganj will construct under the supervision of PGCB. **China Electrical Power Equipment and Technology Co., Ltd** will implement 400/230kV GIS Substation. The project is set to follow the donor agency guideline (ADB/AIIB) and the national guidelines in respect to the safeguard compliance issues. According to the Environment Conservation Act 1995 and Environment Conservation Rules 1997 (amended in 2017) of Bangladesh, transmission lines and grid substations are categorized as Orange B category' projects that require an Initial Environmental Examination (IEE) for environmental clearance certificate (ECC). Therefore, PGCB has done necessary location survey, environmental assessment studies and IEE reporting for getting ECC from the Department of Environment (DOE).

The contractor of the project is **China Electrical Power Equipment and Technology Co., Ltd which** will responsible to ensure that all activities of substation follow the policy of construction environmental social management plan (CESMP), and during the construction phase of the substation project, environmental monitoring will be done by guideline of ECR 1997 in respect to the guidelines addressed in the approved IEE of the DWZTGEP.

China Electrical Power Equipment and Technology Co., Ltd will resettlement related guidelines of the project (DWZTGEP) when needed. China Electrical Power Equipment and Technology Co., Ltd will keep best practice for biodiversity management, pursuit of economic growth through employment creation and income generation should be balanced and ensure to integrate practices and technologies that promote energy efficiency, use resources—including energy and water. The CESMP will be the part of the contract documents and will use as a monitoring tool for compliance.

The following scope of work and area will conduct through the construction of new one substation, which will be done by **China Electrical Power Equipment and Technology Co., Ltd.**

SN	Name of the Substation	GPS	Land area
1	Kaligonj 400/230 kV indoor GIS substation	23.967419N 90.551346E	18.05 acres

	400 kV GIS Switchgear with: 400 kV double busbar system - Eight (8) Nos. of 400 kV transmission line bays - Three (03) Nos. of 400 kV transformer bays - Two (2) Nos. of 400 kV bus coupler bays - Two (2) Nos. of 400 kV bus section bay for HV testing. - Two (2) Nos. of three phase power autotransformers 400/235/34.5 kV, 520/750 MVA.		
	230 kV GIS Switchgear, with: 230 kV double busbar system - Ten (10) Nos. of 230 kV transmission line bays - Three (3) Nos. of 230 kV transformer bays - Two (2) Nos. of 230 kV bus coupler bays - Two (2) Nos. of 230 kV bus section bays		
	33 kV AIS Switchgear: - Two (02) Nos. of 33 kV auxiliary/earthing transformer bays - Two (02) Nos. of three phase, 33/0.415 kV, 500 kVA, auxiliary/earthing transformers		
Space for future 6 nos. of 400kV line bays - Space for future 6 nos. of 230kV line bays - Space for third three phase power autotransformers 400/235/34.5 kV, 520/750 MVA. - Space for 400kV bus reactor - SCADA Control for all bays at different voltage level. - Associated substation control and monitoring system, relay protection, metering, telecommunication, AC & DC auxiliary power supply, cables, metal structure, earthing and lightning protection. - Land development of complete switchyard area by cutting, land filling, compacting up to a suitable - Level including slope protection.			
Complete outdoor civil works, including 400 kV and 230 kV gantry foundation, 400 kV and 230 kV and 33 kV equipment foundation, power transformer and auxiliary transformer foundations, blast wall, substation main gate and guard house, security boundary wall and internal fencing, access road, internal roads and parking, surface and switchyard drainage system including outfall, cable trench including soak pit, PVC pipes etc., switchyard surface finishing and gravel surfacing			
Complete civil works and facilities for two new GIS building for 400kV & 230 kV GIS and control building separately, including foundation works, super structure works, finishing works like rendering, painting, water supply, sanitary, floor finishing, rain water drainage system, lightning protection, etc.			
Complete water supply including deep tube well for drinking water, pump house, pump, water			

reservoir, water pipe lines, etc., sewage facilities including septic tank, etc.
The equipment to be supplied, installed and commissioned is shown on the bid drawings as well as mentioned specification

China Electrical Power Equipment and Technology Co., Ltd will also consider environmental aspects/impacts, environmental monitoring, social monitoring at the project side. As per national and ADB/AIIB guidelines (ECR 1997, Labour Law 2006, OHSA, NIOSH, WHO, SPS etc.) in CESMP China Electrical Power Equipment and Technology Co., Ltd will establish, prepare and follow all of the plans suggested in the EMP of IEE of the project.
CESMP is a live and site-specific plan to manage or avoid or minimize the negative impacts during the construction period for the construction of one substation works [civil work for control building, boundary wall, gantry, transformer foundation, cable drain, substation tower, tower erection and stringing]. The environmental monitoring (air, water, soil, noise, EMF) will be submitted as per project office guidelines. As per package (DWZTGEP) 5, one substation will be constructed as per PGCB and ADB/AIIB compliance guidelines.

China Electrical Power Equipment and Technology Co., Ltd will follow the ADB Safeguard Policy Statement (SPS) 2009 during the constriction period of substation project. **China Electrical Power Equipment and Technology Co., Ltd** will be responsible to ensure all construction activities of construction of substation project follow the policy provisions specified in the project's CESMP. There will be no physical or economic displacement of people. The entire proposed construction of the substation project will be built through land acquisition which has been completed by PGCB.

All environmental parameter based monitoring will be done as per EMP of IEE of the project and ECR'97 (including amendments). There will be submission of baseline environmental parameters monitoring data by **China Electrical Power Equipment and Technology Co., Ltd** as per EMP & project office order before starting the construction of the associated package.

The project implementation team of China Electrical Power Equipment and Technology Co., Ltd will engage and communicate to all persons working under the control of project management unit (PMU), PGCB. The project implementation unit (PIU) of China Electrical Power Equipment and Technology Co., Ltd will be constructed the one substation with the engagement of sub-contractor in different sectors. ESHS team of China Electrical Power Equipment and Technology Co., Ltd will fulfill the total scope of work as per specification of tender documents. China Electrical Power Equipment and Technology Co., Ltd will have recruited experience stuffs and labours for one substation project areas. China Electrical Power Equipment and Technology Co., Ltd will have recruited site manager, site supervisor, health & safety or accident prevention officer for their project implementation. The objective of the Health, Safety Plan is to ensure that the operation phase of the substation do not result in occupational hazards and also in all conditions the plant is ready to face any emergencies with minimal loss of life and property. The

Health, Safety Plan covers possible occupational hazards and emergencies such as falls, exposure to high noise levels and collapse of structures, fires, & explosions. The plan is to be achieved by continuous monitoring of work standards at site, incident statistics, implementation of recommendations and mitigation measures made in this report in respect to occupational hazards and ensuring the conditions subjected to occupational hazards. Proper labor management procedure will be followed with maintaining health, safety and sanitation and any guidance from ADB/AIIB will be followed in this regard and also for social issues respectively.

Community health and safety issues will be maintained with COVID-19 and communicable disease concern. Proper training to respective persons and consultations will be conducted accordingly.

The structural drawings for substation and available drawings of different components will be provided by China Electrical Power Equipment and Technology Co., Ltd. It will be approved by PGCB after checking the drawing with specification of tender document However, if the China Electrical Power Equipment and Technology Co., Ltd needs to prepare any additional structural drawings or make any correction of existing drawings, that to be prepared by the China Electrical Power Equipment and Technology Co., Ltd without any additional cost. China Electrical Power Equipment and Technology Co., Ltd are requested to inspect the available drawings in the Design Dept. of PGCB to satisfy them regarding the extent of available drawings. China Electrical Power Equipment and Technology Co., Ltd are required to propose the substation materials from a manufacturer who will use the same material standard as mentioned in the tower drawings.

China Electrical Power Equipment and Technology Co., Ltd will install deep tube in the project side with a respective death. The depth of deep tube-well installation will be decided after discussion with local Department of Public Health & Engineering (DPHE) of Mohakhali, Dhaka. Local Department of Public Health & Engineering (DPHE) will be say about the depth of installation of tube-well at the 400/230 kV Kaliganj GIS Substation project site. China Electrical Power Equipment and Technology Co., Ltd will test deep tube-wall water quality parameters after installation. China Electrical Power Equipment and Technology Co., Ltd will make underground storage tank with appropriate line. The underground storage tank will be made of cement. After finished the construction of substation project, China Electrical Power Equipment and Technology Co., Ltd will be dismantled the sanitary toilet and its USTs. The human excreta from USTs will be used in the landfilling materials at appropriate locations

Substation project may require about 150 people for worked at this substation with specialized construction skills. Based on the construction site, workers profile data and interviews with China Electrical Power Equipment and Technology Co., Ltd. For a variety of reasons many employers prefer to conduct local recruitment first and turn to outside recruitment only if the

local one does not succeed. Local recruitments are less expensive because there are no recruiting fees, and they generally require less training and fewer referral bonuses and travel and relocation costs. Local recruitments are also quicker. For a local hire, the process may be completed within a few weeks. In addition, many employers must recognize that some recruitment efforts involve competing for talent in a global marketplace and require effective use of modern technology. Effective employee recruitment is one way companies remain competitive in a changing and increasingly global marketplace. China Electrical Power Equipment and Technology Co., Ltd will recruit the local people from Kaliganj GIS Substation project site area for construction phase; because of local labour do not need extra opportunity of housing and sanitation in substation area.

Managing traffic at the construction workplace of this substation is an important part of ensuring the workplace is without risks to health and safety. Vehicles moving in and outside road of the substation project, reversing, loading and unloading are often linked with death and injuries to workers and members of the public. China Electrical Power Equipment and Technology Co., Ltd will take step to minimize local traffic at the substation areas. A flag man will keep to stand when a trucks or heavy loaded vehicles entry from the high –way to the substation yard. For the internal traffic, China Electrical Power Equipment and Technology Co., Ltd will make temporary brick carpeting road in the substation yard. Traffic congestion signboard will use at main-road of all substation area. The red and yellow color light is used at the substation are where it will need for the traffic management. The dust may emit due to friction of wheel and street. The project may require large quantities of construction materials such as cement, sand, and metal, building making materials, wires and aggregates during construction. It is desirable to locate storage and loading areas away from the areas of frequent pedestrian activity (community foot paths and agricultural land areas)

Trimming or removing the hazard trees is a secondary part of the construction phase of the substation project. Tree trimming (cleaning of trees) will mandatory after the acquisition of land and before landfilling at the substation project. Tree trimming may be done by crews using mechanical trimming equipment or aerial lift trucks, or by climbing crews (an alternative way of trimming). China Electrical Power Equipment and Technology Co., Ltd screws clear vegetation and redefine the easement width with light-duty power equipment. In the area of Kaliganj SS, 333,819.4 cubic meter land will be needed to development land. This land has grass like shrub on the land. PGCB has taken 18.05 arcs land for the construction of 400/230 kV substation project. China Electrical Power Equipment and Technology Co., Ltd will be filled-up sand 333,819.4 cubic meters which will collect or dragging from nearest sources.

As per biodiversity action plan, small tree may be replaced to another for plantation from the substation area. Even small flora like herbs may plant where has free space remaining beyond the construction area of substation. Beside, bird nest might be replacing it position from substation to another areas. The main effects of roads on terrestrial vertebrates as well as a variety of mitigation measures that have been widely used for different ways: crossing structures, dry

ledges, fencing, right-of-way escape ramps, and noise barriers. Because some species have similar needs and respond in the same way to mitigation measures, specific design standards.

In the substation project, GOB is acquired land and China Electrical Power Equipment and Technology Co., Ltd will filled the low land by sand with approved height from the ground level. Land owner (affected persons) may be trimming his/her trees before land filing or before developing the substation project. If there are trees in the past and the trees do not need to be cut down for developing the substation. So that China Electrical Power Equipment and Technology Co., Ltd will has no needed to cut down the existing trees at the project site.

On-site emergency plans will prepare to protect the public health, safety, and environment on and off the substation project site in the case of a major natural disaster or construction accident relating to or affecting the substation Project. China Electrical Power Equipment and Technology Co., Ltd shall prepare the plans and be responsible for implementing the plan with its operations team in coordination with the local emergency response support functions.

This Site Specific Environmental Management Plan has been prepared for the construction of Kaligonj substation projects and installation of electrical equipment in the appropriate place of the Kaliganj substation yards. SSEMP will only be applied to specific sites of construction works. The project will be carried out in 400/230 kV substation at Kaliganj GIS Substation project site. **China Electrical Power Equipment and Technology Co., Ltd** are directly responsible for the environmental performance of the project during the phases of construction and operation. The Project implementation unit (PIU) of **China Electrical Power Equipment and Technology Co., Ltd** and construction Supervision of PGCB will have the necessary education and experience in order to objectively asses the requirements of the Kaliganj GIS Substation. During the construction period, potential adverse environmental impacts associated with the construction of the existing facilities for Kaliganj GIS Substation project site have been identified in this section along with environmental management plan. The management plan including dust control, effluent treatment, hazardous waste management, solid waste management and health & safety from the civil work and installation of electrical equipment.

Kaligonj substation under package-5 is financed by AIIB & ADB. An IEE has already been carried out for the project according to the requirement of PGCB and ADB for necessary environmental and social clearances. At substation project, Environment, Social, Health and Safety (ESHS) Management System (MS) is a comprehensive system of policies, procedures, and standard procedures that is developed and implemented to manage ESHS hazards and risks related to the development. Issues related to grievances and others will be raised and solved through the GRC of the project. Reports will be kept accordingly.

CESMP is a live document and all the management plans will be updated according to the guideline provided and safeguard compliance procedure during the construction of the project.

CESMP_P5_Kaliganj SS

Chapter 01

Introduction

1.0 Introduction

The project entitles "Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS Substation at Kaliganj will construct under the PGCB. The safeguard compliance guidelines will be followed as per ADB/AIIB policies accordingly. The project location is Fuldigram, Boktarpur, Kapasia Road, Kaligonj, Gazipur. The finance partner of the project is Asian Development Bank & AIIB. According to the Environment Conservation Act 1995 and Environment Conservation Rules 1997 (amended in 2017) of Bangladesh, transmission lines and grid substations are categorized as Orange B category' projects that require an Initial Environmental Examination (IEE) for environmental clearance certificate (ECC). Therefore, PGCB has done necessary location survey, environmental assessment studies and IEE reporting for getting ECC from the Department of Environment (DOE). China Electrical Power Equipment and Technology Co., Ltd will follow the EMP and IEE of the project for all the management aspects related to environmental and social issues.

A gas insulated substation (GIS) is a high voltage substation in which the major conducting structures are contained within a sealed environment with a dielectric gas known as sulfur hexafluoride (SF_6) gas as the insulating medium. Traditionally, a gas-insulated substation (GIS) uses a superior dielectric gas, SF_6, at moderate pressure for phase-to-phase and phase-to-ground insulation. The high voltage conductors, circuit breaker interrupters, switches, current transformers, and voltage transformers are in SF_6 gas inside grounded metal enclosures. The design, specification, and construction of GIS SS have included details in the contract documents that are logical to construct or achieve the desired aesthetic result. Since the contract documents specifically define constructed methods and imply assembly techniques. The application of construction understanding during the early phases of GIS substation project design helps to improve design efficiency.

In construction activities especially, the greater the risk, the greater the degree of hazard control and supervision is required. Before the work starts, competent of construction procedure and EHS personnel should, this constriction work will have to include;

- ✓ Identify and devise risks and their management strategy
- ✓ Ensure training – site specific and job-specific
- ✓ See that the workforce has access to PPEs and know how to use them
- ✓ Observe, inspection and report this agreed safe work methods will implement as site-wide range
- ✓ Labour management plan including hygienic food, pure water supply and give them in the hygienic environment
- ✓ Upon arrival at the site, employees, nearby people and visitors will receive information about the site hazards and steps taken to control those risks. Also, briefing them about the hazards,

PPEs, welfare facilities and site rules can ensure that the work in progress is smooth and efficient.

- ✓ Specific audit and visit plan for E&S, health and safety issues will be developed and followed and associated records will be kept for further procedure.

Incorporating health and safety check-up can keep on the work progress and well-being. Risk assessments, health and safety training, corrective and preventive measures supply of PPE to labours, above all will part of the checklist of the construction of the substation project. As per contract China Electric Power Equipment and Technology Co., Ltd will appoint ESHS group including project manager, construction manager, design engineer for GIS substation, civil engineer, health & safety (accident prevention) officer and site manager, chief supervisor for GIS substation environmental & social Specialist as well as skilled and unskilled labour forces to the substation project sites. China Electric Power Equipment and Technology Co., Ltd will follow specific audit and visit plant in regard to E&S, health and safety issues and keep the records accordingly in sites and for further corrective actions. China Electric Power Equipment and Technology Co., Ltd will supply sufficient PPE for labours and visitor. China Electric Power Equipment and Technology Co., Ltd will prepare a Construction Environmental Social Management Plan (CESMP) live document and submit to the PGCB. PGCB will review the CESMP report. After approved the CESMP report, China Electric Power Equipment and Technology Co., Ltd will start the land filling and civil work as per instruction of PGCB

All managers and project implementation unit of **China Electric Power Equipment and Technology Co., Ltd** will follow the CESMP report in the purpose of work method statement, environmental code of practice, site safety, emergency plan, health & safety issue, safety training, dust mitigation measure, noise control etc. If the project manager does not under anything in CESMP, the Environmental specialist of China Electric Power Equipment and Technology Co., Ltd will visit Kaliganj substation project sites and give a brief of all items of CESMP to the project Manager. Besides, the field people of Kaliganj substation project area will keep in contact with an environmental & social specialist. The mission of contributing to safe working conditions, environmental protection, participating in the detection of risk and danger is a matter for all; so labours and workers must also communicate hazardous conditions when they will engage with the construction work of Kaliganj substation.

China Electric Power Equipment and Technology Co., Ltd is the selected contractor for the project entitle "Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS Substation at Kaliganj on turnkey basis (Package-5)" at the approved site of Gazipur. The project has included new GIS Substation at Kaliganj. The new GIS substation projects will construct specifically at the fixed Kaligong location by the mitigation of social and environmental impacts. China Electric Power Equipment and Technology Co., Ltd will follow all methodology documents (CESMP), site specific environmental management plan (SSEMP) outlines

management measures to be implemented, and will have to mitigate social, environmental, health and safety impacts and risks associated with the construction phase of the substation projects. China Electric Power Equipment and Technology Co., Ltd shall comply with the existing statutes and regulations of Bangladesh concerning the execution of works as per requirements of the Department of Environment (DoE), ECR 1997 (amendment), OHSA, NIOSH. Also, China Electric Power Equipment and Technology Co., Ltd shall comply with the ADB's anticorruption Policy (1998, as amended to date) requires as a borrower (including beneficiaries of ADB-AIIB financed activity), as well as suppliers, and contractor under AIIB & ADB-financed contract and, observe the highest standard of ethics during the procurement and execution of the Kaliganj substation project under PGCB.

China Electric Power Equipment and Technology Co., Ltd shall comply the ADB environmental and social safeguards document of ADB as well as IFC/WB sector-specific EHS guidelines on power transmission and distribution. The higher authority (project management unit) of Power Grid Company of Bangladesh Ltd (PGCB) will approve the electrical and civil design of the substation of China Electric Power Equipment and Technology Co., Ltd and PGCB will also give a letter to China Electric Power Equipment and Technology Co., Ltd for starting of the construction work. China Electric Power Equipment and Technology Co., Ltd have an own environmental policy for carrying out the construction of Kaliganj substation projects.

In practice, it is recommended that contractors should have any ISO 14001 for the eligible to construct the project work as contractor. PGCB is imposing the requirements of ISO certification during the prequalification of contractors. Environmental policy, ISO 45001 quality management certificate, ISO 14001 and ISO 9001 are attached in appendix A

China Electric Power Equipment and Technology Co., Ltd will prepare a 'Construction Environmental & Social Management Plan' (CESMP) demonstrating the manner in which they will comply with the requirements of ECP and the mitigation measures proposed in the EMP. The CESMP will form part of the contract documents and it will use as a monitoring tool for environmental compliance. Violation of the compliance requirements will treat as non-compliance leading to the corrections or otherwise imposing penalty on the contractor (China Electric Power Equipment and Technology Co., Ltd)

1.1 Project Background

The proposed Dhaka and Western Zone Transmission Grid Expansion Project (DWZGEP) of a total investment of $750.0 million will ensure that the capacity of electricity supply in Dhaka and western zone of Bangladesh is upgraded, with improvements in the technical efficiency of the transmission system. The proposed project is expected to provide support for the construction of Kaliganj substation and support the improvements of existing transmission network of PGCB. Massive development activities are planned in this region. After successful implementation of this projects power supply reliability of the Kaliganj region of Gazipur, it will be highly

enhanced through new Kaliganj substation and associated transmission lines area of Gazipur District. PGCB has done necessary location survey, environmental assessment studies and necessity of power grid station in this Kaligonj area. After submission of IEE, Department of Environment (DOE) has given environmental clearance certificate (ECC) on 28/07/2020 which is renewed of ECC for the DWZGEP valid till 28/07/2023. The ECC with project NOC, ECNEC and renewal ECC is attached in appendix B

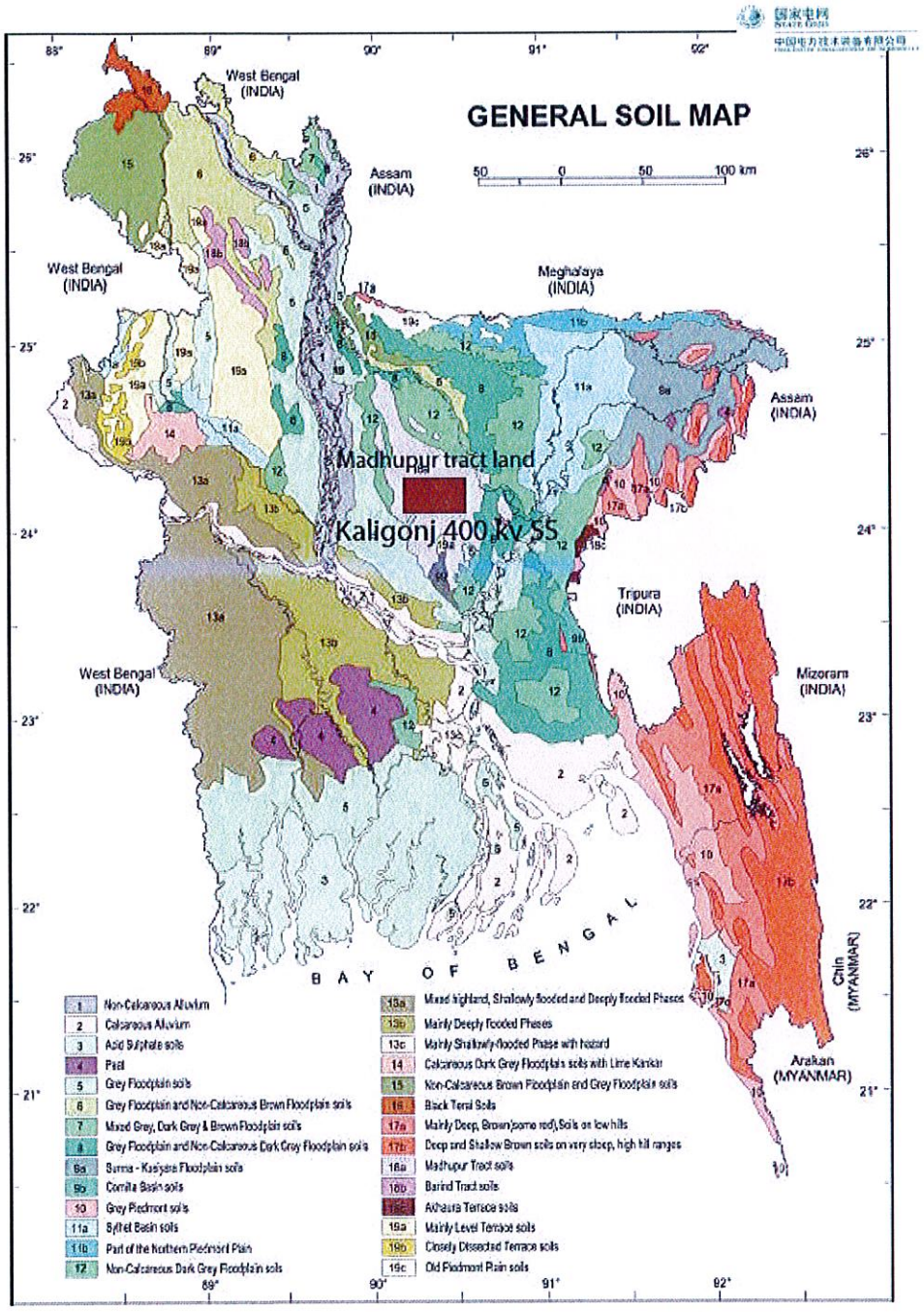
1.2 Objectives of the CESMP Study and Scope

CESMP is a living document where will include policy, project construction processes, E & S management plans and health safety instructions to carry out the substation project within the time frame. The Environmental policy including all-round Management System for Quality, Environment and Occupational Health and Safety Management of China Electric Power Equipment and Technology Co., Ltd is incorporated in the CESMP report.

The following objectives and scopes of CESMP preparation

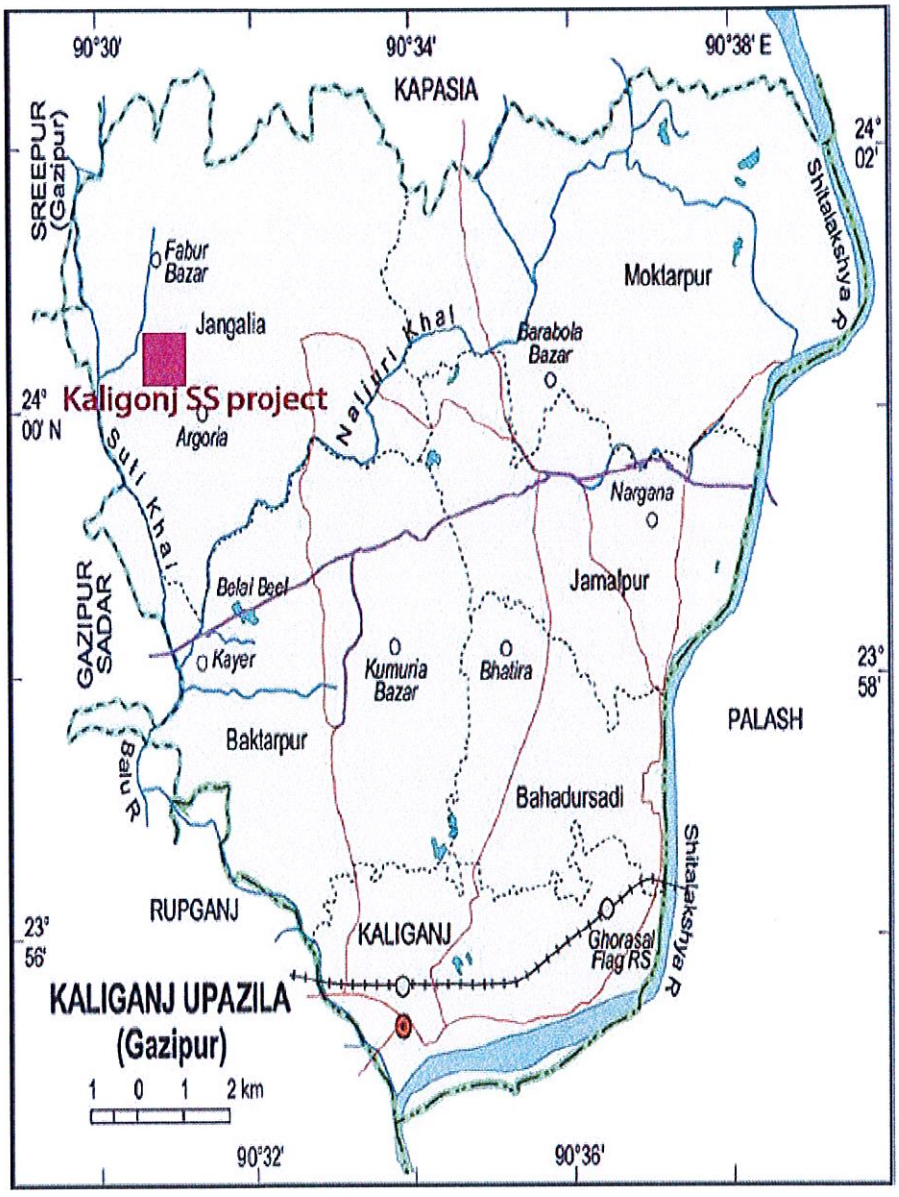
- CESMP have environmental and social aspects, impacts, management for the construction work
- CESMP is a comprehensive and detailed process of proposed Kaliganj substation construction initiative, activities, environmental and social management plans, impact assessment, mitigation measures and monitoring to be conducted and implemented.
- CESMP will carry out in relation to the legislative framework relevant to the environmental and social impact studies. Baseline environmental conditions around the project site will establish during this stage of the study.
- The CESMP is prepared based IEE of Dhaka and Western Zone Transmission Grid Expansion Project (June 2019). Initial Environmental Examination has been prepared by Power Grid Company of Bangladesh, Ministry of Power, Energy and Mineral Resources, Government of Bangladesh for the Asian Development Bank.
- CESMP will have observations and discussions with stakeholders including community representatives and PAPs at important locations of the project and Project Influence Area (PIA). The main purpose of this approach is to obtain a fair impression of the people's perceptions of the substation project and its environmental impacts and possible mitigation during the construction of the Kaliganj substation project.
- Environmental monitoring parameters, frequency of monitoring and responsibility of such monitoring will have included in the CESMP
- Environmental monitoring plan will have included in CESMP as per the guideline Power Grid Company of Bangladesh Ltd, which is fully integrated with the management plan. The nature of the key impacts/associated with project implementation is likely to be such that instrumental monitoring, air, noise, soil, water parameters.
- Monitoring of health safety aspect at the project site that specified actions will take, coupled with visual observations on site. All monitoring recommendations will make for

specific purposes, which are directly related to overall construction environmental management and the control of specific impacts for the substation project.



CESMP/SUB/PGCB/ADB/ DWZTGEP/GIS/P5

Fig 1.1 Soil Map of Bangladesh and Kaligonj Substation location



CESMP/SUB/PGCB/ADB/ DWZTGEP/GIS/P5

Fig 1.2 Area Map of Kaligonj Upazila (Gazipur)

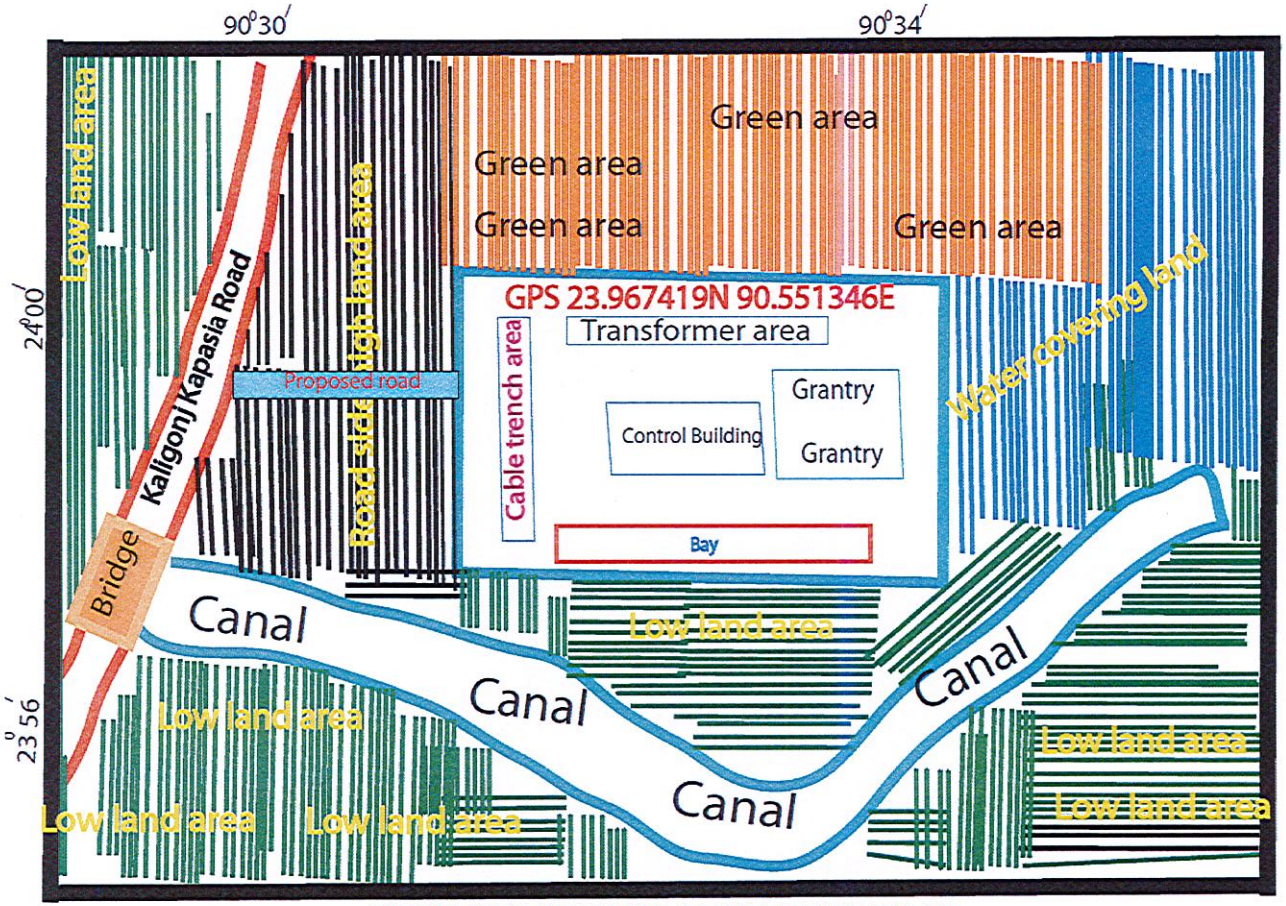


Fig: 1.3 Site specific area of Kaligonj 400 kV GIS substaion

Chapter 02

Construction Environmental and Social Management and Monitoring (CESMMP) Plan

2.0 Construction Environmental and Social Management and Monitoring (CESMMP) Plan

During the construction of Kaliganj substation as per term of conditions of Department of Environment through ECC, all parameters of effluent, gaseous emission, noise, solid waste, hazardous waste will be within the limits in the Environment Conservation Rules (ECR) 1997. In the case of non-coverage of ECR 1997 & the environment, health and safety safeguard guideline will be adhered to the Kaliganj substation project. The design, construction, installation, and rehabilitation of electricity works shall take into consideration environmental issues and concerns with the view of Environmental Code of Practice (ECOP). Factors to consider include, but are not limited to:

- the promotion of energy efficiency,
- the efficient use of non-renewable resources,
- the use of renewable resources,
- the social impact of new projects, and community concerns,
- the minimization of environmental damage, including visual impacts,
- tree management programs, and
- A reduction in and the correct disposal of waste products.

A Standard Environmental Code of Practice (ECOP) is prepared as a guideline for environment management of different components of construction of Kaliganj substation project The main objective of an ECOP is to manage construction activities in harmony with the environment in an effort to contribute to the well-being of the community and the environment by: (a) minimizing pollution, (b) sustaining eco-systems, (c) conserving cultural heritage, and (d) enhancing amenity. The ECOP has designed to address all potential impacts during the construction of the substation by the PGCB. Power Grid Company of Bangladesh, a subsidiary of PDB is responsible for operation, development, and maintenance of power transmission line. The ECOP will be provided guidelines for best operating practices and environmental management guidelines to be followed by China Electric Power Equipment and Technology Co., Ltd for sustainable management of all environmental issues. This ECP could be annexed in the general conditions of all the contracts carried out for the subprojects of the project.

All above mentioned code of practice is the target and contents of management during the construction of substation. The monitoring of substation activities will come from all issues of code of practices. China Electric Power Equipment and Technology Co., Ltd will follow above ECOP and CESMMP will base on above practice. The total environmental code of practices are attached an appendix C.

2.1 Target and content of the Construction Environmental and Social Management and Monitoring Plan (including Health and Safety)

The Construction Environmental and Social Management & Monitoring Plan (CESMMP) will have made to implement at the site in order to avoid or minimize environmental and social impacts. The CESMMP presents an overview of required measures and sub -plans; labour management plan, dust management plan, noise management plan, wastewater management plan, traffic management plan, waste (solid, hazardous) management plan, soil and erosion management plan, emergency preparedness & response plan (fire safety plan) for public health and safety management plan, stakeholder engagement plan, local recruitment plan, code of conduct for the workforce and occupational health & safety management plan.

The framework of ADB's Safeguards Policy Statement (SPS) provides guidance for the development of the detailed environmental and social management and monitoring plan for the construction of the SS project. During the period of the substation construction work, the entire workforce will accommodate in temporary camps or in rental houses nearby the substation yard or out site of the substation yard. The accommodation of labour in substation yard will be approved by PGCB. Usually, the distance of lobour accommodation area will be 1-2 km from the substation yard. It is therefore anticipated that one camp will construct at the Kaliganj SS yard with the accommodation of the entire workforce.

PGCB will accompany for the inspection of substation construction work. The location will be selected by the sub-contractors who will take into account such aspects as access to construction site, access to services, access to materials etc. China Electric Power Equipment and Technology Co., Ltd will enter into an agreement with the house owner for the establishment of construction camp as project time period basis. The rental house will have road commutation, less traffic, hygienic location, availability of water (drinking) and hygienic sanitation opportunity. The substation project is a fixed located project and PGCB has already been acquired land as per the Acquisition and Requisition of Immovable property Act, 2017, Electricity Act 2018 and Electricity rules 2020.

China Electric Power Equipment and Technology Co., Ltd will follow all logistic (construction procedure of control building as BNBC, erection & stringing work as per guideline of PGCB, environmental aspects/impacts, environmental monitoring, social, labour law 2006) of Bangladesh. China Electric Power Equipment and Technology Co., Ltd will also include as per national and international logistics (ECR 1997, Labour Law, OHSA, NIOSH, WHO etc.) in CESMMP

During the construction phase of the substation, the laboratory based environmental monitoring will be conducted by accredited laboratories approved by Bangladesh Accredited Board (BAB) using the instrument with calibrated and maintained equipment. Kaliganj substation of package-5 under DWZTGEP will be constructed by China Electric Power Equipment and Technology Co., Ltd. The quarterly [after every three month] progress report including monitoring data and information will be submitted to PD office of DWZTGE, PGCB. The construction of substation project will be within the temporary boundary wall. Air sampling will carry out at the substation yard for measuring the level of dust as well as other air quality parameters as per ambient air quality standard 2022. Noise will measure at the boundary wall of the SS project. Groundwater will collect from deep-tube well water within the temporary boundary wall. But surface water will collect from Tongi khal or nearby canal (South side). During the total project period, the environmental monitoring will be done at the construction site of Kaliganj substation by China Electric Power Equipment and Technology Co., Ltd. The air noise and water samples will collect at pre -construction stage as a base line study of the Kaliganj project locations. The air, noise and water samples will collect in same way during construction phase of Kaliganj substation. The comparable any deviation or variation between two results of environmental monitoring will give idea to PGCB for further modification.

Quarterly Surface water will collect from Tongi Khan or canal [south side of the SS project]. Quarterly Ground water sample will collect from Kaliganj new substation projects of their own ground water sources. China Electric Power Equipment and Technology Co., Ltd will be boring for groundwater and this water will be tested for Kaliganj substation project. The soil samples will collect to see the fertility from cropland adjacent to the substation project in quarterly basis. Noise level will measure in quarterly during the construction period of DWZTGEP (P5). PGCB will review the environmental monitoring reports along with monitoring results of the Kaliganj substation projects.

The materials, supplies, equipment, and personnel requirements are largely guided by technical aspects of monitoring and such requirements thus, largely control the budget of the monitoring program. China Electric Power Equipment and Technology Co., Ltd will arrange all kinds of equipment, accessories of substation-making items and engage technically efficient personals. China Electric Power Equipment and Technology Co., Ltd will compare the air quality values with different standard levels (ECR 1997, WHO) and also previous results of IEE report (June 2019).

Table: 2 .1: checklist of issues/ impacts for construction environmental & social management plan (CESMP) with action and Key Performance Indicator

Impacts/ Issues	Actions	Key Performance Indicator
Soil erosion; soil and water contamination (Construction workers camp establishment and operation)	Camp management plan will implement. Photographs will take to record the site conditions prior to the establishment of the camp. Land clearing, leveling and grading will be minimized and carried out in a manner to minimize soil erosion. Camp will have rainwater drainage arrangements. Camps will have to protection arrangements against soil erosion. Identification suitable sites for disposal of hazardous and non-hazardous waste. The selection will be done by the consultation with the PIU and the local municipal authorities. No waste disposal will carry out in khals, beels and rivers. Confinement of the contaminants Immediately after such accidental spillage. Collection of contaminated soils, treat and dispose them in environment friendly manner. All areas intended for storage of hazardous materials to be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulation. The camp site area will completely	Results of water quality analysis. Number of related complaints.

	restored after completion of construction works.	
Vegetation loss; threat to wildlife and fauna	Clearing natural vegetation will avoid as far as possible. The camp will establish in a natural clearing to the extent possible. Complete record will maintain for any tree cutting. The camp staff will not indulge in any animal shooting, trapping, catching or killing activities. Include information on wildlife protection in all too box orientation briefings for camp staff. Contractor shall use lower wattage flat lens fixtures that direct light down and reduce glare and shall avoid use of flood lights. China Electric Power Equipment and Technology Co., Ltd will also raise awareness about the protection of birds and other wildlife species among the work force to reduce impacts such as disturbance and poaching. To move the bird nest, make an alternate nest nearby and carefully move the hatchlings—not unhatched eggs which will be done by China Electric Power Equipment and Technology Co., Ltd	Number of any non-compliance reports. Number of trees felled. Number of sighting of key wildlife species.
Community Health and Safety issues	Entry of the site personnel in the local communities will minimize to the extent possible / appropriate. OHS plan will be prepared and implemented by China Electric Power Equipment and Technology Co., Ltd. Protective fencing to be installed around the Camp to avoid any accidents. The community will inform about the nature of construction activities and the associated health and safety risks; awareness rising of the communities will	Number of any non-compliance reports. Number of trainings conducted.

	carry out for this purpose with the help of training sessions, posters, signage and other similar means. Location and telephone numbers of the nearest hospital will display at appropriate places at work sites and in construction camps. If necessary, an ambulance can be made available at the site.	
Social and Gender Issues	Code of conduct will implement. Local norms and customs will respect. Camp crew will avoid entering the villages. No child labor will be employed in the camps by China Electric Power Equipment and Technology Co., Ltd.	Number of non-compliance reports. Number of related complaints.
Sites of archeological, cultural, historical, or religious significance	In case any artifacts or sites of archeological, cultural, historical or religious significance are discovered during camp clearance, the works will stop, and the Archeological Department will inform. Bhawal Estate was the second largest zamindari in Eastern Bengal which is situated in Gazipur district , The distance between Bhawal Estate and ,400 kV GIS SS Kaligonj is13.31 which is not fallen with area of historical and Ecologically Critical Area	Number of non-compliance reports
Odor	Waste disposal sites will locate away from the communities. Regular maintenance of waste management facilities will undertake.	Number of related complaints.
Hydrocarbon and chemical storage and handling	Visual Inspection of storage facilities.	No leakages from the containers in the storage. Handling follows procedures to avoid spillages. Monthly report keeping.
Grievances	In the project area number of grievances must be registered and addressed.	Minutes of grievance redress meetings; number of grievances received;

		number of grievances resolved. Monthly record keeping.
Bird collision and electrocution data	Walk over surveys and interviews.	Zero mortality. Record keeping.
Electro-magnetic fields	Measurement through appropriate equipment	WHO recognized standards maintaining. Yearly record keeping.
Air Quality	Water spraying will continuation at the project area for air dust pollution	The air quality parameters will keep within the limit of ambient air quality standard 2022 for Bangladesh
Noise Level	Noise level from work site will measure and level of noise will be kept as per different zones of ECR (salient, residential, mixed, commercial and industrial zones). The corona noise may be produced at time of straining of metal wire.	The high sound level which may be produced from the work site will not disturb the locality of substation site. The tension of stringing wire will be increased to reduce the corona noise from LILO line and high voltage OHTL near substation
Water quality	China Electric Power Equipment and Technology Co., Ltd will control water pollution from the Kaliganj substation project. Effluent from pilling side will discharged before settling	Water quality will keep within the standard limit as per ECR 1997
Soil quality	China Electric Power Equipment and Technology Co., Ltd will reduce the soil contamination by diesel oil, lube oil from the project sides	Soil quality will be kept within the standard limit USEPA
Traffic Impact	China Electric Power Equipment and Technology Co., Ltd will be controlled traffic by managing road traffic, recruited a person who will be controlled site traffic at	The traffic control will reduce as rules of BRTA and Road Transport Act 2018 in Bangladesh (SRO No 333 Law/2019)

	substation area.	

Table 2.2: Checklist of monitoring Plan for occupational health and safety issues, labor camp condition traffic congestion

Monitoring Aspect/issues/ activities	Monitoring Parameter	Standards/ Guidelines	Means of Monitoring	Frequency	Location	Implementing Agency	Monitoring Agency
Labour Camp	Living arrangement, drinking water, cooking arrangement , Sanitation facilities, dust explosion, mosquito net and waste collection bin	-	Visual inspection	Monthly but it will report in quarterly	Kaligonj substation yard	CET	PGCB, ADB
Traffic condition	Local traffic near the substation near high-way/road	BRTA	Traffic congestion	Daily	Kaligonj substation yard	CET	PGCB, ADB
Occupational health and safety issues	PPEs like hand gloves, spectacles for eye protection, helmets, masks, visible jacket, earplug, and safety boots	BLL, OHSA, NIOSH	Health and safety	Daily	Kaligonj substation yard	CET	PGCB, ADB
Accident	Any incidental event	-	-	Daily	Kaligonj substation yard	CET	PGCB, ADB
Tree plantation	-	-	-	After completion of project	Kaligonj substation yard	CET	PGCB, ADB

In the above cost purposes, reporting, environmental monitoring with cost inherent for the test of air, water, noise and soil. To implement the project properly, environmental, social, health safety specialists will recruit in the project schedule. In the civil work, site fencing, land acquisition, compensate for agriculture goods, traffic safety, the rental cost of the labour camp at substation sites, awareness poster & program for labours and surrounding population, transportation coats of labour from worksite to the site of substation project. To mitigate the corrosion impact,

resettlement of flora, fauna, tree plantation, cooking arrangement, retained biodiversity will include in the cost.

2.2 ADB Safeguard Policy Statement (SPS) 2009

The ADB's Policy objectives on involuntary resettlement are to (i) avoid involuntary resettlement wherever possible; (ii) minimize involuntary resettlement by exploring project and design alternatives; (iii) enhance or at least restore the livelihoods of all DPs in real terms relative to pre-project levels; and (iv)improve the standards of living of the displaced poor and other vulnerable groups.

The Involuntary Resettlement Safeguard covers physical displacement (relocation, loss of residential land, or loss of shelter) and economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods) as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas. It also covers whether such losses and involuntary restrictions are full or partial, permanent or temporary. The following Involuntary Resettlement Policy Principles are followed by ADB, these are

- Screen early to identify involuntary resettlement impacts and risks and determine the scope of resettlement planning through a survey and/or census of DPs, including a gender analysis, specifically related to resettlement impacts and risks.
- Carry out meaningful public consultations with DPs and affected local communities. Inform all DPs of their entitlements and resettlement options and ensure their participation in various stages of the project especially vulnerable and poor groups. Establish a GRM to receive and facilitate resolution of the AP's concerns. Support the social and cultural institutions of DPs and their host population.
- Improve, or at least restore, the livelihoods of all DPs through (i) land- based resettlement strategies when affected livelihoods are land based where possible or cash compensation at replacement value for land when the loss of land does not undermine livelihoods, (ii) prompt replacement of assets with access to assets of equal or higher value, (iii) prompt compensation at full replacement cost for assets that cannot be restored, and (iv) additional revenues and services through benefit sharing schemes where possible.
- Provide physically and economically DPs with needed assistance, including the following: (i) if there is relocation, secured tenure to relocation land, better housing at resettlement sites with comparable access to employment and production opportunities, integration of resettled persons economically and socially into their host communities, and extension of project benefits to host communities; (ii) transitional support and development assistance, such as land development, credit facilities, training, or employment opportunities; and (iii) civic infrastructure and community services, as required.

- Improve the standards of living of the affected poor and vulnerable group to at least national minimum standards. In rural areas provide them with legal and affordable access to land and resources, and in urban areas provide them with appropriate income sources and legal and affordable access to adequate housing.
- Develop procedures in a transparent, consistent, and equitable manner if land acquisition is through negotiated settlement to ensure that those people who enter into negotiated settlements will maintain the same or better income and livelihood status.
- Ensure that DPs without titles to land or any recognizable legal rights to land are eligible for resettlement assistance and compensation for loss of non-land assets.
- Prepare a DRP elaborating on DPs' entitlements, the income and livelihood restoration strategy, institutional arrangements, monitoring and reporting framework, budget, and time-bound implementation schedule.
- Disclose both the BRP and DRP in a form and language understandable to DPs and other stakeholders.
- Conceive and execute involuntary resettlement as part of a development project or program. Include the full costs of resettlement in the presentation of project's costs and benefits. For a project with significant involuntary resettlement impacts, consider implementing the involuntary resettlement component of the project as a stand- alone operation.
- Pay compensation and provide other resettlement entitlements before physical or economic displacement. Implement the DRP under close supervision throughout project implementation.
- Monitor and assess resettlement outcomes, their impacts on the standards of living of DPs, and whether the objectives of the DRP have been achieved by taking into account the baseline conditions and the results of resettlement monitoring.

Safeguard Policy Statement is a document drafted by the PGCB for resettlement, specifying the procedures it will follow and the actions it will take to properly resettle and compensate affected people and communities. PGCB may check all activate at all times to ensure that adverse effects during the construction phase are avoided and the CESMP are duly implemented. For the construction period, China Electric Power Equipment and Technology Co., Ltd will comply with the requirement of the CESMP as part of his contractual obligations, which covers all aspects of the project. It will further require to customize the overall CESMP and to develop as it and works specific Construction Environmental Social Management Plan (CESMP) including all necessary sub-plans as indicated in the CESMP.

As per the Acquisition and Requisition of Immovable Property Act, 2017, Section 2(1) for the substation project, Power Grid Company of Bangladesh Ltd has already paid for buying fixed land of Kaliganj substation.

2.2.1 Process of Compensate as per the Electricity (Amendment) Act 2018

For the purpose or the interest of the public, the Government of Bangladesh can acquire other's property by paying compensation. It may be for the temporary or permanent basis. If it is taken over for permanently but afterward if it is not used, the government does not bind to return it. However, lands used for graveyards, places of cremation, religious or educational instructions are usually not taken over. On the basis of duration, taking over is of two kinds. Government, non-government or semi-government private agencies or departments carry out development works for the purpose or interest of public. Development works may be carried out in their own lands or in lands taken over by the government with due compliance of some definite processes or rules. This process is generally called as acquisition of land. Development works are generally permanent nature and are carried out directly or indirectly on or over the land which is taken over by way of acquisition. the newly enactment Act, The Acquisition and Requisition of Immovable property Act, 2017, Section 2(1) defines the term as follows: "Acquisition means acquiring the ownership and possession of any immovable property for any requiring person or organization in exchange for compensation or rehabilitation or both." The new law states that lands of worship can also be acquired now only if it is indispensable in public interest. The bill proposes increasing compensation of the affected people as the previous law lacked the provisions. The new law provides for an additional 200 percent compensation on the market rate if any land is acquired for the government project and the compensation will an additional 300 percent if the land is for any non-governmental organization. It also provides for the appointment of joint district judge level officials as the arbitrator in this type of cases. But the appeal, if there is any, will be heard by district judge level officials. The purpose of a substation is to 'step down' high voltage electricity from the transmission system to lower voltage electricity so it can be easily supplied to homes and businesses through our distribution lines. As per Electricity Act, 2018 (S.RO. No. 28-Law/2019) Government of Bangladesh shall make necessary arrangements for the development and reformation of power generation, transmission, supply and distribution systems, introduction of advanced technology and sale and purchase of power and relevant work. As per public interest and for continuously distributing electricity, Govt. of Bangladesh has taken land for substation at Kaliganj through the appropriate compensate of the land. All documents of land acquisition for the Kaliganj substation are preserved by PGCB of the project "Dhaka and Western Zone Transmission Grid Expansion Project". The status of compensation or compensate of affected persons (APs) will include in the baseline study of Environmental & Social Safeguard Compliance Report through the public consultation. If any grievance will outcome from the affected person near the substation area regarding land acquisition, all APs can be able to complain through GRM form at the Kaliganj substation areas.

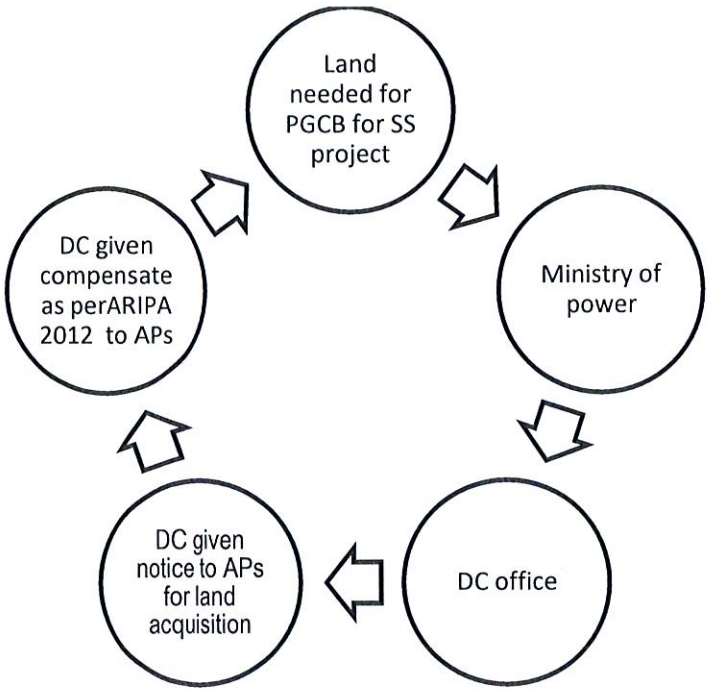


Fig 2.1 Flow chat of compensation process for SS land acquisition

2.3 Stakeholder Engagement Plan (SEP)

ADB's Safeguard Policy Statement requires ADB's borrowers/clients to carry out meaningful consultation processes in all projects financed by AIIB & ADB. For policy application, ADB will require borrowers/clients to engage with communities, groups, or people affected by proposed Kaliganj substation projects, and with civil society through information disclosure, consultation, and informed participation in a manner commensurate with the risks to and impacts on affected communities. For projects with significant adverse environmental, involuntary resettlement, or Indigenous Peoples impacts, ADB project teams will participate in consultation activities to understand the concerns of affected people and ensure that such concerns are addressed in project design and safeguard plans.

The ADB's Safeguard Policy Statement emphasizes requirements for establishing a grievance mechanism that receives and facilitates the resolution of affected people's concerns, complaints, and grievances about a Project's environmental and social performance. The grievance mechanism should be scaled to Project risks and adverse impacts, address affected people's concerns and complaints promptly. It should also ensure the process is understandable and transparent, gender responsive, culturally appropriate and readily accessible to all segments of affected people. It should also not impede access to judicial or administrative remedies. The grievance mechanism should be delivered to the affected people in appropriate manner.

The ADB Public Communications Policy 2011 promotes greater transparency and accountability by enabling ADB's stakeholders—especially people affected by development activities—to better participate in the decisions that affect them. ADB-assisted activities are expected to consider the right of people to seek, receive, and impart information and ideas, and consider feedback from its stakeholders, including affected people. Information shall be given to affected people early enough for them to provide meaningful inputs into project design and implementation.

Stakeholders are people, groups, or institutions, which are likely to be impacted by the proposed Project or benefitted by the Project interventions, or those who can influence the project. In this project, the primary stakeholders include all directly affected persons such as title owners losing land, physically displaced people living on their land, sharecroppers, and indirectly affected persons and communities/ host villages. The secondary stakeholders are NGOs, community-based organizations, community development projects, government agencies, development partners, media, community leaders, civil society, traders, construction laborers, and consultants in the substation project area

To ensure transparency and access to information relating to the project, China Electric Power Equipment and Technology Co., Ltd will take the following measures for the implementation of a stakeholder engagement plan:

- The company's website: the company's website will available to all project partners, and will be used by China Electric Power Equipment and Technology Co., Ltd for making available information on the project, basic assessments, reports, etc. The GPS website will provide information concerning such issues as improvement of the road quality, and the construction details. Access to the feedback on the project, and the grievance mechanism, will ensure.
- Bulletins will prepare and made available in the project office and the municipality office. The Bulletins will include important information on the project, any possible inconveniences to the inhabitants and the traffic during the construction. They will also provide information on the contact with China Electric Power Equipment and Technology Co., Ltd, as well as details of the possibility of access to the Grievance Mechanism.
- Participation in events in the municipality to ensure involvement in all local occurrences and initiatives.
- Public consultation and direct meetings with stakeholders.
- Notice boards, on which the most up-to-date information on the project developments, and the possible inconveniences to the local population, will display.
- Project/site office, in which an opportunity to submit comments/complaints, as well as access to the Project documentation, will provide.

- Communication through employees and contractors – information meetings about the most important risks and impacts.
- Placing of information signs concerning the existing risks associated with the project implementation.
- Reports of the post-development analyses and monitoring will publish and/or forwarded to appropriate authorities / institutions following national and international regulations.
- Grievance mechanism – implementation of the internal and external grievance mechanism.
- Supporting local measures associated with the improvement of the quality of living and the environment through, inter alia, co-financing of educational institutions, or participating in the costs of environmental projects.

2.3.1 Stakeholder engagement schedule

Stage of the Project	Schedule	Measures
Preparation and obtaining of permits	Implementation of the stakeholder engagement plan As from the submission of documentation – on an ongoing basis	Making publicly available of the SEP Launching the grievance mechanism Informing of the course of proceedings as regards Environmental Impact Assessment and obtaining the building permit
Construction	A minimum of 30 days prior to the commencement of construction work Commissioning and hand-over to operation	Information for municipalities, enterprises and inhabitants prior to the commencement of construction work, and reminding of the contact details and the grievance procedure – information in local newspapers. Establishing rules for submitting comments for the construction firm employees. Information for municipalities and inhabitants, information in local newspapers.
Operation	Post-development environmental monitoring	Forwarding the results to the competent authorities – in accordance with the existing regulations – and publishing of relevant information on the website

The environmental and social risks and impacts identification process should determine whether the proposed location of a project is in areas where cultural heritage is expected to be found, either during construction or operations. In such cases, as part of the **China Electric Power Equipment and Technology Co., Ltd** 's CESMP, the client will develop provisions for

managing chance finds through a chance find a procedure that will apply in the event that cultural heritage is subsequently discovered. The client will not disturb any chance to find further until an assessment by competent professionals is made and actions consistent with the requirements of this Performance Standard are identified.

2.4 Grievance Redness Mechanism

Grievance Redress is a very important part of resettlement project implementation. Therefore, this project will follow the specific grievance redress mechanism to ensure that the voices of the APs merge with implementation decisions. Affected people and communities will set their arguments to the grievance redress committee (GRC) consistent with the grievance redress method. The structures, processes, and outcomes are described in the following sections. Environmental, social and public health concerns may be raised by the affected persons and their communities in the period of project involvement and construction activities. Transparency is a demand of communities and affected people in procurement and maintaining the quality of construction. They may also be paying attention to construction activities. Complaints and grievances may, therefore, range from land acquisition, resettlement, procurement, and quality of works on site. A dispute over ownership and inheritance of the acquired lands of affected persons and assets missed by the census, joint verification, and valuation of affected assets, compensation payment, and the like may arise in the process of resettlement.

To solve the resettlement related disputes and make the project accountable to the affected people and their community, a complaint and grievance mechanism will work. Based on "extra-legal" method the Grievance Redress Committee (GRC) will be officially recognized community to resolve disputes arising out of various matters related to land acquisition, resettlement, environment, safety, and other social concerns.

If any of project affected person want talk about grievance related issue, s/he can contact with PD of Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP) through the local representative of Power Grid Company of Bangladesh. The fundamental objectives of this mechanism are to resolve any resettlement-related grievances locally in consultation with the aggrieved party to facilitate smooth implementation of the social and environmental action plans. Democratizing the development process at the local level and to establish accountability to the affected people are the main objectives of the grievance redress system. A GRC has been set up under the DWZTGE project. All the issues related to grievances will be presented through GRC.

Complaints and Grievance Mechanism

Affected people may appeal any disagreeable decision, practice, or activity arising from land and assets and from construction related activities to the grievance redress committee. APs will fully have informed of their rights and of the procedures for addressing complaints, whether verbally

or in writing during consultation, survey, and time of compensation. The project planning and implementation will careful enough and provide advance counseling and technical assistance to the APs in the land acquisition and compensation collection process to prevent grievances. This will ensure through careful land acquisition and resettlement (LAR) design and implementation, by ensuring full participation and consultation with the APs, and by establishing extensive communication and coordination between the affected communities, the PGCB, and local government bodies.

2.4.1 Grievances Redress Committees (GRCs)

A three-tier bottom up GRC system will establish in this substation project. The second GRC will consist of the following persons: (i) project director; (ii) representative of city ward; (iii) representative of the affected persons; (iv) representative of the local deputy commissioner's office (land); and (v) representative of the Department of Environment (DOE) for environmental related grievances. A hearing will call with the GRC, if necessary, where the affected person can present his or her concerns and issues. The process will facilitate resolution through mediation. In the event that a grievance cannot be resolved directly by the PIU (first tier) or GRC (second tier), the affected person can seek alternative redress through the city ward committees or in appropriate courts. The APs will be informed through public consultation that they have a right to have their grievances redressed by the local committees as well as by the project management or project implementation units. The APs can also call upon the support of the implementing Upazila Chairman/ representative engaged to implement the RAP to assist them in presenting their grievances or queries to the GRC. Other than disputes relating to ownership right under the court of law, the GRC will review grievances involving all resettlement assistance and other support. The local GRCs (at the union/Upazila/municipal level) will hear the grievances first. Only unresolved cases will forward to the next tier – Project level GRC for further review and resolution. Grievances will redress within a month from the date of lodging the complaints. GRC decisions will on a majority basis and will disclose and available for review by the stakeholders. If any disputant is unhappy or unsatisfied with the outcome of the Project level GRC, he/she may file cases in the court. GRCs at the union/Upazila/municipal level will form with representatives from PGCB, Representative of RAP implementation consultants, local elected members. There will one GRC at the local level by the project to make it accessible to affected people both in terms of distance and time.

The member secretary of GRCs will regularly available and accessible for APs to address concerns and grievances. One representative of the affected people (male or female) will participate in the grievance redress sessions when the complainants will a female. The GRC processes (both local and Project levels) in terms of legal and other interpretation matters.

Table 2.3: Three levels GRC for the substation project of package 5

GRC of the DWZTGEP			
Sl No	**Name & Designation**	**Name of the office**	**Status in Committee**
1	DPD of package 5	DWZTGEP, PGCB	Convener
2	Executive Engineer of package 5	DWZTGEP, PGCB	Member
3	Manager Account & Admin	DWZTGEP, PGCB	Member
4	Sub-divisional engineer/ Assistant Engineer of package 5	DWZTGEP, PGCB	Member
5	Project manager of China Electric Power Equipment and Technology Co., Ltd	China Electric Power Equipment and Technology Co., Ltd site office	Member
6	Representative of RAP implementation consultants	RAP implementation consultants	Member
7	Local Union Parishad Member	Union Parishad, Rurgonj	Member
Kaliganj, Gazipur			

2.4.2 Scope and Jurisdiction of GRC

The scope of work and jurisdiction of GRC are:

- The GRC shall evaluate, consider, and resolve grievances, related to social/resettlement and environmental mitigations during implementation, received by the committee.
- Any grievances presented to the GRC should ideally be resolved on the first day of the hearing or within a period of one month, in cases of complicated cases requiring additional investigations.
- Grievances of indirectly affected persons and/or persons affected during project implementation will also be reviewed by GRC.
- The GRC will not engage in any review of the legal standing of an "awardees" other than in direct losses or distribution of shares of acquired property among the legal owners and associated compensation or entitlement issues.
- GRC decisions should ideally be arrived at through consensus, failing which resolution will base on majority vote. Any decision made by the GRC must be within the purview of RAP and entitlements.
- The GRC will not deal with any matters pending in the court of law.
- A minimum three (3) members shall form the quorum for the meeting of the GRC.

2.4.3 Filing Grievance Cases and Resolution Process

The persons interested will able to file their grievances without any fear and intimidation. Where required, the GRC will assist the people in drafting the grievances. All grievances must be submitted in writing to the Chairman, GRC at the local level. The complaints may be represented by the AP him/herself or through the appointed agent such as locally selected official/legal advisor. The judgment made by GRC will communicate to the concerned aggrieved person in writing. If dissatisfied with the agreement of the GRC, the concerned aggrieved person may request through the convener at the local level GRC, a further review of the judgment of GRC by the Project-level GRC. In such cases, the case will forward to the Convener of the project-level GRC with all documentations by the local level GRC. If the disputant remains unsatisfied, he/she can go to the formal court of law. Through community meetings, notices and pamphlets in the local language (Bangla), and the GRC procedures and operational rules will publicize widely so that affected people are aware of their rights and obligations, and procedure of grievance redresses.

GRC meetings will be held in the respective Field Office of PGCB or other location(s) as agreed by the Committee. If needed, GRC members may undertake field visits to verify and review the issues on dispute, including titles/shares of the land parcel, land occupancy, or other relevant matters. Resolution of complaints will finish within 7 working days. Investigation of grievances will involve site visits and consultations with relevant parties (e.g., affected persons, contractors, traffic police, etc.). Grievances documents and personal details (name, address, date of complaint, etc.) will include, unless anonymity is requested. Local GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within 15 working days. China Electric Power Equipment and Technology Co., Ltd will have observer status on the committee. If unsatisfied with the decision, the existence of the GRC shall not impede the complainant's access to the government's judicial or administrative remedies. Initial grievance sheet (including the description of the grievance) with an acknowledgement of receipt handed back to the complainant when the complaint is registered at the filed level site office of substation projects. Closure sheet, one copy of which will hand to the complainant after he/she has will be agreed to the resolution and signed off. Grievance monitoring sheet, mentioning actions taken (investigation, corrective measures) will inform to affected persons. The updated register of grievances and complaints will available to the public at the SEC office, substation construction site, and other key public offices along the project area. Should the grievance remain unresolved, it will elevate to the second tier or third tier. The complaints and grievances from the aggrieved persons will address through the process described below.

2.4.4 Grievance Resolution Process

Step 1	The GRC on behalf of PGCB informs person-interested and counsels them about the project goals, objectives, role of people and project authority in project implementation, land acquisition and resettlement policy, compensation and entitlement modalities, entitlement packages, and eligibility and process to obtain the

	entitlements, etc. during consultation meetings and on regular personal contact. People with clear understanding of the approach to GRC and PGCB for solution of the problems and compensation under law and assistance (in case of acquisition) as applicable. People-interested with confusion and valid complaints on land acquisition and resettlement process, entitlements or any other issues related to project implementation approach GRC for resolution. The aggrieved persons may also opt to produce their grievances directly to the Deputy Project Director (DWZTGEP, PGCB)
Step 2	The implementing agency assists the aggrieved PAPs to produce a written complaint to the convener of GRC with stories and expectations. The GRC counsels the aggrieved persons on the mandate and procedure of grievance resolution. GRC scrutinize the case records and sort out cases to be referred to the DC or the court of law and those to be resolved in GRC. Hearing is organized on cases with merits at the GRC secretariat at local level and resolution is given by the GRC within one month of receiving the complaints. Aggrieved persons satisfied with the resolution approach PGCB for quick implementation of the decision under the provision of the RAP. The agreed resolution is forward to PGCB central office for approval by the Deputy Project Director before execution of the decision. In case, the resolution is not acceptable to the aggrieved person, he/she approaches the Deputy Project Director of DWZTGEP, PGCB (project level GRC) through the local level GRC convener with assistance from the implementing agency for further review.
Step 3	Cases with all proceedings are placed with the Deputy Project Director of DWZTGEP, PGCB for review. The DPD with assistance from the GRC members will review and take decision. If found necessary, field investigation is carried out and the resolutions are given within one month of receiving the complaints. The resolution will send to the Conveners office of the local level GRC to communicate to the aggrieved persons for acceptance. The resolution accepted by the aggrieved person is then approved by the DPD. In case the resolution is not acceptable to the aggrieved person, he/she approaches the court of law for resolution.
Step 4	The resolution accepted by the aggrieved persons at any level (local or project level) is approved by the Deputy Project Director and forwarded back to the Conveners' office keeping records at his/her office. Based on the approved grievance resolution, the implementing agency processes his/her entitlements and assists PGCB in quick execution of the resolution.

The total GRM process resolution and approved GRC and GRM form are attached Appendix D

2.4.5 Approval of GRCs and Entitlements of GRC Members

All the decisions and proceedings of GRC meetings at any level will finally approved by the Deputy Project Director, PIU, and PGCB. According to the agenda of the resettlement plan, the approved GRC decisions will implement in a particular location.

Affected people will exempt from all administrative and legal fees, according to the RAP proposes. Complainants to the court will also have the right of free legal representation. The detailed procedures for redress of grievances and the appeals process will widely publicize among the parties involved.

All GRC members will attend a training and orientation meeting earlier, to commence of their work. Project staff and consultants/resettlement Specialists will conduct the training.
Grievances will be heard once a month by GRC. Before starting project construction work the resettlement process has to be completed, the GRC may meet more than once in every 30 days depending upon the number of such cases. Within 15 days of the hearing of the grievances the GRC will inform the concerned aggrieved persons of their decision.

2.4.6 Grievance Redress Monitoring

The Project Manager of PIU will keep records of all the grievances and their redress in monthly cumulative formats, which will be provided by the INGO and to be signed by the convener of the Grievance Redress Committee. The format will contain information on the number of grievances received with nature, resolved, and the number of unresolved grievances.

2.4.7 Land Acquisition information & GRC issue:

The procedural steps of resolving grievances will have some terms of references (TOR) about land acquisition and GRC at the Kaliganj substation sites. GRC procedures and operational rules will publicize widely through community meetings and pamphlets in the local Bangla language so that project affected persons (PAPs) are aware of their rights and obligations, and procedure of grievance redress. All local GRC documents will be maintained by the China Electric Power Equipment and Technology Co., Ltd for review and verification by Construction Supervision Consultant (CSC), [RAP implementation consultants, ADB], development partner (ADB) and any external reviewers. The PGCB Field Office(s) will act as the secretariat to the local GRCs. As a result, the records will up-to-date and easily accessible on-site.

Step-1	PGCB, through the project implementation Contractor (**China Electric Power Equipment and Technology Co., Ltd)**, informs the PAPs of their losses and entitlements in writing and through personal contact. If satisfied, the PAPs claim compensation payment from the PGCB. If confused,
Step-2	The PAPs approach to the China Electric Power Equipment and Technology Co., Ltd for clarification on the provisions, loss and entitlements. If satisfied with the clarification, the PAPs claim compensation payment from the PGCB. If not satisfied,
Step-3	The PAPs approach to the GRC. China Electric Power Equipment and Technology

	Co., Ltd staff assists the PAPs in producing the complaints and organize hearing within 30 days from the date of complaints being lodged.
Step-4	GRC sessions are held with the aggrieved PAPs. The minutes are recorded and duly considered. If the matter is resolved, the Project Director gives approval. If not resolved,
Step-5	The aggrieved person may accept the GRC decision or can bring the case to the court of law for settlement.
Step-6	The minutes of the GRC sessions, approved by the Project Director, are sent to the concerned officials for arranging payment. The final verdict is communicated to the aggrieved PAPs, who then claim their compensation payment from the PGCB through China Electric Power Equipment and Technology Co., Ltd

Land acquisition information has disclosures to local public during the stakeholder consultation and participation is a key aspect of resettlement projects according to the ADB RAP policy. Participation in consultation meeting is ensured by using Participatory Rapid Appraisal (PRA) approach. Both primary and secondary stakeholders of the project are informed through personal contact, informing the land owners, phone communication, etc. The key objectives of the consultation meetings are to - (i) disclose both positive and negative impacts of the project to the community and stakeholders; and (ii) ensure inclusion of views and opinions from the project affected persons about project impacts in their livelihood and social wellbeing (iii) land owners are known that their land will use for the construction of substation project. The informal meetings has arranged with land owners as they are the most prominent groups for the substation project. In addition, opinions from local respectable persons, vulnerable and disadvantaged groups has taken into consideration and comprehensively gathered during the consultation meetings. After public consultation, PGCB is sent notice to the land owners of substation areas for their land acquisition. Project affected person is met with respective DC office for their land compensation. The deputy commissioner is then under obligation to determine compensation in accordance with the guidelines mentioned in Electricity Act 2018. He is then required to offer compensation money to the owners and make payment before taking over possession. After acquisition of the substation lands, registered lands then taken over by PGCB. All registration of land and their respective papers & documents will hand to the PMU, PGCB

2.5 Implementation plan for Kaliganj substation

An implementation plan for the Kaliganj substation is a document that outlines the steps where PMU of PGCB will give plan to project implementation unit (PIU) of **China Electric Power Equipment and Technology Co., Ltd** will take to accomplish a shared goal or initiative. The implementation plan is the step-by-step guide for PGCB's and ADB's goals will be achieved by China Electric Power Equipment and Technology Co., Ltd. An implementation plan is a project management tool that facilitates the execution of a strategic plan for a company or a project by breaking down the implementation process into smaller steps within the timeline, the teams and

the resources this will need. In this case, **China Electric Power Equipment and Technology Co., Ltd** will give plan to PGCB for each component of Kaliganj substation project; PGCB will see the plan accordingly and will give schedule of construction for each component of Kaligonj substation. Scheduling the substation project milestones is an important step in the planning process because these checkpoints help to progress during execution of Kaliganj SS project. Milestones serve as metrics—they are a way to measure how far come in your project and how far you have left to go. To visualize project milestones and keep entire team on track, use a Gantt chart. China Electric Power Equipment and Technology Co., Ltd will give plan with Gantt chart of project milestones for substation component (Land filling, boundary wall, control building, cable drain, transformer platform etc.)

Table 2.4: Gantt chart for the construction of Kaliganj substation under package 5

30 months	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5	Quarter 6	Quarter 7	Quarter 7	Quarter 8	Quarter 9	Quarter 10
Civil work											
Land filling											
boundary wall											
control building											
Cable drain											
transformer platform											
Internal Road & concrete culverts											
Erection											
Erection of tower											
Cabling											
Stringing											
Line stringing among towers in SS											

Chapter 03

Environmental Social Health & Safety (ESHS) Resources

3.0 Environmental Social Health & Safety (ESHS) Resources

China Electric Power Equipment and Technology Co., Ltd management team will identify and communicate to all persons working under the control of PGCB. This person(s) will have specific responsibility for environment, social, health, and safety (ESHS) with clear and defined roles and authority for:

- Ensuring that an environment, health and safety management system is established, implemented and maintained in accordance with the requirements of this standard,
- Defining roles, allocating responsibilities and accountabilities, and delegating authorities to facilitate an effective and efficient environment, health and safety management system. Roles, responsibilities, accountabilities, and authorities shall be documented and communicated,
- Ensuring that reports on the performance of China Electric Power Equipment and Technology Co., Ltd its environment, health and safety management system are presented to appropriate China Electric Power Equipment and Technology Co., Ltd top management for review, including recommendations for improvement, and used as a basis for improvement of its environment, health and safety management system.

All those with the environmental, social, health and safety management responsibility shall demonstrate and document their commitment to the continual improvement of environmental, social, health and safety performance. **China Electric Power Equipment and Technology Co., Ltd shall** require that all persons working under its control take responsibility for the identified environmental, social, health, and safety aspects/risks in their workplace and adhere to **China Electric Power Equipment and Technology Co., Ltd applicable** environment, social, health, and safety requirements.

3.1 Human Resources

The Human Resources (HR) Strategy establishes a merit-based effective system that supports ADB's vision and strategies. This represents a major cultural change and commits ADB to improve the effectiveness of its human capital, introduce a new performance management and rewards system, and disseminate widespread leadership throughout ADB. **ADB** needs highly qualified, experienced, dedicated, and motivated staff to carry out the construction of Kaligonj substation project

Based on an approach to community action, China Electric Power Equipment and Technology Co., Ltd considered two groups of human resources: Human Resources from officials (engineers, HR, administration, official) and Human Resources from the hiring labour must make sure that the policies of human resource management being consistent with tenant companies with its own policies, the Bangladesh legislation and the ILO, labour law of Bangladesh policies.

Table 3.1: ESHS unit of China Electric Power Equipment and Technology Co., Ltd

Sl No	Name	Designation	Contract no
1	Geng Jialing	Contractor's Representative Project Director / Project Manager	+8618202770077
2	Wu xiao bo	Substation Design Engineer	+8615202803443
3	Fan Jian ye	Site Manager/Executive Project Manager	+8615838395844 +8801743316337
4	Liu yang	HV Electrical Engineer/ Chief supervisor for GIS substation	+8613419505928 +8801923239963
5	Yang rong chun	Control & Protection Engineer	+8613540045735
7	Zhang long fei	Substation Civil Engineer	+8613129903972
8	Yang yuan xiong	Health & Safety (Accident Prevention) Officer*	+8613908630032
9	Mashud Mahamud	Contractor Representative	+8801722529169
10	Zou meng	Social/ Land Acquisition / Compensation Specialist*	+8615202756080

3.1.1 ESHS Manager

In respect of the engineering construction risk and operations management risk for the construction of Kaliganj substation projects, the ESHS group will be formulated comprehensive regulations and systems for project construction, the ESHS manager will be a part of the group who will give various standardized processes and various contingency plans for work method statement for the construction of substation project as well as health & safety aspect at the project side. ESHS manager will ensure that its environmental and social, health and safety (ESHS) policy and legal and other commitments will meet, in an effective and efficient manner.

The ESHS manager will provide a systematic and methodological approach to the identification, assessment, management, and monitoring of Kaliganj substation project environmental and social risks and impacts, through the preparation, construction and operation of the project.

3.1.2 ESHS Supervisor

The Health and Safety Supervisors (HSS) is responsible for the enforcement of health and safety law and will consider taking action against individuals following an inspection or an accident investigation in the Kaliganj separate substation projects. The HSS's enforcement policy states that a prosecution should normally take place in any one of a number of circumstances, including:

a. Understand and implement the Company Safety Policy
b. When a workplace death is caused by a breach of the law;
c. If there has been reckless disregard of health and safety requirements;
d. If the offender's standard of health and safety management is far below what is required. When considering whether to prosecute individuals, the HSS considers the management chain and the role played by individual supervisors. The policy states that action should be taken where an offence was committed with the consent or complicity, or to have been attributable to neglect on the part of the individual.
e. Appreciate the responsibilities of personnel under their authority and ensure that each employee knows his/her responsibility and are equipped to play their part.
f. Ensure that all written schemes and procedures identified in Part 3 of this document are prepared, contain sufficient detail for each task to be critically analyzed, and fully comprehensible to all required to use them.
g. Prepare and maintain a scheme which identifies work equipment requiring inspection by competent persons and ensuring that the equipment is easily identifiable and available for inspection on the date required.
h. Prepare and maintain suitable records of all inspections. These records to identify precisely what was inspected, how, who by, when, any defects found, remedial action taken and the date/time of the next inspection.
i. As the appointed "responsible person" under the Supply of Machinery Regulations ensure that all items of work equipment manufactured in house comply with the essential health and safety requirements of schedule three of the regulations and that all necessary documentation i.e. user and maintenance guides etc. are produced.

3.2 Health & Safety Responsibility

Health and safety is the responsibility of all people in managerial and supervisory roles carry additional responsibilities which must be properly carried out in order that the lower officers can demonstrate their duty of care. Each Manager is responsible for his personal safety and that of all

personnel under his or her authority, including others who may be affected by the China Electric Power Equipment and Technology Co., Ltd's activities.

- Understand and implement China Electric Power Equipment and Technology Co., Ltd safety policy
- Specific legal duties are defined under legislation;
- Tasks and activities can be delegated through the management chain, but accountability cannot;
- Care should be taken when delegating tasks that the person one is delegating to is equipped with the level of competency to discharge those tasks appropriately. Similarly, the same care should be taken during the selection and recruitment of managers and supervisors;
- The enforcing authority (Health and Safety Executive) can and do prosecute individuals in certain circumstances;
- Demonstrating due Diligence is an important responsibility of management;
- Training and development to ensure health and safety knowledge is maintained at an appropriate level is critical.
- Appreciate the responsibilities of personnel under their authority and ensure that each employee knows his responsibility and are equipped to play their part.
- Conduct Risk Assessments on activities within their department ensuring that the methods and systems of work are safe. Also that the necessary procedures, rules and regulations designed to achieve this are formulated, published and applied.
- Provide written instructions of work methods outlining potential hazards and precautions, and ensure they are complied with Ensure accident and near-miss reporting procedures are
- Understood and complied with, and assist with accident investigations where appropriate. Ensure all employees and sub-contractors are suitably trained/competent to carry out the prescribed task and that the necessary licenses/certificates of competence are in force and appropriate.
- Ensure the Statutory Notices, the Safety Policy, Insurance Certificate and the names of Appointed First Aiders are displayed and maintained in prominent locations. Ensure that all new employees in the company are provided with a copy of the policy statement, receive such induction training as may be laid down in procedures, are issued with personal protective equipment as required and their personal responsibilities as set out in this manual.
- Reprimand any employee for failing to discharge their health and safety responsibilities.
- Set a personal example with regard to health and safety matters.

The objective of CESMP is to inform managers and supervisors of their responsibility and accountability for health and safety, and their legal duties towards those either directly or indirectly under their charge, and towards those who may be affected by their acts or missions.

3.3 Minimum Wage

The term minimum wage is not defined by the Labour Act 2006 rather it sets a procedure for fixing industry wise minimum wage rates. Minimum wage rates are declared by the Government on an industry basis following recommendations by the Wages Board, a specialist tripartite board established under article 138 of the Labour Act 2006. In making its recommendation, the Wages Board takes into consideration cost of living, standard of living, cost of production, productivity, price of products, business capability, inflation rate, economic and social conditions of the country and of the locality concerned and other relevant factors. The Minimum Wages Board (MWB) is obliged to revise its recommendations if any of the aforementioned criteria change (within one to three years). The minimum rates of wages for any industry may be re-fixed after every six years as may be directed by the Government.

According to the Minimum Wage Board there is no specific Minimum Wage Act, however there is a specific labour act which is known as Bangladesh Labour (Amendment) Act 2013. The Minimum Wage board was established in 1959 under the Ministry of Labour & Employment, Bangladesh, to govern and fix minimum wages. Bangladesh has a government-mandated minimum wage, and no worker in Bangladesh can be paid less than this mandatory minimum rate of pay. Employers in Bangladesh who fail to pay the Minimum Wage may be subject to punishment by Bangladesh's government. Bangladesh's Minimum Wage is the lowest amount a worker can be legally paid for his work. Most countries have a nation-wide minimum wage that all workers must be paid. The Bangladesh minimum wage is 1,500 taka per month for all economic sectors not covered by industry-specific wages (in the garment industry the minimum wage is 5,300 taka per month). The minimum wage is set nationally every six years by the National Minimum Wage Board in a tripartite forum industry by industry. The minimum monthly wage is determined on the basis of daily and weekly working hours which are 8 hours daily and 48 hours per week. Overtime remuneration is paid at the rate of one and a half times or double the daily rate of wages. Minimum Wages in Bangladesh remained unchanged at 8000 BDT/Month in 2022 from 8000 BDT/Month in 2021.

3.4 Reporting for the Substation Project

The main environmental issues during the construction phase of the substation project, the report will be provided by the China Electric Power Equipment and Technology Co., Ltd as per the management and monitoring plan of CESMP, after the field visit of environmental consultant, social consultant, and safety officer of the project. The reporting schedule will monthly, but the site project manager will report weekly to the head of the office of China Electric Power

Equipment and Technology Co., Ltd for overall progress work and work situation. The site safety officer will do the same as the site project manager. The site safety officer will be recorded any incidental event at the substation project site. China Electric Power Equipment and Technology Co., Ltd will give quarterly an Environmental Monitoring Report (EMR) based on the quarterly environmental issues, work progress, laboratory base environmental monitoring, public consultation, and GRM to PGCB. By comparing the quarterly information of the substation project to the previous quarter information for the same quarter, PGCB can get rich insight into the work performance of China Electric Power Equipment and Technology Co., Ltd. Furthermore, quarterly EMR reports help to predict the future potentiality of substation work, quarterly environmental and social issues which will highly be correlated to a China Electric Power Equipment and Technology Co., Ltd's work progress for the Kaliganj substation project.

Table 3.6: Reporting plan/structures for the construction of SS project

SN	Type Reports	Total Number
1	Monthly Progress Work Report	30 in thirty months project
2	Quarterly Environmental Monitoring report	10 in thirty months project
3	Weekly Work Report	150 in thirty months project

The ADB will engage a third party consultation firm to implement the RP. The third party consultation firm will responsible for mobilization of communities to participate in the process of RP implementation, environmental aspects, compensate conducting the relevant socio-economic surveys, project impact assessments and enumeration of the APs, preparation of inventory of losses, dissemination of relevant information including entitlements to APs, facilitation of the proper functioning of the GRM, and implementing all other safeguard measures to secure the rights of all APs including women and vulnerable groups. Third party consultation firm will also check the different reports of the construction activities.

3.4.1: Weekly Inspection:

Supervisors, competent persons, and ESHS members including health & safety supervisor can use this form or additional form as is or customize it for their site inspection. Social & Environment Manager will be collected a checklist from the site engineers or site manager. The weekly checklist which may be;

Weekly Inspection			
Completed by:	Site:	date:	
Report			
Items	Comment	Area	Action
PPE			
Fire protection			
EMF			

Welding machine			
Public protection			
Materials quality			
Traffic control			
Noise level			
Air pollution			
soil quality			
others			
copies provide to:			

3.4.2 Month & Quarterly Reporting

Writing a monthly report serves as an important tool for communicating construction as well progress achievements and ongoing projects to PGCB. The report creation process can also provide the team members with accountability as assess most recent performance and productivity levels. Monthly reports should generally be brief, but also comprehensive, listing major activities and actions taken, as well as goals for the upcoming month. This monthly report comes from the weekly inspection report of ESHS for Kaliganj substation projects. For the sustainability environmental and social aspects, China Electric Power Equipment and Technology Co., Ltd will publish quarterly report for PGCB which will include detailed information on the implementation of the CESMMP, including monitoring results and covering amongst other health & safety issues, incidents/accidents reports, needs for corrective measures, conflicts amongst construction workforce or with local residents, grievances of workforces or stakeholders, any other detail related to the social and environmental management and performance. Subcontractor-related issues will also include in the monthly report.

Chapter 04

EHS Operational Inspection Resources

4.0 EHS Operational Inspection Resources:

Prior to the construction & operational phase of the Project, China Electric Power Equipment and Technology Co., Ltd will establish and begin to implement a substation location wise plan for construction of control building cable trench, under the direction and design specification of power Grid Company of Bangladesh (PGCB).

Before moving a new location for construction activities following points to be checked, a pre-mobilization checklist could use by China Electric Power Equipment and Technology Co., Ltd Concerned Site in-charge along with ESHS Officer will check below parameters: -

- Suitable approach road/access to reach over there
- Condition of soil and area nearby the location
- Tree/house or any other infrastructure available
- Topographical situation of the substation project are
- Availability of Water nearby
- Any other issue may affect social and environment
-

If any major issue may affect Environment and Social parameters, then project manager & ESHS Manager visit the location to resolve the issue. If required, the matter may escalate to PGCB and consultant.

During construction work following points to be checked and ensured their compliance

By Safety Supervisor/Officer

- Workers/Supervisor Competency check
- Safety Induction process compliance (for all workforce)
- PPEs compliance
- Display of ESHS Posters/Emergency Information availability
- Monitoring all Environmental Parameters – Noise, Water, Air, Soil, Stack RH, and Temperature etc.

By Site Supervisor/Engineer

- Use of Fit and Approved Tools and Plants
- Gang follow safe working practice
- Observe unsafe act and condition and resolve the issue from root
- Escalate Critical ESHS Observations if not resolve at site level
- Provide or ensure Tool Box Talk daily morning
- Ensure all emergency support are available and effective

- First Aid, Drinking Water, Attendance Register, Rest Shed, Site Toilet etc. are available and effective
- Inform Higher Management about any major Incident/Accident if happened
- Ensure local people should not enter inside working zone

By Project Manager/Site Manager

- ✓ Visit the location at least once (construction phase) to ensure all ESHS parameter complied
- ✓ Provide PEP Talk to all workforce at site for team motivation
- ✓ Observe UA/UC and resolve the issue or escalate to higher management
- ✓ Review the Site ESHS status with site team and guide team to improve the performance
- ✓ Organize site motivation program

4.1 Site Tracking Procedure

A passive GPS tracking system will monitor location and will store its data on journeys based on certain types of events. So, for example, this kind of GPS system may log data such as where the device has traveled in the past 12 hours. The data stored on this kind of GPS tracking system is usually stored in internal memory or on a memory card, which can then be downloaded to a computer at a later date for analysis. In some cases the data can be sent automatically for wireless download at predetermined points/times or can be requested at specific points during the journey. An active GPS tracking system is also known as a real-time system as this method automatically sends the information on the GPS system to a central tracking portal or system in real-time as it happens. This is also a useful way of monitoring the behavior of labours as they carry out their work and of streamlining internal processes and procedures for delivery fleets. China Electric Power Equipment and Technology Co., Ltd already have GPS locations of the Kaliganj substation.

Any tracking system is used for location tracking and messaging when standard means of communication are not available. The personal tracker provides a means of communication for workers who complete dangerous or hazardous tasks in remote areas where cellular or radio coverage isn't always available. Remote workers need to have access to reliable two-way communication and SOS Alerting – and those who are in charge of their safety need to be able to quickly locate their employees in case of an emergency. The current advice from the Health and Safety Executive (HSE) is that no work should bring employees back into the workplace unless it is safe to do so. The SOP of human tracker is attached in appendix H

4.2 Non-conformity handling and detection procedure:

Non-conformity is a process or activity which doesn't fulfill its intended purpose of project work, procedure of working process of the substation. This could be because there has been a failure to follow the procedures outlined in the management system of any construction project and workers. On their own, non-conformities can lead to a bad workers, wrong procedure and incomplete planning and experience for an individual, but if left untreated, can also lead to a cascade of bad experiences for a group of participated in the project. This is why it is important to not only identify these areas but address them in good time and adequately. Our approach to measuring process conformance is to identify a partial set of nonconformities; that is a subset of all occurring process nonconformities.

Any non-conformity noticed during site visit or escalation from site team need to address in ESHS system. China Electric Power Equipment and Technology Co., Ltd different management have to discuss the issue of non-conformity and try to resolve with their level, but if not due to resource and financial problem non-conformity observation should be escalated to next management level. Detection of non-conformity may at by site personnel or during the visit of ESHS Officer, Project Manager, Site Manager, Regional Manager and next level of hierarchy. As per ESHS system every management level has their own site visit schedule and they have to submit their visit observation where they may raise non-conformity for any issue. Also China Electric Power Equipment and Technology Co., Ltd have Cross Regional and Corporate Audit to check the ESHS Compliances.

4.3 Management of data on tracking and non-conformities:

Management of data on tracking and non-conformities the design and use of the most current technology is core to our service model. Our multi-disciplinary team of project managers, IT professionals, civil engineers, and agents collaborate to develop and implement tools and processes that improve information flow, facilitate analysis, assess project costs and expedite project completion. CCTV may be recent and modern tracking instrument for the SS project

Data Management: Utilizing our proprietary, trademarked information system, source, manage and access intellectual content vital to establishing Right of Way corridors of overhead power line project.

GIS Solutions; by capturing and integrating land rights data with powerful digital maps, a clear picture of the subject area emerges. Our Custom GIS Applications and Geo-database Modeling services provide information critical to selecting a route or site at a significant cost savings and far more expeditiously than traditional methods.

Project Tracking: Our suite of technical tools, managed by experienced staff, facilitates real time Project Tracking, 24/7. As a result, issues are identified and resolved as expeditiously as possible, communication is optimized, and budgets are achieved.

A successful substation asset management program has many components with civil work, control building, electrical equipment. The primary purpose of the inspection herein will develop best practices guidelines against which electric utilities could benchmark their current inspection programs and make appropriate adjustments both for civil and electrical arrangement. The main inspector of the substation project is PGCB; both of them will observe whole project activities from civil work to operation phase of the substation. Any objection might be given against China Electric Power Equipment and Technology Co., Ltd after inspection. At the case, China Electric Power Equipment and Technology Co., Ltd will take initiative measure for their specific objections or Non-conformity of construction work of the substation project.

Chapter 05

Substation Project Activity

5.0 Substation Project Activity

China Electric Power Equipment and Technology Co., Ltd provides a full scope of Engineering Procurement, Construction for Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS SS at Kaliganj Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP) (Package-5). China Electric Power Equipment and Technology Co., Ltd have prepared CESMP report as per requirement of PGCB and ADB. After approved the CESMP, all project planning, initial and final designs, material procurements, execution of the projects till final commissioning are handled by qualified and experienced teams of engineers and professionals, using state of the art equipment, latest technologies and essential soft-wares. Various stages of the substation projects from preliminary survey till final hand over to the respective clients are very closely monitored by an independent cell giving high priority to the safety and security concerns, during project executions and achieving the desired targets. CET is having a qualified team of engineers, supervisors and skilled workers sufficiently equipped with full range of tools, machinery, equipment, vehicles etc is possessed by the division to produce quality work for due and proper project implementation, in accordance with the client requirements and international practices. All big and small project activities are executed by the company own specialized groups, including but not limited to the following.

China Electric Power Equipment and Technology Co., Ltd Services provided Include:

Engineering and Design works

- ✓ Preliminary survey the substation locations and optimization studies.
- ✓ Procurement and delivery of material and equipment to sites.
- ✓ Construction and installation works for the substation project.
- ✓ Installation of Equipment and others in the substation yard.
- ✓ Testing & commissioning of the projects and final hand over to the Clients (PGCB)



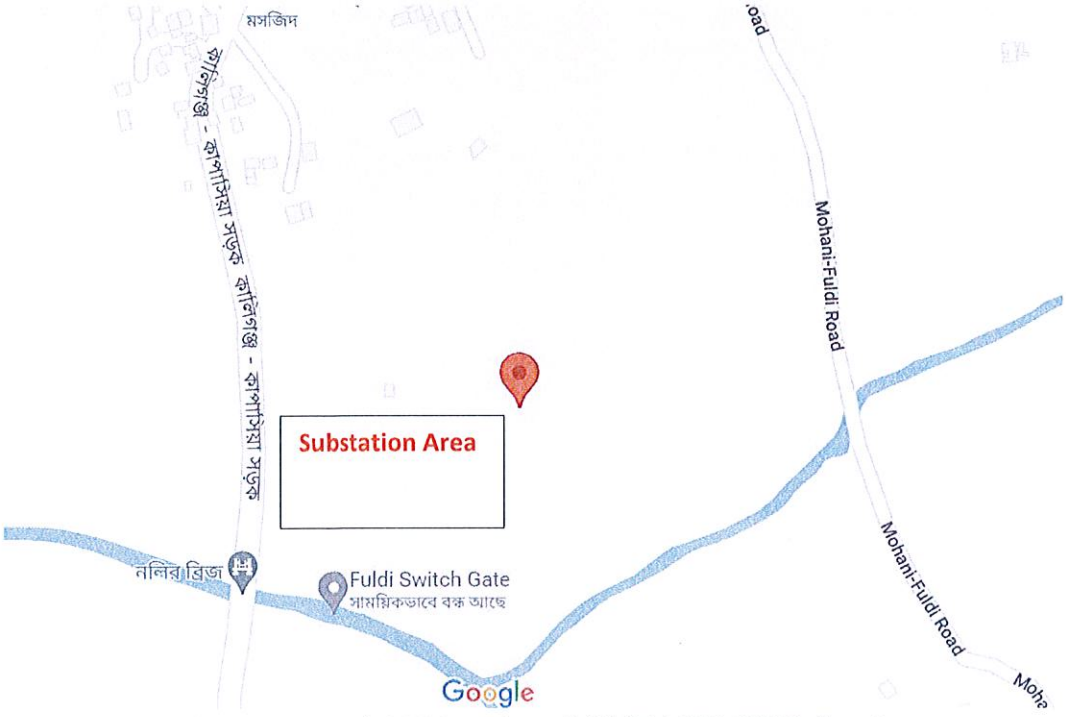


Fig 5.1: GIS and GPS location of 400/230 kV GIS Kaliganj

5.1 Project Related Activities:

The satisfactory design, construction, operation and maintenance of 400 KV Kaligonj substations will be to the satisfaction of the PGCB as per tender document. The detail scope of work for specific sub-stations is described in Schedule A of the bidding document. The work includes but not limited the design, detailing, construction and maintenance of the following:

- Site survey and subsoil investigation.
- Site preparation including retaining walls or site slope protection, cutting or filling up to the level specified and leveling as well as compaction.
- Road including access road with a culvert or sufficient drainage pipes and roadways within sites, surfacing the entire area within site boundary and surface water drainage.
- Foundations for all equipment to be installed in outdoor switchyards, control building, indoor switchgear and any other building required for the project.
- GIS and control building (complete building consisting of structural reinforced concrete frames, brick walls, concrete roof and floor slabs) with cable celling room.
- Motorized door for GIS entrance.
- Floor finishing: Homogeneous floor tiles cable floor, GIS room floor & control room floor, Nitocote epoxy resin coating in battery room.
- Cable trenches, cable tunnels, cable ducts and pipe ducts.
- Water supply and plumbing installations.
- Surface water and foul drainage.
- Boundary wall and entrance gate.
- Property line demarcation.
- Air conditioning and ventilation
- Lighting, small power, external floodlighting, emergency lighting and fire protection.

5.1.1 Substation Area Clearing and Land Filling

After receiving the final permit/clearance from PGCB, China Electric Power Equipment and Technology Co., Ltd shall clean and remove the unspecified & the unsuitable materials (root of paddy or bushes) from the substation area. Land development work shall be carried out by dredged filling material or by carried earth/filling sand. The height of land filling will be done high from the road surface as per tender document.

5.1.2 Making Temporary Boundary Wall

Before land filling, China Electric Power Equipment and Technology Co., Ltd have to construct necessary dyke/embankment for protection the developed land as per tender document. Bamboo made or tin made temporary boundary wall will make for the substation area security, mitigation measure of wild life as well as awareness for the local people. When the permanent boundary wall will complete, temporary boundary wall will shift elsewhere and materials will be sold as the solid waste by **China Electric Power Equipment and Technology Co., Ltd.**

5.1.3 Structure Foundation and Installation

The next step in the construction process is to drill foundations for the control building structures. The foundation plan and other engineering designs will be given by China Electric

Power Equipment and Technology Co., Ltd and after checking, PGCB will approve it before starting the foundation and installation work. This involves drilling holes, which are then typically filled with concrete foundations for control building, boundary wall, cable drain, transformer foundation etc. The SS layout plans for associated scope of work under package 5 is attached in appendix I

5.1.4 Equipment and Conductor Installation

Substations generally have switching, protection and control equipment, and transformers. In a large 400 kV substation, circuit breakers are used to interrupt any short circuits or overload currents that may occur on the network. Power transformers are the most important equipment in an electrical substation. All supporting structures shall be provided by China Electric Power Equipment and Technology Co., Ltd with holes, bolts and fittings as may be necessary to accommodate insulators, isolating switches and other equipment provided under the contract with PGCB. Structures required to support cable sealing ends shall be provided with arrangements for supporting the cables. Attachment holes for the connection of earthwire bonds shall be provided adjacent to the earthwire attachment point. Attachment holes for the connection of the substation earthing grid shall be provided on the vertical face of the structure for the substation project.

5.1.5 Testing and Commissioning of Substation Project

Testing and commissioning of substation electrical equipment is an important and critical activity. This activity is of vital importance and is influential in ensuring the health of equipment. The purpose of this course is to gain knowledge of the various tests and test procedures during testing and commissioning of equipment in electrical substation. Primary goal of this report is to provide in a simple and more of conventional way of conducting the testing of various switchgears and the system. Tests on galvanized members and components shall be carried out at the works to ensure compliance with the requirements. Miniature circuit breakers shall comply with the requirements of the main electrical part of this Specification. Cables shall be XLPE insulated, single wire armored and PVC sheathed overall and will be manufactured and tested in accordance with the requirements of BS 5467, 600/1000V grade or equivalent. Cables shall be XLPE insulated, single wire armored and PVC sheathed overall and will be manufactured and tested in accordance with the requirements of BS 5467, 600/1000V grade or equivalent. The Testing and commissioning will include

- Checking and testing transformer
- Test report transformer oil
- Checking all circuit beakers
- Checking Cables and cabling

5.2 Implementation & Operation

5.2.1 Training and Awareness,

China Electric Power Equipment and Technology Co., Ltd **has** procedure for identifying the training education and experience needs of all labours and non-employees, including sub-contractors, whose work may involve hazards and risks to the health and safety of labours and non-employees within the substation yard and also to ensure that they have received the appropriate training. A record of such training will be maintained by **China Electric Power Equipment and Technology Co., Ltd.**

The substation has procedures to make employees and non-employees aware of:

- The importance of conformance to all aspects of the Health and Safety management system.
- The potential or actual risks that a hazard may create and the safety aspects of improved personal performance.
- Their roles and responsibilities in achieving conformance to all aspects of the Health and Safety management system, including the preparedness and response for dealing with hazardous situations should they arise.
- Potential consequences of departure from the specified processes or operating procedures.

Necessary trainings are in the scope of the CET for regular operation and maintenance of the SS along with SAS as well as emergency restoration procedure.

5.2.2 Consultation and Communication

The substation will have procedure for dealing with internal and external communication of Health and Safety issues for labours and non-employees. The procedures include inductions, receiving, documenting, and the responding to relevant interested parties. Labousr shall aware of the health and safety coordinators, and through them, they are represented in the management system. China Electric Power Equipment and Technology Co., Ltd will communicate and consult with PGCB in all respect of work condition and work progress.

5.3 Operational Control

China Electric Power Equipment and Technology Co., Ltd will identify activities for the substation project this will associate with the project risks where control measures need to be applied. Documented procedures and work instructions will be maintained to stipulate operating criteria on all those activities, deviation from which can lead to unacceptable risks to the concerned people. Where activities associated to identifiable hazardous conditions are related to contractors, documented procedure No. is maintained for communication and control.

5.4 Performance Measurement & Monitoring Work Activity

All ESHS persons will monitors and measures Occupational Health and Safety performance on a regular daily basis. Performance measures are based on the recording of information of relevant

activities and conformance to the established objectives and targets. All PPE are checked for adequacy, operating conditions and useful life by the site in charge. **China Electric Power Equipment and Technology Co., Ltd** are appointed for carrying out material handling are also responsible for periodic calibration and maintaining records of the material handling equipment. Calibration records are to be retained for the period of work by the concerned contractor. Site in charges / managers are responsible for compliance of the calibration.

As per PGCB and ADB, the monitoring parameters are felling of trees and clearing of vegetation, fauna (wildlife), drainage congestion/flooding, noise pollution, dust Pollution, surface water quality, ground water/drinking water quality, pollution due to wastes, traffic congestion/road accident, occupational health and safety and community health and safety in the construction phase and tree replantation , drainage congestion, community health and safety and safety & security of substation & workers in the operation phase. The frequency of monitoring Community health and safety will daily. The monitoring frequency of PPEs, Fire protection, welding machine, winch machine, public protection, materials quality, traffic control, dust flow, health & safety issues, Accident/incident, ESH Training, Wild life, Public protection /Awareness poster in the daily basis environmental monitoring (air, water soil quality and noise level) in the quarterly basis.

Chapter 06

Legal Policies and Administrative Framework

6.0 Legal Policies and Administrative Framework

The Environment Conservation Act of 1995 establishes the requirement for an environmental assessment in Bangladesh. Any proposed "industrial unit or project" must obtain prior approval from the Department of Environment (DoE). The act has classified projects to be assessed by the DoE in four categories (Green, orange A and orange B, and Red). Electrical infrastructure projects involving transmission lines longer than 50 km are categorized as Orange B category, which triggers an automatic requirement for an IEE. The DoE issues an authorization for the project to proceed subject to a satisfactory review of the environmental assessment. The authorization consists of two parts, one is a "site clearance", which gives approval to the sites proposed for the project and the other is an "environmental clearance", which approves the content of the project. Project site operations are covered under state environmental regulations under whose jurisdiction the site is located along with applicable DOE legislations.

PGCB, as the project proponent, is responsible for carrying out the IEE study of the proposed project. Therefore, PGCB has the responsibility to administer the environment assessment process with the consultants, review the findings, and submit the documents to the DoE for review. A key requirement of the IEE for projects classified in the Orange B category is an EMP. The function of the EMP is to enable PGCB to show the DoE how it will deliver the environmental performance assessed in the IEE (for which DoE approval is sought). The EMP should describe the management responsibilities, mitigation measures as well as the institutional arrangements, and explain how monitoring will be carried out. Possession of a "clearance" from the DoE does not relieve the developer of a project from the requirement to comply with other environmental regulations. The Bangladesh National Environment Quality Standards for industrial effluents have been set and compliance with them is mandatory. There are also statutory instruments that are applicable to power development projects, which are not primarily environmental but to mitigate environmental impacts. Compliance with such statutory instruments is mandatory. Organization related with Enforcement of Environmental Standards: The roles and responsibilities of different ministries and departments related with the enforcement of environmental requirements are briefly described below:

6.1 Ministry of Environment Forest & Climate Change (MoEFCC), Bangladesh

The Ministry of Environment, Forest & Climate Change (MoEFCC) and climate change is the key government institution in Bangladesh for all matters relating to national environmental policy and regulatory issues. Realizing the ever-increasing importance of environmental issues, the MoEFCC was created by replacing the Ministry of Agriculture in 1989 and is at present a permanent member of the Executive Committee of the National Economic Council. This group is the major decision-making body for economic policy issues and is also responsible for approving

all public investment projects. The MoEFCC oversees the activities of the following technical/implementing agencies:

- Department of Environment (DoE)
- Forest Department (FD)
- Forest Industries Development Corporation (FIDC)

6.2 Department of Environment (DoE)

In order to expand the scope of environmental management and to strengthen the power for achieving it, the Government adopted the Environmental Pollution Control Ordinance in 1977. The ordinance provided for the establishment of an Environmental Pollution Control Board, which was assigned with the responsibility of formulating policies and proposing measures for their implementation. In 1982, the Board was renamed as the Department of Environmental Pollution Control (DEPC). Six divisional offices were established in Dhaka, Chittagong, Khulna, Barisal, Sylhet and Rajshahi. A special presidential order again renamed the DEPC as the Department of Environment (DoE) and placed it under the newly formed MoEFCC in 1989.

The DoE is a department of the MoEFCC and is headed by a Director General (DG). The DG has complete control over the DoE. The power of the DG, as given under the Act, may be outlined as follows: The DG has the power to close down activities considered harmful to human life or the environment. The operator has the right to appeal and procedures are in place for this. However, if the incident is considered an emergency, there is no opportunity for appeal. The DG has the power to declare an area affected by pollution as an ecologically critical area. The DoE governs the type of work or process, which can take place in such an area. Before undertaking any new development project, the project proponent must take an Environmental Clearance from the DoE. The procedures to take such clearance are in place. Failure to comply with any part of the Environment Conservation Act (ECA) 1995 may result in punishment by a maximum of 5 years' imprisonment or a maximum fine of Tk. 100,000, or both.

6.3 Forest Department

This Department under the Ministry of Environment Forest and Climate Change is responsible for the protection and management of all reserve forests of the country. The personnel of the department extend down to the union level in areas where there are reserve forests. It has recently started some agro forestry programs. The Forestry Department officers are also responsible for the protection of wildlife in the forests.

6.4 Other Related Organizations

There are several other organizations, which are related with certain social and environmental functions. These organizations include:

- Ministry of Land: Land Reform and Land Acquisition Directorate;
- Ministry of Water Resources: Bangladesh Water Development Board;

- Ministry of Fisheries and Livestock: Directorate of Fisheries;
- Ministry of Labour and Employment (Occupational Health and Safety and labour issues);and
- Ministry of Power and Energy (supply and safety guidelines).
-

6.5 National Legislation Relevant to Environment

National strategies, policies, acts and rules related with the environment include the following:

- Environment Pollution Control Ordinance, 1977;
- Environmental Quality Standards for Bangladesh, 1991;
- National Conservation Strategy 1992;
- Environment Policy,1992;
- National Environment Management Action Plan, 1995;
- Environment Conservation Act (ECA 1995);
- Environment Conservation Rules (ECR 1997);
- Bangladesh Labour (Amendment Act #30, 2013);
- Electricity (Amendment Act 2012).

6.5.1 The Bangladesh Wildlife Preservation Order (1973; amended to Act in 1974)

The Bangladesh Wildlife (Preservation) Order of 1974 provides for the preservation, conservation and management of wildlife in Bangladesh. The earlier legislations on wildlife preservation, namely, the Elephant Preservation Act, 1879, the Wild Bird and Animals Protection Act, 1912, and the Rhinoceros Preservation Act, 1932 have been repealed and their provisions have been suitably incorporated in this law.

6.5.2 The National Forest Policy (1994)

The National Forest Policy of 1994 is the amended and revised version of the National Forest Policy of 1977 in the light of the National Forestry Master Plan. The major target of the policy is to conserve the existing forest areas and bring about 20% of the country's land area under the forestation program and increase the reserve forest land by 10% by the year 2015 through coordinated efforts of GO- NGOs and active participation of the people.

6.6 Other Environmental Related Rules and Policies

In addition to the environmental policies and regulations, the following rules and regulations, listed in Table 6.1 will be checked for compliance to help maintain a sustainable environment and safe working conditions during project construction and operation.

Table 6.1 **Environmental Laws, Regulations and Standards of Bangladesh**

Year	Title	Objectives and Relevance to Project
1885	The Telegraph Act (Act XIII of	Under the law sections 10-19, specifies parameters andobligations for government-built transmission lines throughout the country.

	1885)	
2013	Bangladesh Labour (AmendmentAct # 30, 2013)	Amends and clarifies appropriate working conditions in allsectors and the rights of workers regarding safe working conditions.
1910	The Electricity Act (Act IX of 1910)	Under the law section 51, government-built transmissionlines throughout the country.
2012	Electricity (Amendment) Act2012	Among other things, specifies conditions of distribution, sale, and use of electricity, including related generation and transmission infrastructure, and obligations regardingthe need for preservation of the environment, and associated protection and safety clauses
2018	Electricity (Amended) Act 2018	This act repeals the provisions of Electricity Act 1910. A chain of penal measures, intended to serve temporary demand, have been taken. Anyone involved with electricity misappropriation, pilferage, or wastage, or with interference or destruction of supply lines, may now be subjected to both fines and imprisonment
1950	East Bengal Protection and Conservation of Fish Act	Requirements and actions for protection and conservationof fish in Bangladesh.
1985	The Protection and Conservationof Fish Rules	Prevention of harm to fisheries resource and fisherieshabitat in coastal and inland waters.
1953	Town Improvement Act	Improvement and development of Dhaka City.
1958	Antiquities Act	Protection and preservation of archaeological and historical artefacts, if found during project construction.
1960, 1966	Port rules, shipping operation	Control of discharges in ports; waterway rules.
1965	Factories Act	Industrial workers' health and working conditions (nowbetter addressed by the new Labour Act).
1971	Pesticide Ordinance	Pesticide use, production, selection and importation.
1976	Antiquities (Amendment) Ordinance	Protection and prohibition of export of archaeologicalartefacts.
1977	Municipal Ordinance	Municipal activities in health, sanitation, water supply,drainage, etc. in the city.
1979	Factory Rules	Disposal of wastes and effluents.
1980	Agricultura l Pesticides (Amendme nt) Act	Selection, use and handling of pesticides in theagricultural sector.
1982	Municipal Act	Drainage, sewerage, water supply and sanitation.
		The Acquisition of Immovable Property Rules, 1982 (No. S.R.O. 172-U82) The government adopted these rules

1982	Acquisition and Requisition of Immovable Property ordinance	in exercise of the powers conferred upon by section 46 of The Acquisition and Requisition of Immovable Property Ordinance, 1982 (Ordinance No. II of 1982). Not directly relevant to this project, as no structures are to be removed except a very small bridge on the site cross-overroad).
1983	Agricultural Pesticides (Amendment) Ordinance	Revised Agricultural Pesticides Ordinance.
1985	The Pesticide Rules	Pesticide selling, use and safety measures.
1990	Bangladesh standard specification for drinking water	Formulation and revision of national standards (inasmuchas the sub-station will continue to require access to safe drinking water).
1860	The Penal Code	This contains several articles related with environmentalprotection and pollution management (it is considered over-ridden by the latest laws and regulations in the last20 years governing environmental management).
1996	Building Construction (Amendment) Act and Building Construction Rules	The Rules are more comprehensive for taking care of thepresent circumstances and issues of building, such as thenew sub-station.

6.7 Policy Related with Energy Development

6.7.1 The Electricity Act (1910) and Electricity Rules (1937)

Under the act, any person can obtain a license to supply electricity and lay down or place electric supply lines. The licensee can open and break up the soil and pavement of any street, railway or tramway and can lay down any line or do other work near other utility services (gas, telecommunication, water, sewer, etc.), provided prior permission is taken from the respective authority, as stated in Sections 12-18 of the Act.

According to Section 19 (1) of this act, the licensee shall give full compensation for any damage, detriment or inconvenience caused by, or anyone employed by, that licensee.

Sub-section (1) of Section 51 of the Electricity Rules, 1937 advises that the licensee should take precautions in laying down electric supply lines near or where any metallic substanceor line crosses to avoid electrocution.

6.7.2 The Electricity (Amendment) Act 2018

The Electricity (Amendment) Act 2018 to consolidate the laws relating to generation, transmission, distribution, supply, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein,

protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of energy security, promotion of efficient and environmentally benign policies, constitution of Central Electricity Authority

The electricity generation from wind, small hydro, solar, biomass, biogas, bio fuel, any kind of waste including municipal and solid waste, geothermal, hybrid power system or such other sources as may be notified by the Central Government from time to time for end use at or near the place of generation; This act have "dedicated transmission lines" means any radial electric supply-line for point to point transmission which are is required for the purpose of connecting electric lines or electric plants of a captive generating plant referred to in section 9 or generating station referred to in section 10 to any transmission lines or distribution system or sub-stations or switching station or any other captive Generating Plant or generating stations, or the load center, as the case may be, dedicated for evacuating the electricity generated from such Captive Power Plant or Generating Station and shall not be used for any other purpose subject to the condition that such line shall not form a loop with the grid and shall not be shared except with the prior approval of the Appropriate Commission, except where authorized for additional connections for redundancy purposes or improved transmission. The conveyance of electricity by use of distribution system and the expression "distribute" shall be construed accordingly.

6.7.3 Electricity Rules 2020 (S.R.O. No.-410-Law/2019)

These Regulations may be called the Bangladesh Energy Regulatory Commission (Electricity Grid Code) Regulations, 2019. The grid code is applicable to distribution system improvement, quality consumer service; system loss reduction and bill collection improvement become possible due to close monitoring of the utilities. As per gird code, the component; electricity transmission planning, connection conditions, outage planning, schedule and dispatch, frequency and voltage management, contingency planning, cross boundary safety, operational event or accident reporting, protection, metering, communication and data acquisition, testing, numbering and nomenclature, data registration, performance standard for transmission, financial standards and all other matters relating to the electricity system of Bangladesh.

The Grid Code is a document that governs the boundary between the Licensee and Users and establishes procedures for operations of facilities that will use the Transmission System. The Grid Code specifies criteria, guidelines, basic rules, procedures, responsibilities, standards and obligations for the operation, maintenance and development of the Electricity Transmission System of Bangladesh to ensure a transparent, non-discriminatory and economic access and use of the Grid, whilst maintaining a safe, reliable and efficient operation of the same to provide a quality and secure electricity supply as reasonably as practicable. Specifying the coordination responsibility and minimum standards of protection that are required to be installed by Users of the Transmission System is specifying the minimum operational and commercial metering to be provided by the Single Buyer, the Licensee and Users, Communication requirements, Data acquisition. Specifying the technical & Performance standards, uniform accounting system and financial standards and reporting indices in these respects to be implemented by the Licensee.

It should be noted that the Grid Code is not concerned with the detailed design and operation of Power Stations and Distribution Systems, provided that their overall compatibility with the Transmission System needs is assured. Specifying the conditions under operation which the Licensee, System Operator shall operate the Transmission System and other Users of the Transmission System shall operate their plant and/or systems for the generation and distribution of electricity in so far as necessary to protect the security and quality of supply and safe operation of the Licensee's Transmission System under both normal and abnormal operating conditions.

In the operation phase of the Grid generally covers:

- Frequency and Voltage Management
- Contingency Planning
- Cross Boundary Safety
- Operational Event and Accident Reporting
- Tests
- Numbering and Nomenclature
- Data Registration.

Bangladesh is to take initiatives to build a country wide power network (transmission and distribution), aiming to utilize full generation capacity and to provide reliable electricity to all by 2021. PGCB is responsible for operation, maintenance, and development of transmission system all over Bangladesh. At present, power generated in different power plants is transmitted to the national grid through 400 kV, 230 kV and 132 kV transmission lines. Two organizations and four public sector companies are responsible for electricity distribution namely- Bangladesh Power Development Board (BPDB), Bangladesh Rural Electrification Board (BREB), Dhaka Power Distribution Company Ltd. (DPDC), Dhaka Electric Supply Company Ltd. (DESCO), West Zone Power Distribution Company Ltd. (WZPDC) & Northern Electricity Supply Company Ltd. (NESCO). DPDC, DESCO, WZPDC, and NESCO have been formed after power sector reform and restructuring to create business friendly environment, transparency, and dynamic to provide electricity to all as per vision 2021.

China Electric Power Equipment and Technology Co., Ltd in compliance with the provision stated in the Electricity Act 2018, the Acquisition and Requisition of Immovable Property Act 2017, the ADB's will be the basis to implement impact mitigation measures. The project resettlement policy has also been benefited from the experience in the resettlement of similar other projects within PGCB and other infrastructure agencies of the GoB. The GoB laws and ADB requirements and as well as past experience from Project implementation, confirms the following principles for this Project. Substation Project related information including entitlements to affected persons will disclose in a timely manner and will make available in places easily accessible to them and in local languages. Consultations will carry out with the affected persons and their communities to elicit their views and suggestions on project design and implementation procedures, and to ensure their participation in project planning, implementation and monitoring.

6.7.4 The Power Policy, 1996

As with the Petroleum Policy, this is presently an integral part of the National Energy Policy (1996). It has different policy statements on a whole range of issues including demand forecasts, long-term planning and project implementation, investment and lending terms, fuel and technology, power supply to the different zones, isolated and remote load centres, tariffs, captive and standby generation, system loss reduction, load management and conservation, reliability of supply, system stability, load dispatching, institutional issues, private sector participation, human resource development, regional/international cooperation, technology transfer and researchprogram, and environment policy and legal issues.As the proposed project is a power transmission project, all necessary requirements mentioned above will be adopted for the Project.

6.7.3.1 The Energy Policy (1996 updated 2004)

The first National Energy Policy (NEP) of Bangladesh was formulated in 1996 by the Ministry of Power, Energy, and Mineral resources to ensure proper exploration, production, distribution and rational use of energy resources to meet the growing energy demands of different zones, consuming sectors and consumer's groups on a sustainable basis. With rapid change of global as well as domestic situation, the policy was updated in 2004. The updated policy included additional objectives namely to ensure environmentally sound sustainable energy development programs causing minimum damage to environment, to encourage public and private sector participation in the development and management of energy sector and to bring the entire country under electrification by the year. The policy highlights the importance of protecting the environment by requiring an EIA for any new energy development project, or introduction of economically viable and environment friendly technology.

6.7.3.2 The Industrial Policy (2010)

The Industrial Policy-2010 aims at achieving the Millennium Development Goals (MDGs) and, reducing unemployment and the proportion of the population afflicted by poverty and hunger to less than half by 2017 through the adoption of short, medium and long-term programs to help build a modern and vibrant industrial sector. Industrial Policy-2010 also pledges that no effort will be spared in raising the growth rate of the Gross Domestic Product (GDP) to 8 percent by 2013, further to 10 percent between 2017 and 2021, and thereby to elevate Bangladesh to the cherished rank of 'middle-income country'. Achieving the recently-announced Digital Bangladesh goal by 2021 and creating employment opportunity for at least one person from each household in order to reduce poverty and unemployment loom large among the central policy objectives of the government.

6.8 Building Construction (Amendment) Act (1990) and Rules (1996)

The first Building Construction Act dates back to 1952. The earlier Government BuildingsAct (1899) exempted certain buildings and land that belonged to or were occupied by the government and situated within the limits of a municipality, from the municipal building laws.

The1990 Act supersedes the provision of Municipal Building Laws to regulate the creation, re-creation, construction, alteration, or maintenance of buildings within the limits of any municipality. The East Bengal Legislative Assembly promulgated the Building Construction Act (1952) on 21 March 1953 as the East Bengal Act II of 1953 in response to the need to regulate haphazard construction of buildings. The act was framed to allow streamlining of planned development and implement government beautification programs.

An important modification to the 1953 act was added through an ordinance titled, "the Building Construction (Amendment) Ordinance, 1986" (Ordinance. No. LXXII of 1986). Later in 1987, the ordinance was adopted for enactment as "The Building Construction (Amendment) Act, 1987" (Act No. 12of 1987).

An authorized officer is empowered through this amendment so that he/she can take necessary action to prevent unauthorized construction or to remove such construction without intervention of the court.

The act was further amended in 1990 allowing power to issue limited sanctions to cut down or raze any hill within the area to which this act applies.

To support the implementation of the provisions laid down in the Building Construction Act, 1952, the government made the Building Construction Rules, 1953. The Imarat Nirman Bidhimalas (1984) superseded these rules. Later in 1996, the government framed the Imarat Nirman Bidhimala (Building Construction Rules, 1996). The rules are more comprehensive and more relevant to present circumstances and issues of building construction and other related development activities.

6.8.1 Bangladesh National Building Code (BNBC)

The main purpose of the BNBC is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property and public welfare. The installation and use of certain equipment, services and appurtenances related, connected or attached to such buildings are also regulated herein to achieve the same purpose.

Chapter-3, part -7 of the BNBC has clarified the issue of safety of workmen during construction and with relation to this, set out the details about the different safety tools of specified standard. In relation with the health hazards of the workers during construction, this chapter describes the nature of the different health hazards that normally occur in the site during construction and at the same time specifies the specific measures to be taken to prevent such health hazards. According to this chapter, exhaust ventilation, use of protective devices, medical checkups etc. are the measures to be taken by the particular employer to ensure a healthy workplace for the workers.

Chapter-1, part-7 of the BNBC, states the general duties of the employer to the public as well as workers - "All equipment and safeguards required for the construction work such as temporary stair, ladder, ramp, scaffold, hoist, run way, barricade, chute, lift etc. shall be substantially constructed and erected so as not to create any unsafe situation for the workmen using them or the workmen and general public passing under, on or near them".

Chapter -1, Part-7 of the BNBC clearly sets out the constructional responsibilities according to which the relevant authority of a particular construction site shall adopt some precautionary measures to ensure the safety of the workmen. According to section 1.2.1 of chapter 1 of part 7; "in a construction or demolition work, the terms of contract between the owner and the contractor and between a consultant and the owner shall be clearly defined and put in writing. These however will not absolve the owner from any of his responsibilities under the various provisions of this BNBC and other applicable regulations and bye-laws. The terms of contract between the owner and the contractor will determine the responsibilities and liabilities of either party in the concerned matters, within the provisions of the relevant Acts and Codes (e.g.) the Employers' Liability Act, 1938, the Factories Act 1965, the Fatal Accident Act, 1955 and Workmen's Compensation Act 1923". (After the introduction of the Bangladesh Labor Act, 2006, these Acts have been repealed).

To prevent workers falling from heights, the BNBC in chapter 3 of part 7 sets out the detailed requirements on the formation and use of scaffolding. According to section 11.2 of the same chapter, "every temporary floor openings shall either have railing of at least 900 mm height or shall be constantly attended. Every floor hole shall be guarded by either a railing with toe board or a hinged cover. Alternatively, the hole may be constantly attended or protected by a removable railing. Every stairway floor opening shall be guarded by railing at least 900 mm high on the exposed sides except at entrance to stairway. Every ladder way floor opening or platform shall be guarded by a guard railing with toe board except at entrance to opening. Every open sided floor or platform 1.2 meters or more above adjacent ground level shall be guarded by a railing on all open sides except where there is entrance to ramp, stairway or fixed ladder. The precautions shall also be taken near the open edges of the floors and the roofs".

6.9 Other Relevant National Environmental Acts, Policies, and Rules

In addition to the above National rules and regulations FECL in its operational phase must comply with other national acts, policies and rules, some of those are as follows:

6.9.1 Environment Conservation Rules 1997 (Amendment 2017)

The Environment Conservation Act of 1995 establishes the requirement for an environmental assessment in Bangladesh. Any proposed "industrial unit or project" must obtain prior approval from the Department of Environment (DoE). The act has classified projects to be assessed by the DoE in four categories (Green, Amber A, Amber B, and Red). Electrical infrastructure projects

involving transmission lines longer than 50 km are categorized as Orange B category, which triggers an automatic requirement for an IEE. The DoE issues an authorization for the project to proceed subject to a satisfactory review of the environmental assessment. The authorization consists of two parts, one is a "site clearance", which gives approval to the sites proposed for the project and the other is an "environmental clearance", which approves the content of the project. Bangladesh law applicable for environmental approval for this project is Environmental Conservation Rules 7(2), which was amended on 24 -12-2017. As per SRO No. 349-Law-2017 4 (ga) 71, electricity transmission lines longer than 50 km fall under 'Orange B' category. According to the provision of Orange B category, an IEE with an Environmental Management Plan (EMP) is the only requirement to obtain the site clearance and the environmental clearance certificate from Department of Environment (DoE).

PGCB, as the project proponent, is responsible for carrying out the IEE study of the proposed project. Therefore, PGCB has the responsibility to administer the environment assessment process with the consultants, review the findings, and submit the documents to the DoE for review. A key requirement of the IEE for projects classified in the Orange B category is an EMP. The function of the EMP is to enable PGCB to show the DoE how it will deliver the environmental performance assessed in the IEE (for which DoE approval is sought). The EMP should describe the management responsibilities, mitigation measures as well as the institutional arrangements, and explain how monitoring will be carried out.

6.9.2 Compliance with PGCB Health Environment and Safety Requirements

PGCB has its own policy and requirements for compliance relating to environment, healthand safety issues for its operations. The company is committed to managing its operations in a safe, efficient and environmentally responsible manner. The PGCB's Health Environment and Safety (HES) manuals, guidelines, procedures, and plans are important tools indicating their commitment. HES manuals include:

- Environmental Impact Assessment Module;
- Guideline on Integrated Impact Assessment;
- Health Impact Assessment Module; and
- Social Impact Assessment Module.

In addition, the requirement for impact assessment is affirmed in the PGCB's Statement of General Business Principles. The PGCB is committed to:

- Pursuing the goal of no harm to people;
- Protecting the environment; and,
- Managing HES as any other critical business activity.

The mandatory company Operations Management System, Environmental Care Element/ Standards, issued in March 1997, refers to Environmental Assessment indicating that "EIA (including a consideration of social impacts) shall be conducted prior to all new activities and facility developments, or significant modifications of existing ones."

6.9.3 Amendment of acquisition & Requisition of immovable property ordinance (2017)

In 2017, the parliament of Bangladesh has passed the Acquisition and Requisition of Immovable property Act, 2017. Infrastructural developments are growing up day by day. For infrastructural developments, the main ingredient is land. But, if we look upon the present situation of the owner of the land specially those who are farmers, they suffer a sorrowful situation because of acquisition of land. Article-42 of our Constitution provides the fundamental right for right to Property, Article-42(1) provides some privileges but 42(2) impose some of the restrictions. Acquisition of the private land by the government for the public purpose is the first condition for infrastructural development. For the purpose or the interest of the public, the Government can acquire other's property by paying compensation. It may be for the temporary or permanent basis. If it is taken over for permanently but afterward if it is not used, the government does not bind to return it. However, lands used for graveyards, places of cremation, religious or educational instructions are usually not taken over.

On the basis of duration, taking over is of two kinds

(a) Acquisition and

(b) Requisition.

Government, non-government or semi-government private agencies or departments carry out development works for the purpose or interest of public. Development works may be carried out in their own lands or in lands taken over by the government with due compliance of some definite processes or rules. This process is generally called as acquisition of land. Development works are generally permanent nature and are carried out directly or indirectly on or over the land which is taken over by way of acquisition. the newly enactment Act, The Acquisition and Requisition of Immovable property Act, 2017, Section 2(1) defines the term as follows: "Acquisition means acquiring the ownership and possession of any immovable property for any requiring person or organization in exchange for compensation or rehabilitation or both."

The new law states that lands of worship can also be acquired now only if it is indispensable in public interest. The bill proposes increasing compensation of the affected people as the previous law lacked the provisions. The new law provides for an additional 200 percent compensation on the market rate if any land is acquired for the government project and the compensation will be an additional 300 percent if the land is for any non-governmental organization. It also provides for the appointment of joint district judge level officials as the arbitrator in this type of cases. But the appeal, if there is any, will be heard by district judge level officials.

It is necessary to mention that under section 50 of newly enacted Act any act done or any measure taken under the foregoing Ordinance shall be deemed to be done under this Act. Further, all notices, notifications, orders, compensation or award made under the previous ordinance shall be deemed to be made under this Act, and all applications and appeals pending before any authority, Arbitrator or Arbitration Appellate tribunal under the previous ordinance shall be continued as if this Act had not been promulgated.

6.9.3.1 Acquisition procedure under the Acquisition and Requisition of Immovable Property Act, 2017

The purpose of an acquisition and requisition law is to empower the acquiring authority to acquire land only for a public purpose affecting proprietary right of citizens. Article 42(1) of our Constitution states subject to any restrictions imposed by law, every citizen shall have the right to acquire, hold, transfer or otherwise dispose of property, and no property shall be compulsorily acquired, nationalized or requisitioned save by authority of law.' The idea of this provision is that a citizen shall not be deprived of his land otherwise than in accordance with law and if he is deprived of for public purposes, compensation at the market rate is given to him. No beneficial object of the acquisition can exonerate the government from the restrictions imposed by law and payment of compensation at the market rate. Further, the law is required to be expounded liberally in favor of the citizen whose land is acquired and strictly against the Government. When constitutional rights of an exceptional character have been created the conditions prescribed by the statute for exercise of such rights should be strictly fulfilled.

Before the Act of 2017, the authority of the Ordinance of 1982, there were two levels or land allocation committee dealing with the acquisition of land, namely, the upper Land Allocation Committee and the lower Land Allocation Committee. Any rule or manual has been gazetted after the newly enactment Act. So, it can be said that when there is no conflict between the new Act and the previous rule or manual, the previous rule can be followed until there is a new gazette notification from the Government.

The upper Land Allocation Committee is at the national level and consists of 22 members headed by the Minister of Land. The lower Land Allocation committee is at the district level and consists of 10 members headed by the Deputy Commissioner. The areas included within the jurisdiction of the upper Land Allocation Committee are: City Corporation of Dhaka and its vicinity, City Corporations of Chittagong, Rajshahi, Khulna, Barisal, Sylhet, Rangpur, Narayaganj and Comilla.

Without those areas, all areas of each district are included within the jurisdiction of the District Land Allocation Committee.

The acquisition law gives the Deputy Commissioner power to acquire property situate either in the central zone or in district zone in two likely situations. At first, if the property is needed and secondly, if the property is likely to be needed. A property is either needed or it is likely to be needed for public purpose or public interest, but while acquiring a property the Deputy Commissioner cannot keep both the alternatives in his pocket. He has to choose between the two, if he keeps both the options open, then he does not know whether the property is needed for immediate use or it likely to be needed for some future use. The use of both these alternative ways in the notice under section 3 [of the 1982 ordinance] is indicative of a lack of application of mind and the notice under section 4 is liable to be struck down on that ground as well.

When any action is taken or proceeding is initiated with *mala fide* intention without formation of any opinion as to the purpose of the acquisition the entire proceeding should be vitiated and, as such, the acquisition proceedings should be declared to be without any lawful authority.

6.9.3.2 Proceedings and application of Land Acquisition in Bangladesh:

As per Acquisition procedure under the Acquisition and Requisition of Immovable Property Act, 2017, the proposal of acquisition is from the governmental, semi-governmental, or autonomous body and passes all the tests, the Deputy Commissioner will start acquisition proceedings. However, section 4(2) of the newly enactment Act provides that in case of acquisition of immovable property for any non-governmental person or organization whatever be the quantity, prior sanction of the government must be taken before the starting of the acquisition proceedings. The proposal of the requiring body or organization, be it governmental or any non-governmental person or organization, approved by the upper or lower Land Allocation Committee or by the Ministry of Land wherever application has to be entered in the register separate with a separate file for each proposal with number/s. Under section 4(1) of the Act of 2017 a preliminary notice has to be published at the well-known places on or near the property proposed to be acquired.

The Deputy Commissioner, under sub section (1), before the serving of notice, in the prescribed manner and form, shall record the real nature, condition and infrastructures built therein, crops and trees of the proposed immovable property in video or still picture or any other technology and thereafter prepare a report accordingly. This statutory provision has actually covered the previous proactive of forming the land allocation committee, application to the Committee and field verification.

After the serving of notice, in the prescribed manner and form, the Deputy Commissioner shall prepare a joint list of requiring persons of organizations and persons interested. If the nature of land is changed in reality from its recent record of right, the Deputy Commissioner, at the time of preparation of the joint list, shall decide about the change of the nature of the land. The Deputy Commissioner shall mention in the joint list, in the prescribed manner, if any house or infrastructure in built or is being built in the proposed immovable property for acquisition, in contravention of public purpose for illegal gain.

The term purpose for obstructing the implementation of section means of purpose for obstructing the implementation of the project, creating hindrance or doing anything that retards the implementation of a project or doing something to get monetary benefit by compensation.

The list prepared sub-section 3(b) of this Act shall be affixed in the notice board of the local land office and in the convenient place of the project. The Deputy Commissioner shall not record the change of the nature of land in the joint list, if after the initiation of proceeding under sub-section 3 (a), the nature of the land is changed by building houses or infrastructures in bad motive.

Previously under the 1982 Ordinance and the Rules framed there from, within 3 days of serving the notice, the representatives of the Deputy Commissioner and the requiring body or organization require starting the field verification and preparing field verification book with the following columns:

- Serial. No.
- Plot No.
- Class

- Amount of the Land
- Name of the Owner
- Particulars and Numbers of the Houses
- Particulars of the Ponds
- Particulars of the Trees
- Particulars of the Crops
- Particulars of the Standing Crops
- Other important information
- Important Remarks.

Section 10(f) of the Act says that after serving the notice any alteration or improvement in, or disposal of, the property to be acquired, made or affected is of no effect. If any person is not satisfied by the decision of the Deputy Commissioner under 4(7) of the Act, he may apply to the Commissioner within the next 7 working days. The Commissioner, in the prescribed manner, shall hear the hearing under subsection 8 and shall provide with the decision within next 15 working days and in case of an important project, shall provide with the decision within the next 10 working days. The decision of the Commissioner under sub-section 9 shall be deemed to be final. If there is any disposal of dispute under sub-section 9 or no appeal is preferred within the prescribed period in sub-section 8, within the next 24 hours, the concerned persons shall in his own cost remove the houses or infrastructures from the proposed immovable property, otherwise the Deputy Commissioner shall take steps to eradicate those in accordance with the concerned of law.

The Deputy Commissioner may, after choosing the place for important project, by order, impose restrictions over the sale of plots and building of infrastructures thereon. Mainly religious places, graves or crematoriums cannot be taken into acquisition. However, if it is essential in public purpose or public interest, by relocating and rebuilding, in the own money of the requiring persons or organizations, it may be taken into acquisition.

Under section 5(1) of this Act, Any person concerned may file an objection against the acquisition proceeding to the Deputy Commissioner within 15 working days. The Deputy Commissioner shall, under section 5(2), speedily hear the objection filed in the presence of the appellant or an agent, after hearing all such objections and after making such further inquiry, if any, as he thinks necessary, prepare a report within-thirty working days, and in case of a nationally important project within 15 working days, following the expiry of the period specified under sub-section (1) containing his opinion on the objections.

Under section 5(3) the Deputy Commissioner-

(a) If the property exceeds 50 [fifty] standard *bighas* (or 16.5 acre) of land, shall submit the record of the proceedings held by him, together with his opinion, for the decision of the Ministry of Land; and

(b) If the property does not exceed 50 [fifty] standard *bighas* (or 16.5 acre) of land, shall submit the record of the proceedings held by him, together with his opinion, for the decision of the Commissioner:

If no objection is raised within the period specified in sub-section (1), the Deputy Commissioner shall, instead of submitting the records of the proceedings to the Divisional Commissioner, make a decision within ten days of the expiry of the aforesaid period, or within such further period but not exceeding thirty days, as the Divisional Commissioner orders to Deputy Commissioner in writing and in case of a nationally important project within 15 days, about the acquisition of the property and such decision of the Deputy Commissioner shall be final.

In addition, at the time of proceeding, the Deputy Commissioner or his representative will make sure whether the alternative venue if chosen will not hamper the proposed project and if he thinks necessary, he will make further enquiry or verification and prepare a report containing his opinion on the objections.

The Government will, on receiving the record of the proceedings along with the report submitted by the Deputy Commissioner, within next 60 days, and the Commissioner will, on receiving the record of the proceedings along with the report submitted by the Deputy Commissioner, within next 15 days, make a final decision about the acquisition of the property and return the proceedings to the Deputy Commissioner.

When the Government, the Divisional Commissioner or the Deputy Commissioner makes a decision about the acquisition of the property, such decision made therein shall be conclusive evidence that the property is needed for a public purpose or in the public interest.

6.9.3.3 Compensation for Acquisition

Compensation awarded under this Part, take measures to give to pay the According section 11 of this section, the Deputy Commissioner shall, before taking possession of the property, pay the compensation awarded by him to persons entitled thereto within sixty days from the date of deposit by the requiring person.

If the persons entitled to compensation but do not consent to receive it, or if there be no person competent to receive the compensation, or if there be any dispute as to the title to receive the compensation or as to the apportionment of it, the Deputy Commissioner shall keep the amount of the compensation in a deposit account in the Public Account of the Republic which shall be deemed payment for the purpose of taking over possession of the property without any prejudice to the claim of the parties to be determined by the Arbitrator. Further, any person admitted to be interested may receive such payment under protest as to the sufficiency of the amount. However, no person who has received the amount otherwise than under protest shall be entitled to make any application under section 30. Deputy Commissioner shall, realizing the compensation from the recipient, who may have received the whole or any part of the same to the person lawfully entitled thereto. In addition, when the property acquired contains standing crops cultivated by *bargadar,* such portion of the compensation as may be determined by the Deputy Commissioner for the crops shall be paid to the *bargadar* according to section 12 of this Act

Acquisition of land by the government for public purpose is a well-known practice in all over the world. Acquisition of private land is made for the purpose of establishment of public institution, autonomous institution, educational institution and so on as the government deems fit. The

Acquisition and Requisition of Immovable Property Act, 2017 operates the functions regarding land acquisition in Bangladesh. This Article finds that in most of the acquisition, the rights of the land owner are violated and neglected. Practice is far different and many important duties and responsibilities are not prescribed by this Act. The Acquisition and Requisition of Immovable Property Act 2017 should be implemented properly and effectively.

6.10 Bangladesh Water Act, 2013

The Water Act 2013 is based on the National Water Policy, and designed for integrated development, management, extraction, distribution, usage, protection and conservation of water resources in Bangladesh. As per this Act, all forms of water (e.g. surface water, ground water, sea water, rain water and atmospheric water) within the territory of Bangladesh belong to the government on behalf of the people. The private landowners will be able to use the surface water inside their property for all purposes in accordance with the Act. A worthwhile initiative is the requirement for permits/licenses for large scale water withdrawal by individuals and organizations beyond domestic use. Without prior permission issued by the Executive Committee, no individuals or organizations will allow to extract, distribute, use, develop, protect, and conserve water resources, nor they will allow to build any structure that impede the natural flow of rivers and creeks. Construction of the substation and transmission lines may deteriorate the water quality. However, it should be ensured that water usage for other purposes in surrounding areas are not hampered by taking mitigation measures.

6.11 National Environmental Policy (NEP) 2018 (Bangladesh)

In 2018, the National Environmental Policy (NEP) was drawn up with the aim of providing protection and sustainable management of the environment. The objectives of the Policy include:

- Land Resources Management
- Water Resources Management
- Air Pollution Control
- Safe Food and Water
- Agriculture
- Public Health and Health Services
- Accommodation, Housing and Urbanization
- Education and Mass Awareness
- Forest and Wildlife
- Biodiversity, Ecosystem Conservation and Biosafety
- Hill Ecosystems
- Fisheries and Livestock
- Coastal and Marine Ecosystem
- Ecotourism

- Industrial Development
- Energy and Mineral Resources
- Communication and Transportation
- Human Resources Management)
- Climate Change Preparedness and Adaptation)
- Disaster Management)
- Science, Research, Information and Communication Technologies)
- Management of Chemical Substances
- Other Pollution Control
- Environment Friendly Economic Development, Sustainable Production and Consumption
- Legal Frame
- Organizational Set-up
- National Environment Policy Compliance

6.12 Other Environmental Related Rules and Policies

In addition to the environmental policies and regulations, the following rules and regulations, listed in Table 3.2 will check for compliance to help maintain a sustainable environment and safe working conditions during project construction and operation.

Table 6.2: Relevant Key Policies

Policy	Brief Description	Responsible Agency
The National Water Policy (1999)	• Protection and restoration of water resources; • Protection of water quality including strengthening regulations concerning agro-chemicals and industrial effluents; • Sanitation and potable water;	MOWR
National Land use Policy (2001)	The policy deals with land uses for several purposes including agriculture, housing, forestry, industrialization, railways, and roads. The plan identifies land use constraints in these sectors.	MOL
National Fisheries Policy, 1998	Preservation and management of inland open water fisheries	MOEFCC
National	• Afforestation of 20% land;	MOEFCC

Forest Policy and Forest Sector Review (1994, 2005)	• Bio-diversity of the existing degraded forests; • Strengthening of agricultural sector; • Control of global warming, desertification, control of trade in wild birds and animals; • Prevention illegal occupation of the forestlands, tree felling and hunting of wild animals.	
National Biodiversity Strategy and Action Plan (2004)	• Conserve, and restore the biodiversity of the country; • Maintain and improve environmental stability of ecosystems; • Ensure preservation of the unique biological heritage of the nation for the benefit of the present and future generations; • Guarantee safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country; • Stop introduction of invasive alien species, genetically modified organisms and living modified organisms.	MOEFCC
Bangladesh Climate Change Strategy and Action Plan (2008)	Establishment of six strategic pillars for action, including: (1) food security, social protection and health, (2) disaster management, (3) protective infrastructure, (4) research and knowledge management, (5) decreased carbon development, and (6) Capacity building and institutional strengthening.	MOEFCC
National Land-use Policy, 2001	The Government of Bangladesh has adopted national Land use Policy, 2001. The salient features of the policy objectives relevant to the proposed are as follows: ➢ To prevent the current tendency of gradual and consistent decrease of cultivable land for the production of food to meet the demand of expanding population; ➢ To ensure that land use is in harmony with natural environment; ➢ To use land resources in the best possible way and to play supplementary role in controlling the consistent	

increase in the number of land less people towards the elimination of poverty and the increase of employment;
- To protect natural forest areas, prevent river erosion and destruction of hills;
- To prevent land pollution; and
- To ensure the minimal use of land for construction of both government and nongovernment buildings.

Table 6.2 presents an outline of the other national legal instrument that will have relevance to the project with respect to the social and environment considerations. The environmental report is prepared in compliance with these national policies

Table 6.2 Other Relevant National Act, Rules, Laws, and Ordinances

Act/Rule/Law/Ordinance	Key Features-Potential Applicability	Responsible Agency
Environment Court Act, 2000 and subsequent amendments in 2002	The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for appeal as well as the constitution of Appeal Court.	Ministry of Environment, Forest and Climate Changes
Public Procurement Act (PPA), 2006 and Public Procurement Rule (PPR), 2008	This rules or acts shall apply to the Procurement of Goods, Works or Services by any government, semi-government or any statutory body established under any law. The rule includes the adequate measure regarding the "Safety, Security and Protection of the Environment' in the construction works. This clause includes mainly, the contractor shall take all reasonable steps to (i) safeguard the health and safety of all workers working on the Site and (ii) protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the	Ministry of Finance

	public or others.	
The Brick Burning (Control) Act, 1989 The Brick Burning (Control) Amendment Act, 1992 and 2001	➢ Control of brick burning; ➢ Requires a license from the MOEFCC for operation; ➢ Restricts brick burning with fuel wood.	Ministry of Environment, Forest and Climate Changes
Water Supply and Sanitation Act, 1996	Management and control of water supply and sanitation in urban areas.	Ministry of Local Government, Rural Development and Cooperatives
Bangladesh Wildlife Preservation Order 1973 and Revision 2008 (Draft)	Restricts people from damaging or destroying vegetation in wildlife sanctuaries and hunting and capturing of wild animals	Ministry of Environment, Forest and Climate Changes
National Forest Policy and Forest Sector Review (1994, 2005)	➢ Afforestation of 20% land; ➢ Bio-diversity of the existing degraded forests; ➢ Strengthening of agricultural sector; ➢ Control of global warming, desertification, control of trade in wild birds and animals; and ➢ Prevention illegal occupation of the forest lands, tree felling and hunting of wild animals.	Ministry of Environment, Forest and Climate Changes
The Forest Act 1927,Amendment 2000 (Protected, village Forests and Social Forestry)	➢ Declare any forests land or wasteland as protected forests; ➢ May stop public or private way or watercourse in the interest of preservation of the forest; ➢ Declare a reserved forest area as village forests; and ➢ Declare an area as Social forests or	Ministry of Environment, Forest and Climate Changes

	launch a social forestry programme in Govt. land or private land with permission.	
Bangladesh Climate Change Strategy and Action Plan (2008)	Establishment of six strategic pillars for action, including: 1. food security, social protection and health 2. disaster management 3. protective infrastructure 4. research and knowledge management, 5. decreased carbon development, and capacity building and institutional strengthening.	Ministry of Environment, Forest and Climate Changes
Wetland Protection Act 2000	➢ Advocates protection against degradation and resuscitation of natural water-bodies such as lakes, ponds, beels, khals, tanks, etc. affected by man-made interventions or other causes; ➢ Prevents the filling of publicly-owned water bodies and depressions in urban areas for preservation of the natural aquifers and environment; and ➢ Prevents unplanned construction on riverbanks and indiscriminate clearance of vegetation on newly accreted land.	MOWR
Vehicle Act 1927 and Motor vehicle ordinance 1983	➢ Road/traffic safety; ➢ Vehicular air and noise pollutions; and ➢ Fitness of vehicles and registration.	Bangladesh Road Transport Authority (BRTA)

6.13 The Bangladesh Labor Act, 2006 and Amendment 2013

Terms and Conditions of employment are guided by **The Bangladesh Labor Act, 2006 and Amendment 2013** that illustrate the basic conditions of employment which are materially consistent with ESS 2. The Act makes it mandatory for employers to furnish employees with written particulars of employment stating, hours of work, wages, leave entitlements, job description, grievance procedure, benefits if any etc. This Act also contains:

- Contracts of employment
- Leave entitlements, i.e. annual leave, sick leave, maternity leave and compassionate leave
- The protection of wages (prohibition against unlawful deductions)
- Retrenchment procedures
- Fair and unfair reasons for termination of employment
- Grievance mechanism

The Bangladesh Labor Act 2006 (**Safety**) specifically details the safety and working condition of the assigned workers. The salient aspects that this chapter illustrates are:

- ✓ **Safety of building and machinery**. It details the inspection requirement of these installations and actions to be taken if these are found unsafe for workers.
- ✓ **Precautions as to fire**. Illustrates fire safety requirement, equipment needed as well as actions to be taken in case of fire
- ✓ **Fencing of machinery, machinery in motion, automatic machines**. Details the fencing and safety requirement to be set around dangerous machinery.
- ✓ **Floors, Stairs and Passages**. Sets out the construction and setup requirement for safe access and ease of use.
- ✓ **Excessive weights**. Illustrates that no excessive weights to be lifted by any worker.
- ✓ **Dangerous fumes and explosive and flammable gas**. Details courses of action in case dangerous and explosive gases and fumes are in work area.
- ✓ **Personal protective equipment (PPE)**. Makes it mandatory to supply workers with PPE

Special Provision Relating to Health, Hygiene and Safety) details:

- ❖ **Dangerous operations**. All potential dangerous operations to be declared and women and children to be barred from such operations.
- ❖ **Notice on accident**. Makes it mandatory to report any accident in workplace.
- ❖ **Notice on diseases**. If any worker is infected with any disease listed in the Second Schedule of the Act, it is mandatory to notify and the employer is obligated to treat the worker.
- ❖ **Restriction to Employ Women Worker**. Lists specific assignments where women may not be employed.

6.14 Compliance with ADB Safeguard Policy Statement, 2009

ADB's environmental and social safeguards form the cornerstone of its support to inclusive economic growth and environmental sustainability in Asia and the Pacific. In July 2009, ADB's Board of Directors approved the new Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operations. The objectives of the SPS are to avoid, or when avoidance is not possible, to minimize and mitigate adverse project impacts on the environment and affected people. Objectives also include helping borrowers strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's environmental safeguards emphasize development and implementation of a comprehensive EMP. Key elements of EMP are mitigation measures, monitoring programs, budgets, and institutional arrangements for implementation. In addition, the environmental assessment process emphasizes public consultation, information disclosure, and consideration of alternatives.

The key safeguard areas which must be addressed are (i) environmental; (ii) involuntary resettlement; and (iii) indigenous peoples

ADB's environmental safeguards emphasize development and implementation of a comprehensive EMP. Key elements of EMP are mitigation measures, monitoring programs, budgets, and institutional arrangements for implementation. In addition, the environmental assessment process emphasizes public consultation, information disclosure, and consideration of alternatives.

Further, ADB adopts a set of specific safeguard requirements that borrowers or clients are required to meet in addressing environmental and social impacts and risks associated with a specific project. ADB will not finance projects that do not comply with its safeguard policy statement, nor will it finance projects that do not comply with the host country's social and environmental laws and regulations. The safeguard policy statement applies to all AIIB & ADB-financed and/or AIIB & ADB-administered sovereign and non-sovereign projects, and their components, regardless of the source of financing.

6.14.1 ADB's Environmental Safeguard Requirements – Policy Principles

Environmental assessment incorporates the following policy principles:

- Projects are screened and assigned to one of the following categories described in Error! Reference source not found as soon as possible.
- Conduct an environmental assessment for each proposed project. Assess potential trans-boundary and global impacts, including climate change.
- Examine alternatives to the project's location, design, technology, and components. Avoid, minimize, mitigate, and/or offset adverse impacts.
- Prepare an EMP.
- Carry out meaningful consultation with affected people and facilitate their informed participation.
- Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.

- Implement the EMP and monitor its effectiveness. Document and disclose monitoring results.
- Do not implement project activities in areas of critical habitat, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area.
- Apply pollution prevention and control technologies and practices consistent with international good practices such as the World Bank Group's Environmental, Health and Safety Guidelines.
- Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease.
- Conserve physical cultural resources (PCRs) and avoid destroying or damaging them by using field-based surveys.

6.15 Compliance with International Requirements

Bangladesh has signed most international treaties, conventions and protocols on environment, pollution control, bio-diversity conservation and climate change, including the Ramsar Convention (Iran), the Bonn Convention on migratory birds, the Rio de Janeiro Convention on biodiversity conservation and the Kyoto protocol on climate change. An overview of the relevant international treaties and conventions signed by GOB is shown in Table 2.4.

Table 6.3: Relevant International Treaties, Conventions, and Protocols Signed by Bangladesh

Treaty or Convention	Year	Brief description	Responsible Agency
On protection of birds (Paris)	1950	Protection of birds in wild state	DOE and DOF
Occupational safety and health in working environment (Geneva)	1981	Prevent accidents and injury to health by minimizing hazards in the working environment	Ministry of Health and Family Welfare (MOHFW)
Occupational health services (Geneva)	1985	To promote a safe and healthy working environment	Ministry of Health and Family Welfare (MOHFW)
International convention on	1997	International treaty on climate change and emission of greenhouse	DOE/MOEFCC

climate changes (Kyoto Protocol)		gases	

This provides a framework for agreements between countries important to the migration of species that are threatened. China Electric Power Equipment and Technology Co., Ltd **will** follow the above rules and regulation for the construction of substation at the selected locations of the project components. The following correlation of substation project and local and international logistics;

Table 6.4: Correlate each law to the substation project.

SN	Name of Law/acts/rule	Purposes to substation project	Remarks/Ref.
1	Electricity Act,2018	This law has given idea about the construction work related to power generation, transmission and distribution, installation or reinstallation of machinery or equipment and any civil work related of TL. If any damage, harm or inconvenience is caused while doing civil works under this Act, the licensee shall, in such manner as may be prescribed by rules, pay compensation to the person affected or the owner of the land affected for acquiring land for construction of electricity towers. or the purpose of laying power supply lines or doing civil works under this Act, the licensee shall reserve the right of way over the land and the space above or underground.	This Electricity Act,2018 is covered the substation construction and distribution of power line. S.RO. No. 28-Law12019.-4n exercise of the power confered by section 61 of the Electricity Act, 2018 published 30 January 2019
2	The Acquisition and Requisition of Immovable prope rty Act, 2017	This law has given idea about land acquisition for substation project, price for the acquisition land etc.	Bangladesh: Act No. 25 of 2017, 10th July 2017
3	Environment Conservation Act (1995) and Environment Conservation Rules (1997)	The act and it rules are related to the conservation of environment. Standard limit of ambient air, water, noise have given and which will use as reference level of pollutions	Act was published in the Bangladesh Gazette, extra-ordinary issue of 16-2-1995 and amended by Act Nos 12

			of 2000 and 9 of 2002.]
4	The Bangladesh Wildlife (Preservation) Order of 1974	Wild animal" means any vertebrate creature, other than human beings and animals of usually domesticated species or fish, and includes the eggs of birds and reptiles; As per of this act (hunt) means do not killing, capturing, poisoning, snaring and trapping of any wild animal. Do not injuring or destroying or taking any part of the body of such wild animal or do not taking of nests or eggs of wild birds and reptiles during construction of substation project	Ministry of Fisheries and Livestock
5	Bangladesh National Building Code (BNBC)	BNBC has clarified the issue of safety of workmen during construction and with relation to this, set out the details about the different safety tools of specified standard. The BNBC code will following for the construction of control building of substation. Lux limit of control building inside, ventilation of control building.	-
6	National Environmental Management Action Plan 1995	The National Environmental Management Action Plan (NEMAP) builds on the NEP and was developed to address specific issues and management requirements during the period 1995-2005. The plan includes a framework within which the recommendations of a National Conservation Strategy (NCS) are to be implemented. The NEMAP was developed with the following objectives: • To identify key environmental issues affecting Bangladesh; • To identify actions to halt or reduce the rate of environmental degradation; • To improve management of the natural environment; • To conserve and protect habitats and bio-diversity; • To promote sustainable development; and To improve the quality of life	DOE/MOEFCC
7	Environment Court Act 2010	The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for	DOE/MOEFCC

		appeal as well as the constitution of Appeal Court.	
8	Bangladesh Water Act, 2013	The Water Act 2013 is based on the National Water Policy, and designed for integrated development, management, extraction, distribution, usage, protection, and conservation of water resources in Bangladesh. As per this Act, all forms of water (e.g. surface water, ground water, sea water, rain water and atmospheric water) within the territory of Bangladesh belong to the government on behalf of the people. There will take permission from executive authority for large scale water withdrawal	Ministry of Water Resources
9	Wildlife (Conservation and Security) Act, 2012	Restricts people from damaging or destroying vegetation in wildlife sanctuaries and hunting and capturing of wild animals	Ministry of Fisheries and Livestock
10	Disaster Management Act (2012)	The Act enacted to make the activities about disaster management coordinated, object oriented and strengthened and to formulate rules to build up infrastructure of effective disaster management to fight all types of disaster. It is necessary to mitigate overall disaster, conduct post disaster rescue and rehabilitation program with more skill, provide emergency humanitarian aid to vulnerable community by bringing the harmful effect of disaster to a tolerable level through adopting disaster risk reduction programs and to enact rules to create effective disaster management infrastructure to fight disaster to make the activities of concerned public and private organizations more coordinated, object oriented and strengthened to face the disasters;	Ministry of Disaster Management and Relief
11	Noise Pollution (Control) Rules, 2006	According to the Noise Pollution (Regulation and Control) Rules, 2006, acceptable sound levels are 55 decibels for daytime – 6am to 9pm –and 45 decibels for night – 9pm to 6am – in residential areas; 50 decibels for daytime and 40 decibels for night in quiet places; 60 decibels for daytime and 50 decibels for night in mixed areas; 70 decibels for daytime and 60 decibels for night in commercial areas; and 75 decibels for daytime and 70 decibels for night in industrial areas. Noise Pollution (Control) Rules lay down the permitted noise levels for both day and night-time as per ECR 1997. The	DOE/MOEFCC

		Noise Pollution (Control) Rules state that no construction machines used to process and break down building materials (bricks, stones etc.) shall be used within 500 meters of any residential areas and such machineries cannot be used between 7 pm and 7 am except without the permission of the concerned authorities.	
12	E-waste Management Rule 2021	The main provisions of this regulation are as follows. • Manufacturers, traders, sellers, transporters, repairers, collection centers, recyclers, dismantlers, etc. of the subject products are required to register with a prescribed form to the DOE. When applying for registration, they shall also submit WEEE management plan. • Registered manufacturers, recyclers, etc. shall obtain environmental clearance in accordance with the Bangladesh Environmental Protection Rules, 1997. • Manufacturers have to establish individual or joint collection centers and set aside funds for the management of WEEE. • For fluorescent lamps and mercury incandescent lamps, if they cannot be recycled, they need to be handed over to collection centers for storage and disposal. • Manufacturers, importers, etc. shall meet the collection targets for WEEE as specified in the Schedule (10% in the first year of the implementation, 20% in the second year, 30% in the third year, 40% in the 4th year, and 50% in the fifth year and thereafter). • In order to facilitate the proper management of WEEE, the name, address and contact information of the trader or seller as well as the information on the registered collection center shall be displayed on the product or on the product label, or this information shall be provided to consumers or large consumers. Traders, sellers and collectors of WEEE shall receive them from consumers at designated points and transport them to collection centers.	MOEFCC

13	The Solid Waste Management Regulations 2021	The Regulations define the responsibilities of businesses involved in solid waste management and impose collection, recycling, and disposal obligations according to Extended Producer Responsibility (EPR) on manufacturers of non-biodegradable products such as glass, plastic, and bottles. The main provisions of the Regulations are as follows. o When recovering resources from waste, the principles of management that consider the waste hierarchy, such as the 3Rs, segregation, and reduction, must be followed at all stages from waste generation to final disposal. o Responsibilities of waste generators, consumers, and users: Dispose of waste in accordance with the regulations of authorities including local government. Dispose of waste separately. Do not dump, store, or burn waste outdoors. o Responsibilities of manufacturers (*not defined) and importers of products Collect non-biodegradable products such as glass, plastic, polyethylene, multi-layered packaging, bottles, and cans from consumers and recycle or dispose of them if appropriate. Determine work plans and implementation procedures for recycling and disposal. Ensure that EPR is properly implemented. Submit an annual report to the Department of Environment (DOE) on the amount of plastic recycled. Raise public awareness of proper waste management.	MOEFCC

Chapter 07

Health and Safety & Training Plan at Substation Project

7.0 Health and Safety Plan & Training Plan at Substation Project

China Electric Power Equipment and Technology Co., Ltd will recruit health safety officer and site project managers who will monitor and look after the health & safety matter of the labour and workers as well as safety for the project adjacent community. China Electric Power Equipment and Technology Co., Ltd will hang a contact list of emergency units of the nearest health complex, district hospital, clinic, medical college and also ambulance services. The safety plan will also include PPE of workers, site visitors, engineers, high officials of PGCB and others. As per Schedule IV (2) Bangladesh Labour Rule (BLR), 'When organizing health and safety, top management should consult with the Safety Committee to define targets, organization, responsibilities, etc. These decisions are put in writing in one document called the Company Health & Safety Policy so that they can easily be communicated in the company and to stakeholders. The Health & Safety policy also contains the commitment of top management to ensuring Health & Safety. In addition, the Safety Committee drafts an OSH Guideline which defines procedures on various aspects such as emergencies, accident investigation, risk assessment, and responsibilities of the Safety Committee etc'. In the view of labour rules of Bangladesh, China Electric Power Equipment and Technology Co., Ltd will make a safety policy for the construction of substation. This policy will implement during project performance.

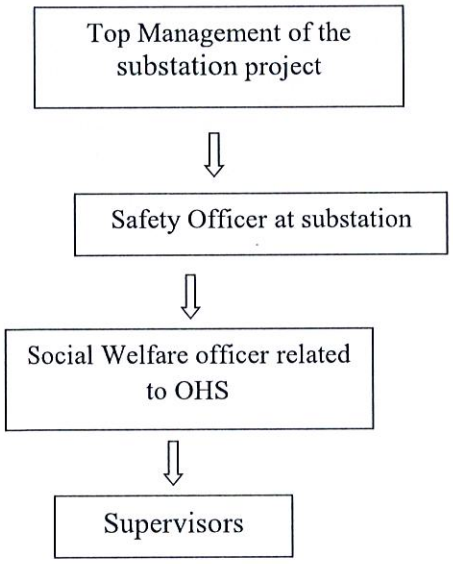


Fig-2.2: Proposed Health & Safety Organ gram of substation **project**

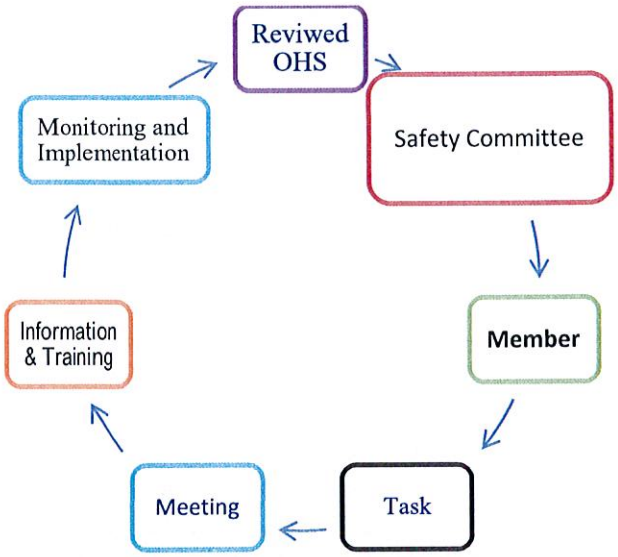


Fig 2.3: Health & Safely Planning of substation **project**

7.1 Health and Safety Reporting

During the construction of substation, work procedure, occupation safety guide, PPE for the workplace, residence of labours, labour law, sanitation facilities at labour camp and workplace, drinking water for labour, personal hygiene of labour, an awareness program for labours and the nearby public will maintain. Health and Safety officer will give all instructions for the work of way. All information, data, photographs of workplace will collect by the health and safety officer, for further reporting. The civil work, safety issues will be monitored by the site engineers of Power Grid Company of Bangladesh (PGCB). The report will be made with the following component by China Electric Power Equipment and Technology Co., Ltd.

- The project description
- Work progress
- Health & safety regulations
- Standard Work Method Statement (SWMS)
- PPE for construction of substation tower and stringing of wiring
- Work schedule along with health & safety issues
- Impacts related to health & safety issues
- Mitigation measure of the above impacts
- Monitoring of to health & safety issues about health, safety and accident or incident
- Monitoring of work standard of substation project
- Emergency Preparedness and Response Plan Occupational Health and Safety issues
- Communication system of health & safety
- Further recommendation for health & safety issues

7.2 Accident Reporting Procedure

Labours or employee anticipates an accident due to perceived negligence or inadequate safety, they must notify their supervisors or Health & Safety department as soon as possible so the accident can be prevented. Depending on the incident, official forms may have to be completed and submitted. The accident and any sustained injuries must be recorded to an accident database or file. The officials responsible must initiate an investigation or request an investigation from authorities if appropriate. The employee who reported the accident has to cooperate if called in for questioning to provide details needed. As a general rule, the employee must provide information in the incident report as accurately as possible on the following:

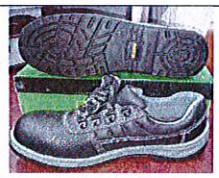
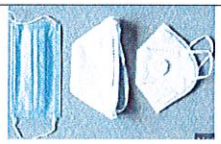
- The place of the accident
- The date and time of the accident
- The people involved or injured.
- Their position or involvement in the accident.
- Their actions immediately after the accident

China Electric Power Equipment and Technology Co., Ltd will take further necessary actions if any incidental occurrence will happen during the construction of substation project. The form of incident/accident template is attached an appendix E

7.3 Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems. PPE is considered to be a last resort that is above and beyond the other facility controls and provides the worker with an extra level of personal protection. Table presents general examples of occupational hazards and types of PPE available for different purposes. Recommended measures for use of PPE in the workplace include:

- Active use of PPE if alternative technologies, work plans or procedures cannot eliminate, or sufficiently reduce, a hazard or exposure
- Identification and provision of appropriate PPE that offers adequate protection to the worker, co-workers, and occasional visitors, without incurring unnecessary inconvenience to the individual Proper maintenance of PPE, including cleaning when dirty and replacement when damaged or worn out. Proper use of PPE should be part of the recurrent training programs for employees
- Selection of PPE should be based on the hazard and risk ranking described earlier in this section, and selected according to criteria on performance and testing established

Table 7.1 Summary of Recommended Personal Protective Equipment According to Safety to single unit of work			
Objective	**Workplace**	**Suggested PPE**	**Picture**
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shields, protective shades, etc.	
Head protection	Falling objects, inadequate height clearance, and overhead power cords.	Plastic Helmets with top and side impact protection.	
Hearing protection	Noise, ultra-sound.	Hearing protectors (ear plugs or ear muffs).	
Foot protection	Falling or rolling objects, pointed objects. Corrosive or hot liquids.	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals.	
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures.	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.	
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors. COVID 19	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors and gases). Single or multi-gas personal monitors, if available	
	Oxygen deficiency	Portable or supplied air (fixed lines). On-site rescue equipment.	
Work at height	Safety belt	The safety belt will be used to work at certain height during erection and stringing	

Body/leg protection	Extreme temperatures, Hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.	
Musk	substation work site	Protect COVID 19 and dust	

The following safety keys (key to life) will need for the construction of substation project. Key safety should be followed by all stuffs of the substation project during the construction phase especially civil work and work at height. Labour take permission from safety officer fpr work at height. The following table has expressed health & safety hazard, Sources, consequence and safety measure of PPE

Table 7.2: Occupational hazard and safety analysis of substation **project**

SN	Hazard	Sources	Consequences	Safety Measures
1	COVID 19	This type hazard due to corona virus	Respiratory problem	Musk, social distance and hand wash is the safety measures of COVID 19
2	Head injury	Heavy objects get down to be on top	Headache, fever, blood clotting	Helmets is the safety measures for head protection
3	Slippery	Walking on wet ground at substation work site	fracture of bone and pain inside of body organs, ergonomic hazards	Safety shoes and boots for protection against moving & falling objects,
4	Heat and burns	Welding work for making iron rod case	blister on skin, irritation on skin	Hand glove is the safety measures for heat and burns protection
5	Insect bites/snake	It will happen at accommodation location, temporary labours camp	Serious health hazards including Malaria *infestation* , fever and mortality	Anti-Insect spray, phenol , mosquito coil are the safety measures for Insect and snake protection
6	Noise hazards	Use of heavy machinery, hydraulic horn for vehicles, sound from diesel engines, pneumatic tools such as	Loss of hearing	Ear-plugs are the safety measures for loud sound protection

		drills, grinders, electrical motors/generators		
7	Work stress	Work stress may be come out from the continuation of substation work with long interval of time	Headache	Taking rest and first aid treatment may be the safety measure of Work stress
8	Vibration	Whole-body or hand/arm vibration, poor lighting, or poorly designed tools, equipment,	Musculoskeletal disorder	short intervals between activity may be the safety measure of vibration
8	Non-ionizing radiation (EMF)	High voltage (400 and 132 kv) radiation	Headache, child leukemia	Mapping need for EMF from the all point of high voltage area of substation
9	Eye irritation	Dust dropped at eye-sight	Pain and itching at eyes	Glass to eye protection
10	biological hazards	Exposure to viruses, bacteria at works site	Fever, headache	To meet with physician is the safety measure of biological hazards
11	Accident	arrangement of inappropriate work environment, insufficient lighting, potential accidents with electricity and fire	Musculoskeletal disorder, fracture of bone and pain inside of body organs, ergonomic hazards	Appropriate PPEs are the safety measures of Accident

7.3.1 Instructions of PPE

PPE are the last resort in the hierarchy for selection of risk controls. Hence it is very important that the PPE are based on the type of hazard to which a person is exposed. The PPE do not eliminate the hazard and are designed to interpose an effective barrier between the person and the harmful objects, substances, activity being performed.

- Demanding PPE based on the peak number of work force at any time in the future in the life cycle of the project, the Project Managers are to plan the requirement of PPE i.e. safety harnesses, fall arrestor, helmets, safety shoes, gloves and first aid boxes so that it will adequate to provide the same to the entire workforce at all times.
- In addition to this peak demand of PPE and first aid boxes, the Project Manager has to decide on a Minimum Threshold Level (MTL) of the PPE too which must be available at the stores at all times. The store in charge of each project has to ensure proper safe custody in the stores at all times
- The moment the stock in stores reduces below the MTL, the store in charge is to raise an indent for additional PPE.

- PPE will keep for visitors and stakeholders at the SS side
- The store in charge shall issue the PPE to the **China Electric Power Equipment and Technology Co., Ltd staff** / contractor staff based on the written approval from the Project Manager. Proper records of the issues are to be maintained by him in the format.
- The site engineer / site manager has to ensure that contractor's workforce is equipped with suitable PPE before commencement of work at any site. In case contractor is unable to provide adequate PPE, then the site engineer / supervisor will draw adequate numbers of PPE from the store in his name and give it to contractor staff. The same shall be back charged to the contractor.
- After completion of the work, the sub- contractors' supervisor will return the PPE to the store. In case of any pilferage / shortage of PPE, the stores in charge will record the same.
- The Project Manager shall record this deficiency in the sub-contractors' bills and the issue of whether to write off / back charge the same to the contractors will be dealt with separately by him keeping all the facts of the case in mind. Till such time as the issue of PPE is closed, the ownership of these PPE will rest with the site engineer / contractor to whom they have been issued.

7.4 Presentation of the medical facilities at Project Areas

An emergency is an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community. Emergencies do not normally include safe work practices for frequent upsets or events that are covered by occupational health and safety. China Electric Power Equipment and Technology Co., Ltd will develop a list of contact information for all internal and external resources and personnel. The list should include the name, description, location, and contact details (telephone,) for each of the resources, and be maintained annually. China Electric Power Equipment and Technology Co., Ltd will provide first aid attendants for the facility as well as medical equipment suitable for the personnel, type of operation, and the degree of treatment likely to be required before transportation to the hospital. The list of the emergency contact numbers of fire services and emergency numbers of medical colleges, hospitals, and health complexes is as following

Table 7.3: Contact detail of the following

Locations	Name of the Institutes	Respective contact detail
Hospitals	Thana Health Complex, Kaliganj	01735923757
Fire service and civil defence	Thana Health Complex, Kapasia	*01715659734*
	Fire service , Kapasia	+01760-355255
	Fire service , Purbachal	01968-881028
	Fire service , Kaliganj	01743-095858

7.5 Evacuation procedure for medical emergencies

The proposed area access of the substation will go through the above health complex and nearby the medical college hospital. **China Electric Power Equipment and Technology Co., Ltd** will collect the contact number of key persons of the above hospital before starting the construction work of the substation. The list of the mobile phone number of emergency of the medical center will hang on the workplace as a poster. The site safety officer will call for an ambulance when an accident and the incidental event will have occurred at the substation workplace. Besides these, Kaliganj Upazila have one health complex and every union have one or two community clinic in Bangladesh. Any emergency of health issues of occupants, workers, stakeholders and public, the emergency ambulance will call for shifting to the better treatment to the nearest hospital and medical colleges. Recently COVID19 is now a burning issue and PGCB has been instructed to prevent the COVID19. **China Electric Power Equipment and Technology Co., Ltd** will give safety training on the prevention of diseases. **China Electric Power Equipment and Technology Co., Ltd will** ensure for supplying pure drinking water to prevent water-borne diseases. Recently COVID-19 is burning issues which will be prevented by using facial musk and washing the hand of the workers with maintaining social distance (3 feet) among the people. PGCB has instructed the risk assessment about the COVID-19. The following instructions are

- Coughing and spitting is forbidden at anywhere of the work place of substation project and do not touch eyes, face and nose
- Wash hands for 20 seconds
- Always used musk during the construction work of substation project
- Fever, cough and problem of breathing

- If Fever, cough and problem of breathing, maintain the social distance (3 feet) or do not do any work at outside for 14 days

7.6 Description of the internal organization and action to be taken in the event of an accident or incident

This will use to record number and type of accidents and incidents including near misses occurring in the workplace both at project site, details, and outcomes of any required investigation; corrective actions required to address incidents, and trend analysis to detect themes such as the recurrence of type of incidents. A safety committee will investigate formed under occupational health and safety supervisor of the substation project. In addition the system should identify roles and responsibilities for recording, reporting and investigating incidents and for corrective action planning. **China Electric Power Equipment and Technology Co., Ltd** have a policy for the free medical treatment for the labour and stakeholders who will fall into any accidental event. Safety officer will try to contact with project manager of **China Electric Power Equipment and Technology Co., Ltd** will follow company regulation and law for accident or incident occurrence at the workplace and appropriate compensate according to record of investigation.

7.7 Safety Visit and Inspection

Safety visits and inspections is a systematic procedure to verify that the OHS Management System has been implemented and is in use according to the planned arrangements. The Divisional Safety Manager is to ensure that the OHS management systems are being implemented and followed as applicable. Safety visits and Inspections are carried out for ensuring effective implementation of the OHS management systems.

In this regards, all safety personnel shall visit the sites daily to stray at the substation yard and carry out safety inspections to ensure that all guidelines are being effectively implemented on ground. The safety officer shall submit a monthly safety report (MSR) to the corporate HSE department by the third working day of the next month.

7.8 Incident Reporting Procedure

To establish a system for reporting and investigating incidents / near misses;

- All incidents / unsafe acts / unsafe conditions occurring at the work sites (however minor they may be) are to be reported to the Project Manager / Safety Officer of **China Electric Power Equipment and Technology Co., Ltd**
- Incident report is to be submitted to the Corporate HSE team within 24 hours of the incident.
- In case of fatal or serious incidents the Project Manager must immediately inform the Divisional Manager / Safety Head telephonically immediately.
- The Safety head shall report the matter to the Managing Director.

In construction of SS project, all incidents, regardless of their perceived severity are reported to the Project Implementation Unit (PIU) after the occurrence and prior to seeking medical treatment unless in cases of life-threatening injuries. This includes construction equipment, and vehicle-related incidents, incident for with awareness. Priority items include care for the injured, establishing control over the accident scene, and notification of proper project personnel. **China Electric Power Equipment and Technology Co., Ltd will** recode the incidental and near miss details during the construction SS period

Table 7.4: Name and Features of incident/accident with remedy

Name of incident/accident	Features of incident/accident	Remedy
Fatal incident	Fatalities occurring directly as a result of a work related incident, including those that occur sometime after the incident as a direct result of the injuries sustained.	First aid treatment followed to hospital
Incident	An unplanned / undesirable event that results in death, ill-health, injury or harm to people or damage to plant equipment or loss to property or an environment hazard.	Call ambulance
First aid case	Work related injury that requires one-time treatment and subsequent observation, and does not result in a lost day accident, for example minor scratches, burns, cuts, splinter injuries etc.	First aid treatment
Medical treatment injury	Medical Treatment Injury is an injury that requires treatment beyond first aid, but does not result in a Lost Day Accident. For example, if someone has a small cut they will receive first aid (from trained first aider), however, if they get a big cut that requires treatment from a nurse or doctor (either on site or at hospital) then it becomes a medical treatment injury. If this person is then off work for one shift or more it then becomes a Lost Day Accident.	Call ambulance followed to hospital
Near miss:	An event that gives rise to an incident or had the potential to lead to an incident	First aid treatment
Non-conformance	Any deviation from the laid down practice, standards, or specifications as spelt out by the management team of China Electric Power Equipment and Technology	First aid treatment (if need)

	Co., Ltd.	
Serious injuries	Any injury resulting in unconsciousness requiring resuscitation or admission to hospital for more than 48 hours viz. amputation, serious or multiple fractures, loss of sight in one or both eyes or serious burns.	Call ambulance followed to hospital

Unsafe act: An act (whether witnessed or not) that unnecessarily increases the likelihood of injury, violates established safety rules or is contrary to expected conduct.
Unsafe condition: A condition not directly caused by the action or inaction of the employees in an area that may lead to an incident or injury if uncorrected. It may be caused by fault design, incorrect fabrication, inadequate maintenance, or subsequent deterioration.
The following classification shall be used for reporting accidents / incidents: Fatality: A work related injury that results in death regardless of the time intervening between injury and death. An employee, contractor, or sub-contractor fatality should be reported, when it is work related.
Serious injury: A work related injury that results in unconsciousness requiring resuscitation or admission to hospital for more than 24 hours. Serious injuries include amputation, serious or multiple fractures, loss of sight in one or both eyes, serious burns etc.
Lost Time Incident (LTI): A work related injury sustained from a single identifiable incident which results in the inability of an employee to work for at least one full day or shift any time after the day or shift on which the injury occurs. Absence more than 48 hours.
Medical Treatment Injury (MTI): A work related injury sustained from an identifiable incident that requires medical treatment by a registered medical practitioner that is beyond the scope of normal first aid treatment. Absence less than 48 hrs.
First aid injury: A first aid injury is a work related injury that requires first aid treatment. The first aid treatment may be administered or supervised by a medical practitioner.
Notification
All incidents regardless of category and severity shall be reported immediately to the Project Manager / Safety Officer immediately.

7.9 Action to be taken immediately after an incident

When an accident involving personal injury or property damage occurs, the Project Manager shall take the following actions

- Care for the injured person is the first priority. Make immediate arrangements to transport him to the nearest hospital if required and provide medical attention at the earliest within the hour.
- Check to see if the work needs to be suspended, cordoned off or properly guarded in preparation for the investigation by the incident investigation team. Take action accordingly and report the same also along with the initial report telephonically.

- In case of property damage, determine the extent of damage and ensure that no further damage will occur.
- Prepare diagrams and sketches of the site as warranted by the circumstances. Prepare to obtain photographs and / or video film at the earliest if possible.
- Carry out initial independent investigations at site and submit a detailed report within 24 hours giving full details.
- Confirm the name of the injured person(s) together with the nature and extent of injuries and whether or not necessary medical treatment has been given to the Safety Head / Division Safety Manager along with the initial report telephonically.

7.10 Investigations

All fatal and serious incidents are to be investigated by a team formed for the same by the directions of the head of PIU at the earliest. The help of an expert (if required) may also be taken as a nominated member of the investigation. Incident investigation is to be carried out as per **China Electric Power Equipment and Technology Co., Ltd incident** investigation procedure and a report submitted to the head of PIU, and **China Electric Power Equipment and Technology Co., Ltd Safety** Head.

7.11 Health & Safety Record Management

For the substation project, maintaining all procedures for controlling all documentation required by the Health and Safety management system. The procedures ensure that documentation can be:

- Located.
- Reviewed, revised, and approved by authorized personnel.
- Latest issues are available at all appropriate locations.
- Prompt withdrawal of obsolete documentation.
- Retention of obsolete documents for legal and/or knowledge preservation purposes.

The Substation project personnel's will maintain a documented system for detailing the core elements and the interactions and providing direction to the related documentation. The minimum requirements for documented procedures are:

- Risk assessments and control
- Incident reporting and investigation
- Emergency Preparedness and Response
- Monitoring and measuring performance
- Responsibilities register
- Training register
- Relevant work procedures and instructions
- Process checklist
- Induction training sheet
- Site safety survey report

China Electric Power Equipment and Technology Co., Ltd will maintain procedure for identification, maintenance, and disposition of records relating to the health and safety management system. These include audit reports, management reviews, incident reports etc. All records held whether hard or soft copy are to be legible and traceable to the relative activity or process and are to be readily retrievable. Records are to be protected from deterioration or loss for the defined retention periods.

7.12 Health and Safety Management System Audit

Health and safety personnel of China Electric Power Equipment and Technology Co., Ltd will maintains an internal audit program for the assessment the health and safety management system. China Electrical Power Equipment and Technology Co., Ltd will supply sufficient PPE for labours and visitor.

The audits are used to determine:

a) Conformance to the China Electric Power Equipment and Technology Co., Ltd Health and Safety management system

b) Correct implementation and maintenance

c) Conformance to the current internal procedures and the assessment of those procedures.

The results of the audits provide information for the management team. Audit programs are based on:

a) The risk profile and risk experience of the particular activities.

b) The results of the previous audits.

Audit procedure to addresses the full audit scope, frequency, and methodology together with defined responsibility for conducting and reporting audits.

7.13 Tool Box Talk

A Tool Box Talk (TBT) is a hands-on way to remind our workers who are our most vital resource and are directly exposed to the hazards, that health and safety are as essential ingredients on the job as is progress. Tool Box Talk is one of the most effective ways to ensure safety awareness at the grass root level and is very helpful in reducing accidents at sites. All the workers at the project sites are to be covered. A TBT is a short pre-work meeting of 10-15 minutes held in the close vicinity of the work site before commencement of the work for the day wherein the workers are made aware of the hazards associated with the work at hand, the risks involved and the control measures thereof. TBT generally deals with specific problems on site and is not an alternative for continual safety training to be provided to the staff. TBT must be conducted every day before commencement of any work by the site in charge, who will fully aware of the activities to be performed at the site. It is important that all the workers and the contractors' supervisor at the project site necessarily attend the TBT before being allowed to work at the site for the day. In the event of an activity changing mid-way during the day, a separate TBT needs to be conducted.

TBT is not a lecture but is designed to get the workers to think and talk about health and safety issues. It is advisable to use pictorial cards for the TBT as pictorial representation is far more effective than plain lectures.

The contents of the Tool Box Talks should include:

- The environmental hazards and risks associated with the particular job to be execute.
- The measures to be taken to control the environmental issues for the particular job.
- Head count / attendance maintenance
- Rundown of previous day's work and details of work for the day
- Time schedule and sequence of work
- Safe working procedures / work instructions / method statements
- Emphasis of Do's & Don'ts
- Demonstration of any special application of work / safety
- Ensure understanding of safety requirements
- Potential safety hazards and the control measures to be followed
- Proper use of PPE
- Visual check of each worker's health
- Health check of PPE
- Visual inspection of chain pulleys and lifting appliances if being used at site
- Lessons learnt from accidents
- Hierarchy of the working teams
- Deliver a safety pep talk
- Any other instructions likely to affect safety
- Any other instructions related to safety issued by the China Electric Power Equipment and Technology Co., Ltd management team

At the end of the session, a record of the talk delivered must be maintained in the Tool Box Talk form. Details must include date, location, topics discussed, names of the attendees and name & signature of the person conducting the TBT. It is of utmost importance to obtain signatures / thumb impression of the attendees to confirm their participation. The efficacy of the conduct of the TBT and the records thereof must be regularly monitored. Safety officer of China Electric Power Equipment and Technology Co., Ltd will visit daily for monitoring the safety aspects in the Kaliganj substation yards.

7.14 Safety Meeting

The objective of the safety meetings is to provide a forum for ensuring successful supervisor – labours and stuffs communications, by making effective use of the communication time by allowing labour participation and providing equal exposure to vital information. These meetings can also help to create a cooperative communication climate, encourage team spirit and enhance supervisor leadership skills and discussed with specific agenda about labour PPE, workplace safety, incident, labours resident, health & safety impacts, mitigation measure of impacts, work

schedule methods. The output of the meeting will be writing regularly by the Health and Safety of the total substation projects

The various types of safety meetings that are conducted to improve safety awareness amongst all personnel are pre-start work meetings, safety meetings and safety committee meetings.

A safety meeting will held before the actual start of work by the side safety officer at the substation sites. The main purpose of the meeting is to brief the contractors and their supervisors on the work procedures and risk assessment for the job, safety officer will be done the work and to inform them about the safety rules and regulations to be followed at the substation sites as spelt out by the China Electric Power Equipment and Technology Co., Ltd management. It is to be carried out by the Project Manager / Safety Officer. An induction certificate is to be got signed by the China Electric Power Equipment and Technology Co., Ltd for record purposes.

Objective of the project safety meetings is to assemble personnel responsible for safety of the construction work in the project, so that they can formally address the issues and take appropriate actions in relation to the achievement of site safety management objectives. The main thrust areas of the safety meetings shall be:

- Confirm that the safety and health management practices as spelt out by the China Electric Power Equipment and Technology Co., Ltd and every management will be carried out properly at SS sites, by all concerned.
- Ensure that the works are being performed safely and smoothly.
- Ensure that all safety rules and regulations are being meticulously followed.
- Review safety inspection reports of the SS site.
- Resolve any safety issues raised by CET.
- Enforce safety training programs.
- Review safety statistics of the previous period.
- Review of the laid down safety practices and their improvements if necessary

Safety meeting will held at least once a month preferably in the first week of each month or any other day decided mutually in the meeting so as to achieve maximum attendance and work output. The project safety meeting will be attended by the Project Manager, Safety Officer, Site Managers, Site Engineers, sub-contractors, and representatives of the China Electric Power Equipment and Technology Co., Ltd (if any). The Project Manager will preside over the meetings while the Safety Officer will be a secretary. Agenda of the meeting shall be as follows. This list is only illustrative and not exhaustive.

- Confirmation of minutes of the last meeting.
- Overview of site safety performance.
- Site safety inspection.
- Incident and accident investigation.
- Minutes of the safety meeting are to be recorded and circulated to all concerned.
- Proper documentation of the pre start meeting with the contractor shall be maintained.

7.15 Activity wise safe working procedure

To establish a safe working procedure throughout the substation project and EHS rules for various operations to ensure the work is carried out safely. It applies to all levels of employment of the organization including contractors working within our premises as well as at customers' sites. It is the responsibility of all Project Managers of **China Electric Power Equipment and Technology Co., Ltd to** ensure that safe work practices have been communicated within the work areas. It is the responsibility of the engineer/supervisor/technician to ensure that the work has been carried out following the safe work practices

7.15.1 Excavation

- Check with authorities about underground facilities like water line, sewer line, electric cables, or telephone cables and obtain proper permit and take proper precautionary measures against the same before commencing any excavation.
- No excavation work is to be carried out unless the work is effectively supervised and planned.
- Ensure adequate manpower for the excavation and foundation work.
- Excavated earth / material must be kept at least 1 mtr away from the edge of the excavation.
- Precautions must be taken to ensure that boulders etc. do not fall back inside the pit.
- All plants and machinery should be placed at least 2 meters away from the edge of the pit to avoid collapse of the pit due to vibration produced by the machines. Wheel blocks must be provided to avoid any undesired movement.
- All JCB / excavator operators working at site must hold valid driving license.
- No vehicular movement must be permitted within 2 meters from the edge of the excavation.
- Excavations deeper than 5 meter must have proper shoring or sloping depending on soil conditions to avert pit collapse during excavation and foundation casting.
- Proper and strong ladders must be used for access and egress into and out of excavations by the workmen.
- Ladders must extend at least 3 meter above the ground level.
- In case there is movement of men or cattle in the vicinity of the excavation, the area is to be suitably barricaded and warning signs displayed before starting any excavation activity.
- Undercutting must not be resorted to under any circumstances.
- Ensure that electrical connections for dewatering pumps, if any, do not cause any danger to the workmen.
- Excavations must be inspected and thoroughly checked daily by an experienced and competent person before starting the work.

- After heavy rainfall, the site in charge should inspect the condition of the excavation. In case there is a possibility of pit collapse, all activity must be stopped immediately. Work must start only after ensuring adequate precautions against the danger.
- Lone workers should not be allowed to work in deep excavations.
- Workmen working at ground level above the protruding reinforcement bars must protect themselves by suitable means against fall on the same.
- Unnecessary gap between excavation and foundation casting is to be avoided.
- Appropriate PPE must be worn by workers at all times. PPE required for excavation activity includes safety helmets, shoes.
- Prohibit children / passers-by from entering into the working area.

7.15.2 Foundation and Concreting for Basement Column

- China Electric Power Equipment and Technology Co., Ltd will keep enough manpower for the foundation work.
- In case there is movement of men or cattle in the vicinity of the excavation, the area is to be fenced with warning signs (luminous if necessary).
- Concrete mixers should be placed at least 2 meters away from the pit to avoid collapse of the pit due to vibration produced by the machine.
- Concrete mixers for 5 numbers substation basement foundation should not be operated by any unauthorized person.
- No maintenance is to be carried out on the concrete mixers while the machine is in operation.
- All rotating parts of the mixers must be adequately guarded.
- Wheel blocks are to be provided to the concrete mixers to avoid any undesired movement.
- Workmen working at ground level above the protruding reinforcement bars must protect themselves by suitable means against fall on the same.
- Template supporting jacks are to be placed evenly and as far away from the edge of the pit as practicable.
- Jacks to be placed on level ground.
- Wooden platform or sand bags are to be placed below the jacks for proper distribution of load.
- Unnecessary gap between excavation and foundation casting is to be avoided.
- Proper and strong ladders are to be used for access and egress into and out of excavations.
- Ladders must extend at least 3' above the ground level
- Main leg members are to be fitted with step bolts as the tower is being erected. The practice of fixing step bolts after erection of complete tower must not be allowed.

- Ascending / descending from the tower should be through step bolts only. The practice of ascending / descending from the tower through tower members must not be allowed.
- Heavy sections should preferably be lifted with the help of tractors. Tractor operator should be sufficiently experienced for this type of work.
- For manual lifting of sections / heavy members, the hauling rope is to be supported with a strong anchorage point to prevent slippage. The end of the hauling rope is to be wrapped around this anchorage point by sufficient member of turns.
- Wire / PP ropes used for tying pulleys etc. to the tower members must be adequately padded with folded gunny bags to prevent damage by the sharp edges of tower members.
- No tower erection works shall be carried out after sunset.
- Tower erection works shall not be carried out during inclement weather viz. dust storms, windy weather, rains or storms. If thunderstorm is approaching, the work should be stopped immediately.
- All safety equipment must be CE / ISI marked.
- Proper first-aid box should be available at site.
- At least two members of each gang must have first-aid training.
- One vehicle should be available at site for providing immediate medical help to the injured, if any.
- Additional safety measures need to be taken while carrying out erection works near power lines which include maintaining safe working distances while working near 'Live' power lines and ensuring proper tower earthing.

7.15.3 Testing and Commissioning of Substation Project

- The whole 400 kV SS will be subjected to inspection and witnessing the tests by the PGCB during manufacture, erection and on completion.
- PGCB or their designated representatives will be entitled to attend the **factory acceptance tests**, which shall be performed at the Manufacturer's works/testing laboratories in country or abroad
- **China Electric Power Equipment and Technology Co., Ltd** shall be responsible for bearing all costs for the mentioned training.
- Prior to each use, all measuring and testing equipment used in inspection shall be calibrated and adjusted against certified equipment having a known valid relationship to inter-nationally recognized standards.
- The transformer shall be designed, manufactured and tested in accordance with the best international engineering practices under strict quality control to meet the requirement stipulated in the technical specification which will be confirmed by **China Electric Power Equipment and Technology Co., Ltd**

- The manufacturer of all equipment shall provide all necessary information and calculations to demonstrate that the transformer meets the requirements for short circuit strength and durability;
- The design review shall be conducted generally following the "User Guide for the application of Gas Insulator Switchgear (GIS) rated voltage
- Triplicate sets of all test records, test certificates and performance curves, whether or not they have been witnessed by the Engineer of PGCB, shall be supplied to the Engineer for all tests carried out in accordance with the provisions of this contract document and specification.
- **China Electric Power Equipment and Technology Co., Ltd** shall provide test pieces as required by the Engineer to enable him to confirm the quality of the material supplied under this contract document and specification
- Tests at Manufacturers' works shall include mechanical, electrical and hydraulic tests to ensure that the plant being supplied complies with the requirements of the Specification. Works tests shall include all routine electrical, mechanical and hydraulic tests in accordance with the relevant IEC or British Standards
- All equipment for substation automation system, control, relay protection and metering shall be fully assembled at the Manufacturer's works and subject to the complete routine and functional tests.
- All circuits shall be subjected to the high voltage test specified in the relevant IEC or approved standard. The insulation resistance of all circuits shall be measured before and after any high voltage tests.
- All panel equipment is to be examined to ensure that it is in proper working condition and correctly adjusted, correctly labeled and that cases, covers, glass and gaskets are in good order and properly fitting.
- Tests on load shall also be done to demonstrate the stability and operation of protection relays as required by PGCB. All tripping, control, alarm and interlocking circuits shall be functionally tested to prove satisfactory and fool-proof operation and/or resetting. The functional and safety aspects of all shorting and/or isolation links, fuses and switches devices shall be proved.
- Routine tests shall include general inspection and electrical operation tests. Each size and rating of PVC cable shall be subjected to type tests as specified in BS 6346. Routine tests are detailed in Section 5 of this document.
- All circuit breakers shall be fully assembled at the Manufacturer's works and subjected to routine tests according to the IEC 62271-100.
- All current transformers and voltage transformers shall be fully assembled at the Manufacturer's works and subjected to routine tests according to the IEC 60044.

- All tanks, conservators and oil-filled compartments, which are subjected in service or during maintenance to oil pressure, shall withstand without leakage a hydraulic pressure test equal to 69 kN/m² or the normal pressure plus 34kN/m² whichever is the greater
- Back to back tests shall be carried out to determine the satisfactory operation of the teleprotection equipment.
- During the course of erection, **China Electric Power Equipment and Technology Co., Ltd** shall provide access as required by the Engineer for inspecting the progress of the works and checking its accuracy to any extent that may be required.
- A general check of all the main switchgear and ancillary equipment shall be made and shall include a check of the completeness, correctness and condition of earth connections, labeling, arcing ring and horn gaps, clearances, painted surfaces, cables, wiring, pipework, valves, blanking plates and all other auxiliary and ancillary items. Checks shall be made for oil and gas leaks and those insulators are clean and free from external damage.
- Circuit breakers shall be visually inspected. In the case of gas type circuit breakers testing will be required on the gas system to prove the gas pressure, quantity, dryness and dielectric strength.
- During commissioning, the transformer ratio and polarity shall be checked using a primary voltage high enough to give a clearly measurable secondary voltage or by using rated primary voltage and comparison with an already proven voltage transformer.
- During the commissioning phase, the PGCB's operating staff will operate plant and equipment under the supervision of the **China Electric Power Equipment and Technology Co., Ltd's** supervisors.
- After satisfactory completion of the tests on completion, the PGCB will issue a Taking over Certificate for the 400 kV Kaligonj SS. The issue of any such certificate shall not however relieve the Contractor of any of his responsibilities in respect of proving that the performance of the plant meets the guaranteed values.
- Use PPEs as per the PPE matrix during testing and commissioning.

7.16 Occupational Health and Safety

Occupational safety and health (OSH), also commonly referred to as occupational health and safety (OHS), occupational health, or workplace health and safety (WHS), is a multidisciplinary field concerned with the safety, health, and welfare of people at work. The goals of occupational safety and health programs include fostering a safe and healthy work environment. OSH may also protect co-workers, stuffs, visitors, and many others who might be affected by the workplace environment.

In common-law jurisdictions, CET will have a common law duty to take reasonable care of the safety of their employees. Statute law may in addition impose other general duties, introduce specific duties, and create government bodies with powers to regulate workplace safety issues: details of this vary from jurisdiction to jurisdiction.

China Electric Power Equipment and Technology Co., Ltd have a plan to develop an Occupational Health and Safety Policy. This policy may review and revise again and again. This will enable the company put in place appropriate measures that will ensure that the health, safety and welfare of all employees, labours, stuffs; together with the health requirements of the local community in which the company is conducting business. The policy should highlight on the following, among others:

- All workers in the SS side wearing PPE
- Safety measures for all machines and equipment to be used;
- Appropriate safety and rescue equipment to be availed in all work places;
- Emergency procedures and actions;
- Risk minimization of accidental damage to employees, community and environment;
- Machine maintenance and machine operator proficiency; and
- Training in safety

There should be (and the authority may conduct awareness campaign to make employee believe) believe within employees that no business objective will take priority over health and safety. The following health and safety aspects will consider for all occupants

- ✓ All injuries and incidents are preventable.
- ✓ No task is so important or urgent that it cannot be done safely.
- ✓ Without diminishing management's obligations, the responsibility and accountability for health and safety rests with every individual.
- ✓ Best practice in health and safety management should be encouraged.
- ✓ Maintain and continuously improve the Environment, Health and Safety Management System (EHSMS) across the organization.
- ✓ Provide a balanced focus on the management of health and wellbeing, personnel and process safety.
- ✓ Proactively pursue the identification of all hazards and eliminate or, if not possible, manage the risk to as low as reasonably practicable
- ✓ Consult with and promote active participation of employees in the management, of their own and other's health, wellbeing and safety.
- ✓ Provide resources to achieve a systematic approach to health, personnel safety and process safety management to ensure continuous performance improvement.
- ✓ Identify performance measures, set improvement targets, measure and report performance at all levels.
- ✓ As a minimum comply with relevant legal and other requirements
- ✓ Develop a culture where all employees and contractors are constantly aware of safety hazards around them and act accordingly at and away from work.
- ✓ Include health and safety performance in the appraisal of employees and contractors and recognize accordingly.
- ✓ Steward the health and safety performance of Joint Venture activities operated by others

7.17 Community Health and Safety

Community Health and Safety items include public health and safety concerns that may affect employees during work activities, and may also impact time away from work. Recently COVID19 is a burning issue for the community people as paramedic. Our efforts strengthen health and safety issues, and prevent disease and promote healthy and safe living. Community Health and Safety issues may arise at any stage of a project life cycle and can have an impact beyond the life of the project. Drinking water sources, whether public or private, should at all times be protected so that they meet or exceed applicable national acceptability standards or in their absence the current edition of WHO Guidelines for Drinking-Water Quality. Air emissions, wastewater effluents, oil and hazardous materials, and wastes should be managed according to the guidance provided in the respective sections of the General EHS Guidelines with the objective of protecting soil and water resources. Waterborne and air borne diseases may have attacked by the workers. To maintain social distance of the working people to the substation project site.

Besides this, hazards posed to the public while accessing project facilities may include:

- Physical trauma associated with failure of building structures
- Burns and smoke inhalation from fires
- Injuries suffered as a consequence of falls or contact with heavy equipment
- Respiratory distress from dust, fumes, or noxious odours
- Exposure to hazardous material

Disease Prevention

Effective controls protect workers from workplace hazards; help avoid injuries, illnesses, and incidents; minimize or eliminate safety and health risks; and help employers provide workers with safe and healthful working conditions. The processes described in this section will help employers prevent and control hazards identified in the previous section.

To effectively control and prevent hazards, employers should:

- Involve workers, who often have the best understanding of the conditions that create hazards and insights into how they can be controlled.
- Identify and evaluate options for controlling hazards, using a "hierarchy of controls."
- Use a hazard control plan to guide the selection and implementation of controls, and implement controls according to the plan.
- Develop plans with measures to protect workers during emergencies and non-routine activities.
- Evaluate the effectiveness of existing controls to determine whether they continue to provide protection, or whether different controls may be more effective. Review new technologies for their potential to be more protective, more reliable, or less costly

- Using mask and check body temperature before starting the daily work at the site of the substation project for protecting COVID19.
- Washing hand of all the labours, workers and stakeholders at the work place to project COVID 19
- China Electric Power Equipment and Technology Co., Ltd **will** also give safety training on the prevention of diseases.

Spread of communicable diseases puts spotlight on migrant labour camps. Labourers will stay in labour camp in the substation project area. Bacterial Vaginosis (BV), Chlamydia, Gonorrhea, Hepatitis, Herpes, HIV/AIDS & STDs, Human Papillomavirus (HPV) and Mycoplasma genitalium (Mgen) are commonly transmitted disease which may affected internally or spread out to the local community people near substation locality.

China Electric Power Equipment and Technology Co., Ltd will ensure pure drinking water quality at substation project site and where the officers, engineer, supervisor will live in. To avoid the water borne diseases, ground tube-well water is act as drinking water. About 95% of Bangladeshi people drinking tube-well water. But if the construction sites will remote areas from the locality, then China Electric Power Equipment and Technology Co., Ltd will ensure potable and pure water for the workers as well officers. China Electric Power Equipment and Technology Co., Ltd will also give training to labours about transmitted diseases. All labours in the substation project must be maintained code of conduct of China Electric Power Equipment and Technology Co., Ltd

7.18 Health and Safety Training for Substation project

Firstly, it should show commitment to the people being trained to recognize that the training is important. It should consult all employees, labours, stuffs on the planning and organization of the training. Training should make sure that properly priorities and plan the training needs for work of substation equipment installation. It may have appointed somebody to give 'competent assistance' and they should be able to help.

The following is a list of common topics to cover in any workplace health and safety inductions. A mobile checklist can help remind you of the steps required follow and ensure consistency across organization.

- Hazards and risks at the substation workplace
- Special equipment, such as personal protective equipment (PPE), which may require additional training
- Safe work practices at work on height at substation yard
- Work health and safety legislation at substation yard
- Emergency procedures for any incidental or accidental events at the substation yard
- First aid boxes and other emergency contacts.

China Electric Power Equipment and Technology Co., Ltd will arrange the safety training every day prior to start work. The training included method statement, first aid box and items. First aid box with items as per Bangladesh labour rules 2015 is attached in appendix J

7.18.1 Safety and Health Orientation

Workplace of substation safety and health orientation begins on the first day of initial employment. Each employee has access to a copy of this safety manual which is formulated by PGCB, through the site supervisor, for review and future reference, and each employee will be given a personal copy of the safety rules, policies and procedures about the substation job. Site supervisors of **China Electric Power Equipment and Technology Co., Ltd** will ask questions of employees and answer employees' questions to ensure knowledge and understanding of safety rules, policies, and job-specific procedures described in the substation workplace safety program manual. All employees will be instructed by their supervisors that compliance with the safety rules described in the workplace safety manual is required. PGCB has published a safety manual for the construction of SS work; the copy of safety manual of PGCB is attached in appendix K

7.18.2 Specific Training for the substation yard

In the construction period of substation; civil work for control building, gantry, boundary wall and, the specific training will need for all personnel whom are engaged with the substation project working. **China Electric Power Equipment and Technology Co., Ltd** will give the following specific training

- Important information to help crane operators, users, and owners stay safe around lines and towers.
- Important safety precautions before digging, excavating, or building at substation area
- Information to help keep you safe when farming near lines, towers, substation, and other structures- it is belong to pond, garden, , road and rives etc.
- Important information to help horticulturalists and pickers stay safe around lines and towers- it is included when proposed line cross over poultry firm, garden, nursery etc.
- After arranging all equipment at the substation, training should give safe limit and distance limit electromagnetic fields (EMF) from the transformers.
- Training and guidance to operating large irrigators near existing overhead high voltage at substation area, and suggests ways to avoid electrical hazards.
- A guide will give to trainee people to help keep safe when working around substation area.
- Training on details keeping safe during recreational activities near substation area.
- Store keepers of the substation project will be taken special training on loading and unloading construction materials of substation project

All labours of the substation project will retrain periodically on safety rules, policies and procedures, and when changes are made to the workplace safety manual. Individual labours will be retrained after the occurrence of a work-related injury caused by an unsafe act or work practice, and when a site supervisor observes labours displaying unsafe acts, practices, or behaviors. A training manual is made by PGCB which is attached in appendix K

7.19 Lockout/Tag-out (LOTO) practices in the substation project

Proper lockout/tag-out (LOTO) practices and procedures safeguard workers from hazardous energy releases. Common examples are springs; elevated components; rotating flywheels; hydraulic lift systems; air, gas, steam, water pressure; cliffed grain; etc. The term "lockout tag-out" refers specifically to procedures used to ensure that equipment is shut down and inoperable until maintenance or repair work is completed. It is used to keep employees safe from equipment or machinery that could injure or kill them if not managed correctly.

- Prepare for shutdown.
- Notify all affected employees of the activities and equipment involved
- Shut down the equipment
- Isolate the equipment from the hazardous energy source
- Dissipate residual energy
- Apply applicable lockout or tag-out devices

As per plan of the construction of Kaligonj substation, China Electric Power Equipment and Technology Co., Ltd will use new machinery, maintain it properly and apply lockout or tag-out devices for all of the machineries of project side.

Chapter 08

Labour Management

8.0 Labour Management

8.1 Description of Human Resource Policy for construction works of direct and indirect workers:

To improve the effectiveness of ADB's human capital, ADB developed a comprehensive competency framework as the foundation for an internally consistent and coherent HR system, drafted job descriptions to accurately reflect the scope and complexity of work responsibilities, revised the selection panels, and accelerated the organization's natural turnover by strategically reducing the workforce through a separation program.

The key components of the PDP are the individual work plan (i.e., the measure of what work is done) and the competency framework (i.e., the measure of how work is done). All staff has work plans based on the department's key result areas which clearly indicate their expected annual outputs. Site managers must ensure that their staff work plans reflect what outputs are valued and will be rewarded. An individual staff member's performance and development plan (PDP) also includes relevant competencies and expected standards. Supervisors of professional staff are expected to consider how results are achieved as a coaching method for continuous development.

This Labour force management plan has been compiled within the context of the project and it is being guided by China Electric Power Equipment and Technology Co., Ltd. This Policy is a high-level corporate statement of intent and establishes the principles to be followed in the management of environmental, social issues and Occupational Health and Safety (OHS) issues. The scope of this Labour force management plan covers the construction phases of the Project. It is further applicable across the entire workforce at all skills levels and deals with all aspects relating to China Electric Power Equipment and Technology Co., Ltd. Employees including recruitment labours and accommodation conditions, management of worker relationships and OHS, the LMP also includes measures related to the management of workers engaged by third parties, and also the management of workforce-related risks within the supply chain.

This labour management Plan has been developed taking into account the requirements of Bangladesh labour law (2006) and the International Labour Organization (ILO) core conventions, and seeks to:

- ✓ Establish arrangements to appropriately manage and protect the OHS and welfare of **China Electric Power Equipment and Technology Co., Ltd** workforce including both employees and sub-contractors and others who may be exposed to risks associated with **China Electric Power Equipment and Technology Co., Ltd** operations and activities.

- ✓ Ensure that employees understand their rights in relation to labour and working conditions.
- ✓ Allow employees to exercise their right to freedom of association and collective bargaining.
- ✓ Provide employees and contractors with a feedback mechanism for them to raise feedback, concerns, complaints and grievances and to receive information on the response and any associated corrective action.
- ✓ Prevent discrimination in hiring, remuneration, access to training, promotion, termination, and retirement on the grounds of race, national or social origin, caste, birth, religion, disability, gender, sexual orientation, union membership, political opinions and age and promote equal opportunities. This applies equally to employees and non-employees.
- ✓ Manage disciplinary practices and retrenchment in a manner that treats those affected individuals with respect and dignity and without threat, abuse, or ill-treatment.
- ✓ Design and manage accommodation provided for use by **China Electric Power Equipment and Technology Co., Ltd workforce** (including sub-contractors) in a manner that prevents or minimizes the risk of harm to health and safety.
- ✓ Ban the use or support of child, forced or compulsory labour in direct operations and in the supply chain. Ensure working hours do not exceed legal and industry standards and conditions of employment including remuneration are fair, equitable and are in line with industry norms

8.2 Labour Management Plan for Substation Project

The Labour force management plan has been guided by international and national good practice regarding workforce management and OHS. China Electric Power Equipment and Technology Co., Ltd has committed to meeting the Bangladesh labour Law, Bangladesh labour Rules and Incorporation of Social Dimensions such as Core *Labor* Standards and Gender as per ADB. ADB adopted a commitment to core labor standards (CLS) as part of its Social Protection Strategy in 2001. Since then, ADB ensures that the CLS are duly considered in the design and implementation of its investment projects. The plan seeks to address potential impacts related to inadequate:

- Labour and working conditions;
- Accommodation conditions; and
- Occupational Health and Safety (OHS).

The impacts during construction will similar to those identified. The impacts during construction relevant to the Labour force management plan are:

a. Exposure of workforce (including contractors) to potential harm, injury, ill-health and to enjoyment of human rights, etc.
b. Exposure of the workforce (including contractors) to poor accommodation standards (both in design and operation).

c. Exposure of workforce (including contractors) to inadequate OHS standards.
d. Conflict and tension associated with interaction between the workforce (including contractors) and local communities

During construction the management of impacts related to labour and accommodation conditions and OHS for China Electric Power Equipment and Technology Co., Ltd labour (including sub-contractors and supply chain) will focus on the establishment of relevant policies and monitoring systems and corrective actions. These will include:

- The development of an OHS management system and OHS monitoring and surveillance program.
- Fitness-for-work health screening.
- The development of a worker health awareness program.
- The development of worker engagement procedures.
- Development of a worker feedback mechanism.
- The development of relevant Human Resource (HR) policies and procedures.
- The development of auditing program for contractors and supply chain; and
- The development of a worker code of conduct.

China Electric Power Equipment and Technology Co., Ltd will consider the qualification and selection process the ability of the contractor to understand and meet the requirements of the environmental and social management plans. During contract award, China Electric Power Equipment and Technology Co., Ltd will conduct a "commence-work review" to refine, clarify, priorities and focus on the key legislation, standards, risks and commitments as relevant to contractor's scope of work ensure that they meet set standards. Sub-contractors will be required to establish OHS management arrangements in coordination by China Electric Power Equipment and Technology Co., Ltd to ensure conformance to the management plans and other contractual commitments. These may include development of procedures and work instructions; training, definition of Key Performance Indicators (KPIs), monitoring and auditing schedules, reporting requirements, management reviews etc.

The impacts during operation are likely to be similar to those identified.

Impacts will include:

- Exposure of workforce (including sub-contractors) to potential harm, injury, ill-health and to enjoyment of human rights, etc.
- Exposure of the workforce (including contractors) to poor accommodation standards (both in design and operation).
- Exposure of workforce (including sub-contractors) to health and safety incidents.
- Conflict and tension associated with interaction between the workforce (including contractors) and local communities.

In order to verify the management measures, China Electric Power Equipment and Technology Co., Ltd will require several monitoring systems as part of its overall Environmental and Social

Management System (ESMS). The Site specific labour management plan is attached in appendix L.

8.2.1 Protection for Sexual exploitation and abuse (SEA) and GVC at substation project

As per Asian Development Bank (ADB), "the main drivers of violence against women are gender inequality, discrimination, and marginalization. This means empowering women is a very high priority. ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, without sustaining any violence against women and child. Considering the fixed location type of substation project, the substation project is expected to have minor labor influx. Project will construct at Kaligonj under Gazipur District and it is expected that total labor including the skilled and unskilled will not be more than 150 for the substation. At substation yard, the number of labor is estimated maximum 50 whom are lived in labour camp in substation area. The construction camps will be constructed within the proposed sub-station areas. China Electric Power Equipment and Technology Co., Ltd will arrange security guard at the labour camp of the substation project area. There is no chance of entry of women in the labour camp of the substation project area. China Electric Power Equipment and Technology Co., Ltd will arrange training program on SEA/SH at the assembly point at the substation project area.

8.3 Labours and Workers Accommodation Plan

The project of the area located at Kaligonj Upazila under district of Gazipur. The above substation does not affect the local household and other wealth of the local people. During the work, the entire workforce will accommodate in temporary camps in the substation site or rental houses near the Kaliganj substation site. This area will use as labour households for accommodation under permission of PGCB. China Electric Power Equipment and Technology Co., Ltd will agree with the house for the establishment of a construction camp. The construction camp will have shad room with proper ventilation, sufficient lights, kitchen and toilet and rest room and availability of water (drinking), and hygienic sanitation opportunity as per Bangladesh Labour Rules, 2015. As per the section 52(2), the temperature of each working room of the firm should be kept in a tolerable limit and there will be windows of sufficient numbers in each shad room for the proper ventilation of pure air. As per the section 58, there will be provision of pure drinking water in easily accessible and suitable place for all workers in each firm and the water should be stored in a hygienic way. The sketches diagram of labour shad is attached in appendix N.

8.4 Labor Management Plan of COVID 19 Contexts

Employees working remotely, supply chain issues and the possibility of staffing shortages-though the COVID-19 virus. This system allows for response to a wide range of emergencies.

WHO is always encouraged for the protection of workers and emergency responders in the context of paramedic situation. The protection of workers is one of the priorities for the response to COVID19 outbreaks. Occupational health services in health care facilities have an important role for protecting workers and ensuring the business continuity of health care services. When someone who has COVID-19 coughs or exhales, they release droplets of infected fluid. Most of these droplets fall on nearby surfaces and objects - such as desks, tables, or telephones. People could catch COVID-19 by touching contaminated surfaces or objects – and then touching their eyes, noise or mouth. If they are standing within one meter of a person with COVID-19 they can catch it by breathing in droplets coughed out or exhaled by them. In other words, COVID-19 spreads in a similar way to flu. As per OHSA has given "ten steps All Workplaces can take to reduce risk of exposure to Coronavirus: these are following

- ✓ Encourage workers to stay home if sick during
- ✓ Encourage respiratory etiquette, including covering coughs and sneezes
- ✓ Provide a place to wash hands or alcohol-based hand rubs containing at least 60% alcohol.
- ✓ Limit worksite access to only essential workers, if possible.
- ✓ Establish flexible worksites (e.g., telecommuting) and flexible work hours (e.g., staggered shifts), if feasible.
- ✓ Discourage workers from using other workers' phones, desks, or other work tools and equipment.
- ✓ Regularly clean and disinfect surfaces, equipment, and other elements of the work environment.
- ✓ Follow the manufacturer's instructions for use of all cleaning and disinfection products.
- ✓ Encourage workers to report any safety and health concerns.

China Electric Power Equipment and Technology Co., Ltd will arrange a training program on COVID-19 spreads and reduce risk of exposure of COVID 19 before starting the substation work in specific locations. The separated COVID management plant will keep at all the substation project.

If the worker or enterprise experiences or found cases related to COVID-19, immediately report to the National COVID-19 hotline 333 or 16263 or to the local authority hotline number provided. Department of Labour Hotline related to COVID-19: 02-8391324 (World Health Organization https://www.who.int/.) Head office Directorate General of Health Services (DGHS)-01797011919 Dhaka- 01714266843, 01972138530, 01711240390 Gazipur-01847129493 Narayanganj-01722909122, 01787386361

The WHO and Bangladesh government has given some instruction to protect COVID -19, which is attached in an appendix O

8.5 Supplying Drinking Water for Labour

A sufficient supply of wholesome drinking water or of some other wholesome drink should *be* made available to workers. Drinking water on construction sites should be obtained and handled with care to prevent contamination of water borne diseases. Water from a polluted source is frequently responsible for the spread of diseases such as typhoid, cholera and dysentery. Tuberculosis, diphtheria and tonsillitis may be spread not by the water itself, but by drinking devices contaminated by mouth secretions of those carrying the germs of these diseases. Many other diseases including the common cold, influenza and cerebrospinal meningitis may likewise be transmitted. The most desirable source of drinking water is a public system approved by the area health authorities having jurisdiction. In most areas bottled water meeting drinking water purity criteria is now available. Samples should be collected only in laboratory-supplied bottles, and sampling techniques should conform to laboratory-issued instructions. In rural areas of Bangladesh, more than 97% of the population relies on groundwater for its drinking water supply that is free of arsenic and total and fecal coliform. An analysis of the water from each convenient source should be secured from the laboratory of the state board of health having jurisdiction. China Electric Power Equipment and Technology Co., Ltd will install deep tube in the project side with a respective death. The depth of deep tube-well installation will be decided after discussion with local Department of Public Health & Engineering (DPHE) of Mohakahli, Dhaka. Local Department of Public Health & Engineering (DPHE) will be say about the depth of installation of tube-well in the respective substation project site. China Electric Power Equipment and Technology Co., Ltd will test deep tube-wall water quality parameters after installation.

8.6 Safe Sanitation at Substation Area

As per IFC and the European Bank Reconstruction and Development (EBRD), an adequate number of toilets should be provided to labours and workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons. And Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 metres from the work side. As per above calculation on the basis of 50-100 labours and workers, 6-7 toilets will be needed in each substation. China Electric Power Equipment and Technology Co., Ltd will have made two type of sanitation one for stuffs and another type for labours. China Electric Power Equipment and Technology Co., Ltd will make underground storage tank with appropriate line. The underground storage tank will be made of cement. After finished the construction of substation project, China Electric Power Equipment and Technology Co., Ltd will be dismantled the sanitary toiler and its USTs. The human excreta from USTs will be used in the landfilling materials at appropriate locations.

Chapter 09

Local Recruitment

9.0 Local Recruitment

The recruitment policy is to hire staff of the highest caliber, on as wide a geographical basis as possible, with preference to nationals. Site specific labor management plan provide an overview of the applicable Bangladesh legislative and how the risks and issues related to labor in the sub-component project of Power Grid Company of Bangladesh under Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP) project to ensure reliable and quality supply of electricity to the rural and urban consumers in Bangladesh through improvements in technical efficiency of the distribution system. Staffs are typically offered renewable term appointments.

- A "term appointment" is a contract of fixed length, the minimum appointment being one year and the maximum being Kaliganj SS yard.
- Open-ended appointments are offered less frequently, on a case-by-case basis.

Positions in country offices are locally recruited. If a candidate with a required skills set cannot be found locally, or global mobility and international experience are essential, then international recruitment may be authorized.

China Electric Power Equipment and Technology Co., Ltd will make reasonable efforts to ascertain that third parties who engage contracted workers are legitimate and reliable entities and have in place labor management procedures applicable to the substation project that will allow them to operate in accordance with the requirements. These contracted workers will have access to a grievance mechanism. In cases where the third party employing or engaging the workers is not able to provide a grievance mechanism to such workers.

9.1 Local labour Requirements

Substation project may require about 150 people per each substation worked with specialized construction skills. Based on the construction site, workers profile data and interviews with **China Electric Power Equipment and Technology Co., Ltd.**

For a variety of reasons many employers prefer to conduct local recruitment first and turn to outside recruitment only if the local one does not succeed. Local recruitments are less expensive because there are no recruiting fees, and they generally require less training and fewer referral bonuses and travel and relocation costs. Local recruitments are also quicker. For a local hire, the process may be completed within a few weeks. In addition, many employers must recognize that some recruitment efforts involve competing for talent in a global marketplace and require effective use of modern technology. Effective employee recruitment is one way companies remain competitive in a changing and increasingly global marketplace. **China Electric Power Equipment and Technology Co., Ltd will** recruit the local people from Kaliganj, Arihazar, Bhulta, Tongi areas

9.2 Job descriptions and the levels of qualifications required for substation project

Substation engineers often are responsible for coordinating supervising civil and electrical development. In this role, engineers develop budgets, including preparing construction bids for

labour, materials, and equipment. Engineers will contact with labour forces, given direction how to develop the pile and column foundations at the specific site. Only labour, security personnel, and day-labour will recruit from the local areas of the project. The permanent employees have been already recruited and their job description already known to all.

9.3 Recruitment procedure for substation labours

Labour will recruit for construction of substation. Labour will recruit who will able to climb up high-raise building, gantry tower erection or any work at height. During interview, work procedure will first know to labor. Labour may be got job for his positive signal. Name, address, national ID card will keep during seeking application and interview.

9.4 Training for Local Labors:

After selection of labour force group, China Electric Power Equipment and Technology Co., Ltd will recall again of those labor for basic training, how to construct a substation project . Occupational safety issue has already discussed in the previous chapters.

Chapter 10

Project Machinery and Vehicle Traffic Management Plan

10 .0 Project Machinery and Vehicle Traffic Management Plan

Managing traffic at a construction workplace of Kaliganj substation is an important part of ensuring the workplace is without risks to health and safety. Vehicles moving in and outside road of the substation project, reversing, loading and unloading are often linked with death and injuries to workers and members of the public. The Construction Site Traffic Management Plan or CSTMP has been developed to help the Project manager at construction stage (PSCS) of substation and China Electric Power Equipment and Technology Co., Ltd to identify hazards and apply appropriate controls so that the movement of vehicles and pedestrians on a construction site is managed and coordinated. Truck Driver / Delivery Driver Requirements

- Only authorized, inspected and approved vehicles may enter site;
- Only operate plant or equipment are authorized to;
- Remain in your vehicle or in a location as instructed by the operator whilst being loaded;
- Always observe and follow sign posted speed limits;
- Follow all instructions given by Liberty Industrial personnel or operators performing loading;
- Inspect load and ensure it complies with all CoR laws before leaving site;
- Fall Protection/prevention is required any time a driver is exposed to a fall hazard of one meter or more – this includes any truck, trailer, or flatbed (unless client site rules override this); and
- Standing on top of a load is strictly prohibited at all times.

This road is busy with heavy traffic, because many vehicles come from Chattogram seaport by using this road. Traffic includes buses, trucks; loaded lorry might be congested at this substation area. The most effective way to protect pedestrians is to eliminate traffic hazards. This can be done by designing the layout of the workplace to eliminate interactions between pedestrians and vehicles. Examples include prohibiting vehicles from being used in pedestrian spaces or providing separate traffic routes so pedestrians cannot enter areas where vehicles are used. The traffic congestion may be found when loaded trucks will carry substation materials; wire, erection materials, transformer, civil work materials entered from outside to the substation yard. China Electric Power Equipment and Technology Co., Ltd will take step to minimize local traffic at the substation areas. A flag man will keep to stand when a trucks or heavy loaded vehicles entry from the high –way to the substation yard. Flag men will be work at day-night when heavy loaded vehicles come from outside of the substation area. The heavy vehicles may enter at night time, because BRTA has made a rule for heavy truck for entering after 8 pm. When heavy loaded truck comes from Chattogram port, it will better to enter to Kaliganj substation at night time. The entry security will inform to the flag men when vehicle come from outside to the entry point. Red-handed flag will stop road's vehicles (bus, truck, light vehicle and local people) to the high-way vehicles for certain period of time. The above mentioned phenomenon will happen during

entry and outing vehicles to the substation yard. Besides, the substation will have to restrict to the local people near the substation area. Only selected and project related personnel's will enter to the substation project site. The gateman of the entry point of this substation will maintain visitor's register. The health & safety personal will give induction training on traffic to the visitors at the entry point. For the internal traffic, China Electric Power Equipment and Technology Co., Ltd will make temporary brick carpeting road in the substation yard. Traffic congestion signboard will use at main-road of all substation area. The red and yellow color light is used at the substation are where it will need for the traffic management. The dust may emit due to friction of wheel and street. The internal road may be *kacha* at joining to substation, surrounding area of substation may non-visible through dust emitted from vehicles movement. China Electric Power Equipment and Technology Co., Ltd will spray water to the internal and joint road (substation to main road) to mitigate the dust from the project site. The internal and outside construction traffic layout is attached in an appendix G

10.1 Operation of Heavy Machinery Plant and Vehicles:

Experienced drivers/operators should be engaged in driving all types of vehicles in the fleet. In case of construction machinery operators (Crane, heavy trucks, rollers, excavator operators etc.) competency for such work should be proved through accepted permits licenses. A copy of the license or driving permit or a permit to handle heavy duty equipment should be retained by the Administration Manager of China Electric Power Equipment and Technology Co., Ltd. All equipment operators should possess valid permits issued by the traffic authorities or construction authorities of the Government of Bangladesh. The vehicle and machinery used for the construction purposes of the site should be inspected regularly by the Site Transport & Store Manager of China Electric Power Equipment and Technology Co., Ltd employed for regular servicing, safety of Tires, repairs oil and hydraulic vacuum. Stickers of different colors may be introduced to recognize the vehicles and machinery used by contractors and sub-contractors.
The Admin personnel of China Electric Power Equipment and Technology Co., Ltd should also:

- Ensure that all the drivers comply with traffic and transport guideline disciplines;
- Ensure that vehicle parking space is provided away from the towns carrying stocks.
- Ensure that the vehicles carrying stocks and construction materials roads
- Ensure that vehicle road worthiness certificates are received for all in the site,
- Ensure that all the vehicles have updated insurance coverage.

Make sure that warning devices are fitted to the vehicles and machine when maneuvering in public roads and the work sites. Flashing orange lights should be mounted on all the vehicles and construction equipment Heavy duty machinery should be fitted with reversing alarms or in the absence should have a banks-man to guide the driver/operator. Signaler should be engaged enabling the operators to safely operate their machinery. Ensure that drivers and signalers are in constant communication during operations of heavy machinery.

10.2 Traffic Safety at SS Project Area

As per Road Transport Act, 2018, No person shall drive a motor vehicle without a driving license or learner's driving license. China Electric Power Equipment and Technology Co., Ltd cannot given any approval or permission for driver with date expire driving license or without valid license. China Electric Power Equipment and Technology Co., Ltd will engage vehicles for transportation of materials; these vehicles must have valid route permit for carrying materials. As per RTA 2018, a vehicle will take ladle weight, excel weight and trail weight prior to permission from appropriate authority but do not take overload materials in vehicle Transportation of materials will be done by the different types of vehicles of the above SS project. Dhaka – Chittagong, Gazipur- Bhulta, Kapasia-Kaligonj roads of the above areas are in good condition. The project of the substation is a temporary type of work. The substation materials (distribution transformer, cable, circuit breaker, lightning arrester, air break (AB) switches / Isolator, busbar, capacitor Bank and Earthing wire will convey to substation locations from sea-port (Chattogram Sea-port). The project may require large quantities of construction materials such as cement, sand, and metal rod, substation materials, wires and aggregates during construction phase.

The following traffic safety measures will follow:

a) All deliveries of stocks should be carefully planned and suppliers should be advised as to the time and location at which these will have to be delivered. All vehicles will transport at night time.
b) The traffic signal will maintain at loading point to fix red color light of night time and signal point will have to maintain a day time
c) They should inform in advance the site stores keeper the delivery of such stocks so that traffic and transportation can be properly managed.
d) The frequent presence of trucks can add to increased traffic, sound (excessive noise) and smoke pollution through exhaust emission.
e) Avoid as far as possible the peak traffic hours such as school hours in order to reduce the risk of any children/traffic accident/incidents.
f) In the event that spills of aggregates occur, (substation materials) all the roads should be cleaned after the deliveries are made. The drivers should be made aware of this requirement.
g) Ensure that allowable axel weight is not exceeded when the deliveries are brought by the suppliers using the fort portal main highway.
h) All the drivers employed by the China Electric Power Equipment and Technology Co., Ltd must be fully sensitized about the speed limits and the need for strict compliance to the safety rules.
i) Regular sensitizing sessions are carried out by the Site administration officer and the Environment/Health & Safety Manager of China Electric Power Equipment and Technology Co., Ltd

j) In case of transporting of friable materials and spoils, adequate protection will ensure when transporting them. All materials will transport in closed trucks or by using tarpaulin sheets to cover materials.

A temporary warehouse and vehicle parking will locate near to substation project, so that; it is easy way for loading. The substation materials will come from the sea-port. Chattogram Sea-port will better of all the projects area of Kaliganj.

10.3 Public Awareness about substation project

China Electric Power Equipment and Technology Co., Ltd shall undertake to increase the level of public awareness prior to commencement of the works to advise all road users of the impending construction work at the substation project. China Electric Power Equipment and Technology Co., Ltd will make temporary boundary wall at the perimeter of project and install message signs (sign posting) to warn possible traffic congestion at work area. China Electric Power Equipment and Technology Co., Ltd will restrict entry to the substation project and security gate will be made, where one or two security guard will monitor the public entry and awareness.

A pre-warning road side sign board is erected before each of the hump in keeping with traffic management procedures. There is a necessity to maintain all the existing road signage and other traffic control methods adopted by the traffic police. Therefore, China Electric Power Equipment and Technology Co., Ltd will consult with the traffic police and with the ESHS Manager about their vehicles movement.

10.3.1 Site Specific Traffic Management plan

In order to alleviate traffic congestion at the substation site where there are near or over-saturated conditions, it is recommended to introduce a type of traffic response signal system. It is applicable for all traffic conditions, from under-saturation to over-saturation. As part of the advanced adopted traffic control system, this new signal control system will develop. The concept of control, system configuration and the effects of traffic at work site of the substation will be controlled by traffic response signal system. One has to stand with red –flag in hand where crossing the road. Alternatively the stick with red –flag has to place on the ground near the road crossing of the substation. The Kaliganj –Kapasia high-way road is passed in east side of 400/230 kV Kaliganj substation area. The Kaliganj –Kapasia road come from the Tongi-Ghorasal high-way. The substation internal traffic and outside traffic layout is attached in appendix G

10.3.2 Vehicles at the SS project Side

In the construction side of Kaliganj substation areas, safe use of motor vehicles, construction machinery, and equipment requires familiarity with the equipment as well as adherence has

followed some basic rules. Each person who operates equipment must have a valid driver's license that is legally appropriate for the type of vehicle they are operating. Equipment operators must have vast knowledge and experience for operating procedure. Equipment operators must make a pre-shift inspection checklist to ensure that all safety devices and operational features are in place and functioning properly. Noted deficiencies must be repaired by a qualified mechanic or technician prior to returning the equipment to service. All mobile equipment must be provided with a windshield that is free of cracks or other conditions that impede the vision of the operator. Operating and maintenance manuals must be kept in the cab of all mechanized equipment. The swing radius of all equipment that swings on a pivot should be delineated and protected if necessary so that any pinch / crush hazards are protected from employees in the immediate area. Barricades must be provided to mark the work area when necessary. Whenever equipment is moved, tools and materials should be secured so as not to pose hazards to either workers or the general public. Vehicles that have an obstructed view to the rear of the equipment must be equipped with a back-up alarm (audible above the surrounding noise levels).

10.4 Description of the fleet of vehicles/machinery used for the execution of the works and emission levels and safety requirements

Experienced drivers will engaged in driving all types of vehicles. All vehicles will have to remain road permit from BRTA. In case of construction machinery operators (Crane, heavy trucks, rollers, excavator operators etc.) competency for such work should be proved through accepted permits licenses. The load test and inspection of crane, heavy trucks, rollers, excavator will be done by approved inspector. The inspector is certified from the directorate of labour, Ministry of Labour, Govt. of Bangladesh. A copy of the license or driving permit or a permit to handle heavy duty equipment will be retained by the site manager of **China Electric Power Equipment and Technology Co., Ltd.** All equipment operators should possess valid permits issued by the traffic authorities or construction authorities of the Government of Bangladesh. The vehicle and machinery used for the construction purposes of the site should be inspected regularly by the site supervisor of **China Electric Power Equipment and Technology Co., Ltd** employed for regular servicing, safety of tires, repairs oil and hydraulic vacuum. Stickers of different colors may be introduced to recognize the vehicles and machinery used by contractors and sub-contractors.

The transport tanager cum store keeper of **China Electric Power Equipment and Technology Co., Ltd will** also be:

1. Ensure that all the drivers comply with traffic and transport guideline disciplines;
2. Ensure that vehicle parking space is provided away from the towns carrying stocks.
3. Ensure that the vehicles carrying stocks and construction materials roads
4. Ensure that vehicle road worthiness certificates are received for all in the site ,
5. Ensure that all the vehicles have updated insurance coverage.

Make sure that warning devices are fitted to the vehicles and machine when maneuvering in public roads and the work sites. Flashing orange lights should be mounted on all the vehicles and

construction equipment heavy duty machinery should be fitted with reversing alarms or in the absence should have a banks-man to guide the driver/operator. Signaler should be engaged enabling the operators to safely operate their machinery. Ensure that drivers and signalers are in constant communication during operations of heavy machinery. **China Electric Power Equipment and Technology Co., Ltd may** be used high-way for carrying of materials from Chittagong to Kaliganj substation area

10.5 Deployment and maintenance sites for each vehicle and machine

Transportation of materials will be done by the different types of vehicles of the above project. Most of the roads of the above areas are good conditions. The project of China Electric Power Equipment and Technology Co., Ltd is temporary or one time work. Tower materials will convey to tower locations of the China Electric Power Equipment and Technology Co., Ltd. The roads are used by villagers; those roads will use for carrying the materials of substation. The minimum traffic congestion might be often due to remote areas (villages), the areas having lower amount of traffic congestion.

Use appropriate safe and decent transportation mode to transport workers to project sites, during the construction phase. Although it is not envisaged that large number of workers will transport from distanced town and villages to the work site, it is imperative that if they are provided routine transport, they must be provided with transport in vehicles equipped with canopy (closed vehicles) with seating facility. No worker must be allowed or must be asked to travel in a back of a pickup, flatbed truck or a lorry which is not suited for passenger travel. This aspect had been very poor in the project construction site. In case of transporting heavy machinery, appropriate Lorries (Low bed) should be used and they should be loaded and parked on the vehicles using required safety methods.

The project may require large quantities of construction materials such as cement, sand, and metal, building making materials, wires and aggregates during construction. It is desirable to locate storage and loading areas away from the areas of frequent pedestrian activity (community foot paths and agricultural land areas)

The area that has been identified for the storage of aggregates will have to be reviewed in the light of its close proximity to human activities such as agriculture, play areas and areas used by the pedestrians.

The following measures are to be followed:

k) All deliveries of stocks should be carefully planned and suppliers should be advised as to the time and location at which these will have to be delivered.
l) They should inform in advance the site stores keeper the delivery of such stocks so that traffic and transportation can be properly managed.
m) The frequent presence of trucks can add to increased traffic, sound (excessive noise), and smoke pollution through exhaust emission.

n) Avoid as far as possible the peak traffic hours such as school hours in order to reduce the risk of any children/traffic accident/incidents.
o) In the event that spills of aggregates occur, (substation materials) all the roads should be cleaned after the deliveries are made. The drivers should be made aware of this requirement.
p) Ensure that allowable axel weight is not exceeded when the deliveries are brought by the suppliers using the Fort portal main highway.
q) All the drivers employed by the **China Electric Power Equipment and Technology Co., Ltd must** be fully sensitized about the speed limits and the need for strict compliance to the safety rules.
r) Regular sensitizing sessions are carried out by the Site administration officer and the Environment/Health & Safety Manager of **China Electric Power Equipment and Technology Co., Ltd**
s) In case of transporting of friable materials and spoils, adequate protection will ensure when transporting them. All materials will transport in closed trucks or by using tarpaulin sheets to cover materials.

A temporary warehouse and vehicle parking will locate near to the labour camp/rental house, so that. It is easy way for loading. The materials come from the sea-port (possible Chittagong sea port) will be directly beside this camp. Hired vehicles will be used for the transportation of goods. If the vehicles will delay after loading or the night, then the car will give space in the parking place.

Table 10.1 List of machineries and vehicles at substation project side

SN	Name of machineries and vehicles	Remarks
1	Bulldozer	
2	Backhoe Loader	
3	Excavator	
4	Articulated Hauler	
5	Compactor	
6	Drum Roller	
7	Carry Deck Crane	
8	Concrete mixer machine	
9	Winch machine	
10	Front Loader	
11	Tower Crane with pulley	
12	Diesel Engine with generator	

10.6 Mapping of itineraries, travel times, and areas where speeds are limited

In case of imported materials from foreign countries, these materials will come to Bangladesh by way of ships. After uploading these materials from ship to truck or lorry, it will transport to the materials storage locations. The storage locations should be middle position of the substation yard. One or two sub-storage will need for storing the substation materials and wire. The project location is western side of Bangladesh;

With a view to reducing the number of road fatalities, the government has decided to fix speed limits for motor vehicles plying on city roads and highways. "No motor vehicles will allow to exceed the speed limit of maximum 40 km per hour on the roads in the capital and 80 km per hour on the highways," decided by Bangladesh Road Transport Authority (BRTA). Truck and lorry do not enter to the city area at before 20.00.

The Government of Bangladesh may make rules for the purposes of carrying into effect the provisions.

Without prejudice to the generality of the foregoing power, such rules may provide for the

- Nature of the mechanical or electrical signaling devices which may be used on motor vehicle ;
- The removal and the safe custody of vehicle including their loads which have broken down or which have been left standing or have been abandoned on roads;
- The installation and use of weighing devices ;
- The maintenance and management of godowns for the storage of goods removed from over loaded vehicles and the fees, if any, to be charged for the use of such godowns ;
- The exemption from all or any of the provisions of Fire Brigade vehicles, ambulances and other special classes of vehicle, subject to such conditions as may be prescribed
- The maintenance and management of parking places and stands and the fees, if any, which may be charged for their use ;
- Prohibiting the driving downhill of a motor vehicle with the Sear disengaged either generally or in a specified place;
- Prohibiting the taking hold of or mounting of a motor vehicle in motion;
- Prohibiting the use of footpaths of pavements by motor vehicles
- Generally, the prevention of danger, injury or annoyance to the public or any person, or of danger or injury to property or of obstruction to traffic ; and
- Any other matter which is to be or may be prescribed by rules.

10.7 Equipment and Material Handling Management Plan

Some equipment is made of ceramic which have a change to broken at moment. Some equipment is too small it can be lost anywhere at the substation project. So, proper handling and storage of Material and equipment is needed for the equipment and material handling management plan.

Sand, cement, stone, and others will need for basement of control building, gantry tower; **China Electric Power Equipment and Technology Co., Ltd will** arrange all materials and the equipment for the civil work at the tower location. One diesel WM, generator, and pump for water will need for the progress of civil work. After finished the civil work, erection will be started with steel or steel allow which is approved by the PGCB. PPE and safety issues will be arranged by **China Electric Power Equipment and Technology Co., Ltd during** erection of the substation tower. Finally the following equipment will need for the Kaliganj substation

List of equipment and accessories for substation	Voltage Detectors, Insulating Sticks, Short Circuiting & Earthing, Earth Clamps, Phase Comparators, Insulating Gloves, Insulated Tools Earthing Connections, Cable Terminations, Sealing Ends, Surge Arresters Hydraulic heads and battery tools for power line cutting and compression of crimping connectors, terminals and joints used in high voltage electrical transmission and distribution Transformer, cable, gantry cable etc

All equipment and materials will handle with care and appropriate PPE will be taken by labours during the movement from one place to another. The material handling will also be needed from storage or warehouse at the substation yard. Proper way should be taken to up and downloading the equipment and material to the vehicles or from the vehicle. The list of SS project side machineries and vehicles is attached in appendix P

10.8 Dust Suppression from Vehicle Movement & Traffic

The dispersion of dust on unpaved roadways can results in many disadvantages. Flying dust can present visibility problems to drivers, greatly increasing the possibility of vehicle accidents. In addition, unpaved roadways that are unstable due to the constant dispersion of gravel dust become susceptible to continuous road deterioration. This can result in wasted municipality and county road budget costs. Dispersed road dust can also stunt the growth of crops and damage the exteriors of nearby homes. Fortunately there are easy, efficient and cost effective solutions to control the problem of road dust regardless of the type of surface involved. Dust might be flow away to the ambient environment by way natural activates (wind flow, cyclone), besides these friction of tires and road may be caused of dust eruption at the project locations. The roads of village are kacha (made of soil only) or not carpeting, it is very chance to eruption dust by the kacha road compared to the carpeting road.

Take time to consider dust control issues before beginning project in order to save time, money, and project resources. Identify site-specific air quality and dust control issues up front and

develop a consensus for addressing these issues. Phase your project and plan your site layout to minimize disturbance of the soil. Include the following action items:

- Make sure everyone working on the job knows who's in charge and all the requirements for dust control. Encourage a proactive and continuous focus on air quality issues on the job site.
- Evaluate dust control procedures periodically to identify additional issues that develop as the job progresses.
- Limit the amount of area graded at any one time. Lessening the amount of surface being disturbed at any one time reduces the amount of dust control required and the amount of water or dust suppressant needed.
- Install wind fences or barriers (less than 50 percent porosity). Place barriers around storage piles, parking, and equipment staging areas.
- Develop semi-permanent staging areas to cut down on the amount of disturbed area.
- Restrict access on unpaved areas to vehicles and equipment that are necessary that day. Limit unnecessary travel and keep the speed under 15 mph on unpaved surface areas.
- Re-stabilize disturbed surfaces by paving permanent roads and restoring vegetation as soon as possible.

Water spray is only one mitigation measure for dust suppression at the project site of substation. Watering is a very effective dust suppressant. When applied regularly, water provides temporary stabilization to disturbed surface areas and reduces fugitive dust caused by earthmoving and driving on non-stabilized surface areas. Water also aids in compaction. It is require that fugitive dust generated from all earthmoving activities be controlled. Watering is one way to control fugitive dust.

- Roads and disturbed surfaces visibly appear moist with minimal silt
- Soil has a crusted surface and is not easily crumbled between your fingers
- Soil moisture content is optimum for compaction
- Visible emissions are less than 20 percent opacity

Prior to any activity on site –

- Wet the area to depth of cuts or equipment penetration For Active Operations –
- Apply water 15-30 minutes before starting operations
- Apply water at the end of the day (e.g. soak overnight the next day's work area)
- Before and after grading, water using a water truck
- During trenching, water using a fine spray or mist
- During screening, mist material after it drops from the screen After Clearing an Area –
- Apply water in sufficient frequency to prevent visible emissions (at least every 2 hours)
- Apply water in sufficient quantity to maintain a moist surface
- Do not over-water - muddy conditions increase track-out water penetration
- Surfactants or palliatives added to water increase penetration, especially in high clay soils

In the climate of Bangladesh, dry season is started from October to March, there is more possible flow away fugitive dust during this time. However the dust level is lowering at the monsoon, because heavy rainfall might be happening at the period. At this moment no need to spray water to the work place of substation yard

10.9 Capacity of the tanker trucks used and calculation of the number of trucks required

Gross vehicle weight rating (GVWR) is simply the maximum allowable weight of an entire vehicle when it's packed up and ready to go -- that includes the weight of the vehicle itself, all of the necessary fluids for operation (gasoline, diesel, oil and so on) and any cargo, passengers and tools. A vehicle's GVWR is calculated by its manufacturer, and it can typically find of owner's manual or on the vehicle's doorframe, near the door latch

Curb weight is simply how much the vehicle weighs on its own, without any cargo or passengers. This measurement includes a full tank of gas and any other fluids that keep a car running. So, a vehicle's payload capacity -- the amount of stuff it can safely carry after you've filled up the tank with gas and topped off all of the fluids -- is just a matter of subtraction.

Gross vehicle weight rating - curb weight = payload capacity

China Electric Power Equipment and Technology Co., Ltd will be calculated how loaded truck by the above equation. Load is also depending on the condition of road. The Kapasis-Kaliganj road can tale easily all of the loaded vehicles. The number calculation design of tanker truck will be depended the road condition along all projects.

Chapter 11

Clearing and Vegetation

11.0 Clearing and Vegetation

Trimming or removing the hazard trees is a secondary part of the construction phase of the substation project. Tree trimming (cleaning of trees) will mandatory after the acquisition of land and before landfilling at the substation project. Tree trimming may be done by crews using mechanical trimming equipment or aerial lift trucks, or by climbing crews (an alternative way of trimming). **China Electric Power Equipment and Technology Co., Ltd crews** clear vegetation and redefine the easement width with light-duty power equipment. The Kaliganj SS area has grass like shrubs. No need extra crews for cleaning the existing vegetation

11.1 Methods, species and schedule for the plantation at substation project Areas

As per the contract document, about 50 trees will plant in each substation project after finished all the construction and arrangement work. Trees will plant inside the boundary wall of the substation project. The skills and knowledge required to plan the implementation of plantation works must be transferable to a different work environment. Knowledge and understanding are essential to apply this standard in the workplace, to transfer the skills to other contexts and to deal with unplanned events.

Chapter 12

Biodiversity

12.0 Biodiversity

Biodiversity refers to the variety and variability of life on Earth. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem levels. Sub-station construction and maintenance can lead to the permanent removal of woody vegetation and in some cases to the complete conversion of strips of forest ecosystem into bare land or land covered by completely different vegetation communities.

The secondary EMF from the sub-station maybe affects to the nearest forest or exiting crops of the substation area. But it has been reported EMFs and flora and fauna are conducted. The shifting of the Earth's magnetic field during a geomagnetic induces currents in an electrical substation grid as the lines of the magnetic field are shifted the conductors. When the current tries to increase or decrease, then the flux generates a secondary EMF. Mutual induction occurs when an alternating current flows through a coil, causing an alternating magnetic field to form around it. In the substation project- shielding and de- shielding effect is considered for arrangement of different electrical equipment (cable trench, transformer, gantry wire etc.). When the primary EMF will be minimized by shielding & de- shielding, the secondary EMF will come from different side of substation electrical equipment during operation phase. The source secondary EMF is the resultant EMF from transformer, gantry tower containing wire.

Since then little research on this subject has been performed, reflecting the general agreement that EMFs have not been shown to have any detectable effects (with the specific exceptions of honey bees in hives and trees growing close enough to lines to be subject to corona). The construction and operation of substation projects can affect biodiversity in many ways, including habitat conversion and fragmentation, changes in hydrology, soil compaction, and erosion introduced species, and hunting and harvesting enabled by the operation of a power line through the substation. Species in small, rare, sensitive, and otherwise critical habitats may be especially affected by the area of sub-station.

The main effects of roads on terrestrial vertebrates as well as a variety of mitigation measures that have been widely used for different ways: crossing structures, dry ledges, fencing, right-of-way escape ramps, and noise barriers. Because some species have similar needs and respond in the same way to mitigation measures, specific design standards.

Traditional rights of various living fauna around state forest areas, will recognize and maintain with due respect to their forest-related cultural values and religious beliefs. Conservation initiatives related to forest, wildlife and biodiversity by indigenous communities will encourage; Undertake a credible valuation of the ecosystem services that the forestry sector provides in Bangladesh. Strengthen protection measures for all types of forested areas by providing

adequately trained manpower, requisite tools, and logistics along with support from other law enforcement agencies.

Project construction activities have the potential to generate a wide range of environmental impacts on ecologically valuable receptors (flora & fauna) including designated sites, sensitive habitats and protected species. Examples of such adverse negative impacts include

- Vegetation loss and conversion including impacts to habitats supporting notable species;
- Felling of trees and effects on roosting bats and nesting birds;
- Loss of ponds and impacts to watercourses with associated amphibians and fish; and
- Disruption of large mammal movements.

The project seeks to proactively address such impacts and proposes to use an adaptive management approach (plan-do-check-act-replant) to reduce their potential severity, based around the use of 'Biodiversity Specialists' to clear the route prior to removal of any vegetation.

12.1 Biodiversity Management Plan for substation project

In the substation project is generally located in fixed position. BMP is very important part of transmission project not for substation project. In the substation project PGCB acquired land and China Electric Power Equipment and Technology Co., Ltd will filled the low land by sand with approved height from the ground level. Land owner (affected persons) may be trimming his/her trees before land filing or before developing the substation project. If there are trees in the past and the trees do not need to be cut down for developing the substation. So that China Electric Power Equipment and Technology Co., Ltd will has no needed to cut down the existing trees at the project site. When TL will connect to the bays of substation, trees under transmission line will cut down to minimize the impacts for the transmission line project. This phenomenon is not under the construction of substation project. The plan for the tree plantation around the SS boundary area is attached in appendix Q

12.2 Measures for limiting Invasive Alien Species

Invasive species are the second largest threat to biodiversity after habitat loss. An invasive species is a species that is not native to a particular area, but arrives (usually with human help), establishes a population, and spreads on its own. Invasive species have much larger impacts on an ecosystem than other species. They have a disproportionate effect, which is what makes them so harmful.

Not all species that arrive in a new location become invasive—in fact, most do not. Lots of garden plants are imported from other places, and even if they sometimes grow wild, they do not achieve big populations and do not make a huge splash on native species survival. These are just called non-native or introduced species. The introduced species that do become invasive are the ones that cause big problems.

Some places are especially vulnerable to invasive species. Islands usually have lots of endemic species and few large grazers or predators; this makes island species more at risk when non-native species are introduced.

Other places have very low rates of species invasion, usually because the climate is especially harsh, like in the Arctic, or organisms need special adaptations to live in that particular habitat, like mangrove trees that can tolerate living in saltwater. As humans move around the globe, more non-native species are turning up in these harsh habitats, some from similar habitats in other parts of the world. These species are more likely to become invasive.

Here are some ways invasive species impact native ecosystems:

- Habitat modification
- Compete with native species for resources
- Predation of native species
- Herbivory on native plants
- Bring in pathogens
- Hybridize with natives, leading to loss of genetic diversity

China Electric Power Equipment and Technology Co., Ltd will be constructed substation without disturbance of Alien Species at the project area. Labours of the substation project do not kill or hunt any bird during the project period. Project site have no encompasses the protected habitats of endangered species designated.

12.3 Integrated Pest Management Plan (IPMP)

Integrated pest management plan is a strategy that promotes use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. Rural development and health sector projects have to avoid using harmful pesticides. Other pesticides can be used, but only as an element of an Integrated Pest Management Plan (IPMP) that emphasizes environmental and biological controls. Though increase in agriculture production hence an increased usage of chemical pesticides and fertilizers is not included in the program objectives, such a consequence of the program cannot be ruled out. Hence this policy is triggered. An integrated pest management plan (IPMP) will prepare and its implementation started during the construction phase of the substation project.

Chapter 13

Emergency Plan

13.0 Emergency Plan

13.1 Description of facilities

Transmission and distribution facility" as defined in the act means an arrangement of conductors and transformation equipment that transmits electricity from the high voltage terminal of the generation transformer to the low voltage terminal of the step down transformer operating phase to phase at a nominal high voltage level of more than 400 and 230 to a nominal low voltage level of 33 volts or less at substation, and includes:

- substation energized in excess of 400/230 kV volts;
- Insulating and supporting structures;
- substation, transformers and switchgear;
- operational and control devices;
- all property of any kind used for the purpose of, or in connection with, the operation of the transmission facility, including all equipment in a substation used to transmit electric energy from the low voltage terminal, to electric distribution system lines that exit the substation and are energized at 400 & 230 kV volts or less, and
- Connections with electric systems in jurisdictions bordering Alberta, but does not include a generating unit or an electric distribution system.

Facilities managers are responsible for the security, maintenance and services of work facilities to ensure that they meet the needs of the organization and its employees. Facilities managers essentially look after all of the services that help a business or other organization do its work. Responsibilities can include:

- ✓ overseeing and agreeing contracts and providers for services including security, parking, cleaning, catering, technology and so on
- ✓ supervising multi-disciplinary teams of staff including cleaning, maintenance, grounds and security
- ✓ ensuring that basic facilities, such as water and heating, are well-maintained
- ✓ managing budgets and ensuring cost-effectiveness
- ✓ allocating and managing space between buildings
- ✓ ensuring that facilities meet government regulations and environmental, health and security standards
- ✓ advising businesses on increasing energy efficiency and cost-effectiveness
- ✓ overseeing building projects, renovations or refurbishments
- ✓ helping businesses to relocate to new offices and to make decisions about leasing
- ✓ drafting reports and making written recommendations

Substation is via of electricity transported over long distances to consumers. New electric transmission facilities will require for some new wind energy facilities. Electric transmission is the process by which large amounts of electricity produced at power plants, such as industrial-scale wind facilities, is transported over long distances for eventual use by consumers. Substation is kept in the middle position between the power generators and consumers of electricity.

Substation is work as step-down activity at the project site. Electricity is usually transmitted to a substation near a populated area. At the substation, the high voltage electricity is converted to lower voltages suitable for consumer use, and then transmitted to end users through relatively low-voltage electric distribution lines. The construction, operation, and decommissioning of high-voltage (400/230) substation and associated facilities would create a range of environmental impacts. The main components of high-voltage electric substation and associated facilities include: transformer, Cable Trench including soak pit, PVC pipes, Gantry Tower structures, 400/230 kV Equipment Foundation.

13.2 Emergency situations

Emergency situations are those conditions that may result in imminent or direct threats to public safety or threaten or impair the companies' ability to provide reliable transmission service to its customers. Emergency situations may include:

- Failure of conductor splices.
- Damage to structures or conductors from wildfire, high winds or other weather related conditions (storm, earthquake etc).
- Line or system outages or fire hazards caused by trees falling into conductors.
- Breaking or imminent failure of cross-arms or insulators, which could, or does, cause conductor failure.
- Damage to structures or conductors from vandalism

In the case of an emergency where life or substantial property is at risk or there is a potential or actual interruption in service, China Electric Power Equipment and Technology Co., Ltd will promptly respond to the emergency and conduct any and all activities, including emergency repair requiring heavy equipment access to the structures or other ancillary facilities, needed to remedy the emergency.

13.3 Emergency procedures

On-site emergency plans will prepare to protect the public health, safety, and environment on and off the substation project site in the case of a major natural disaster or construction accident relating to or affecting the substation Project. The Applicant shall prepare the plans and be responsible for implementing the plan with its operations team in coordination with the local emergency response support functions. The plans will describe the emergency response procedures to be implemented during various emergency situations that may affect the project or the surrounding community or environment. The emergency plans described in this section are an outline of the details that will include in the detailed emergency plans to be developed prior to the construction and operating phases of the project. This outline is based on Applicant's experience in operating other similar wind power projects. During both construction of the substation project, safety manager will equipped with cellular phones. Preliminary construction

emergency plans will develop and submitted for review by PGCB, prior to the start of construction activities. Preliminary operations and maintenance emergency plans will also be developed and submitted for review by PGCB and prior to the start of plant operations. During the substation project construction and startup period, the emergency plans will update to conform to safety information for the specific equipment needed at the project.

The emergency plans cover a number of events that may occur at or near the substation project site by natural causes, equipment failure or by human mistake. The following is a list of potential events that will be covered by the emergency plans.

- Personnel injury;
- Construction emergencies;
- Project evacuation;
- Fire or explosion;
- Floods;
- Extreme Weather Abnormalities;
- Earthquakes;
- Volcanic eruption;
- Facility Blackout.

The Project operating and maintenance (O & M) group of China Electric Power Equipment and Technology Co., Ltd and third party contractors will receive regular emergency response and safety training to assure that effective and safe action procedure will take to reduce and limit the impact of an emergency at the all substation project sites. Third party contractors will inspection all vahicles and equipment used in the SS project area. The site emergency plan with contact details is attached in an appendix R

13.3.1 Standard Operation Procedure (SOP) of Site Emergency Plan

A Standard Operation Procedure (SOP) is the manual indicated step by step procedures of emergency response for health & safety officials of substation project to understand the specific emergency response activity in the case of any accident, incident and fire. In the standard procedure of emergency plan or emergency prepared plan. There are four phases of emergency management: mitigation, preparedness, response, and recovery. There is entire SOP on **Site Emergency Plan each** of these phases. The following diagram illustrates the four phases of emergency management.

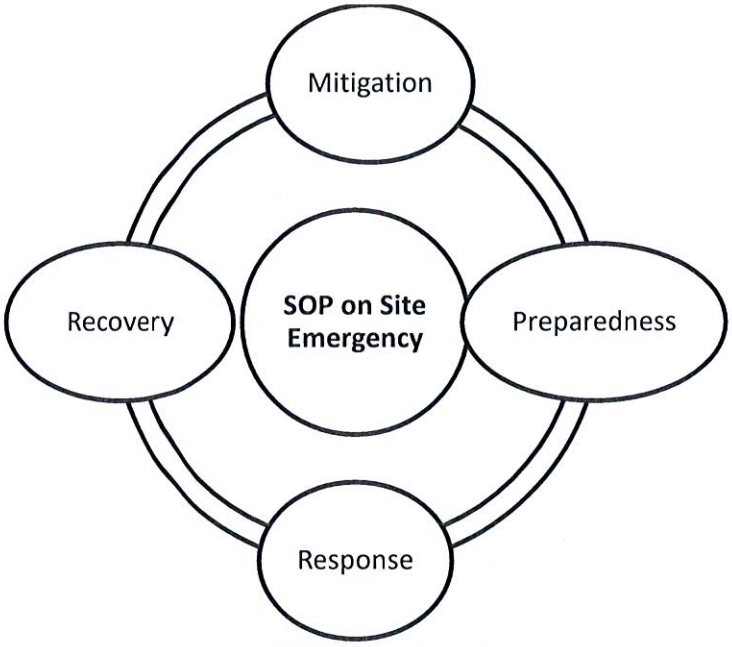


Fig 13.1 SOP on Site Emergency

In the four phases of emergency, Mitigation activities take place before and after emergencies, Preparedness activities take place before an emergency occurs. Response activities take place during an emergency. Recovery activities take place after an emergency. Mitigation activities are a compound plans for preparation to protect or overcome from any emergency situation. In the preparedness activities; China Electric Power Equipment and Technology Co., Ltd will collect the contract number of ambulance and hospital, nearest fire station, first aid boxes etc. China Electric Power Equipment and Technology Co., Ltd will response and recovery as per Bangladesh labour Rule 2015. As per BLR, in case of explosion, fire, building collapse or malfunction of machineries, the concerned institute must notify about the accident in accordance with Form-27 (b) to the concerned authorities mentioned in Clause (a), (b) and (c) of Sub-section (1) of Rule 69, within 3 workdays of the happening though no worker/employee is injured therein . Health and Safety official with contact detail is attached in table 3.1 and also appendix R

13.4 Fire Fighting Management Plan

Fire extinguisher and sand bucket will keep at substation materials storage house. The adverse negative impact of storage house is fire incident. At the substation site, the fire extinguisher will be kept to protect fire incidents from wielding machines, engine oil, generator room, etc. This fire safety management plan applies to all other staff working on-premises employed by any other employer. In this respect, other staff will comply with these relevant fire safety arrangements and policies. A fire safety management plan details the arrangements to implement, control, monitor and review fire safety standards and to ensure those standards are

maintained. The plan describes the arrangements for effectively managing fire safety to prevent fire from occurring and, in the event of a fire, to protect people and property near the substation project. Among the above emergencies, fire issues might have occurred at the substation locations during the work periods.

At the substation locations, the poster with emergency contact number Thana, district fire services and civil defense will hang at the substation project site at the time of fire incident; water may be spray to the existing fire by using a water pump which is an act fire hydrant at the substation project yard. In an emergency of fire, the project people of China Electric Power Equipment and Technology Co., Ltd will give the fire message to the fire services and civil defense. At the time of the fire incident, water may be spray into the existing fire by using a water pump which is an active fire hydrant.

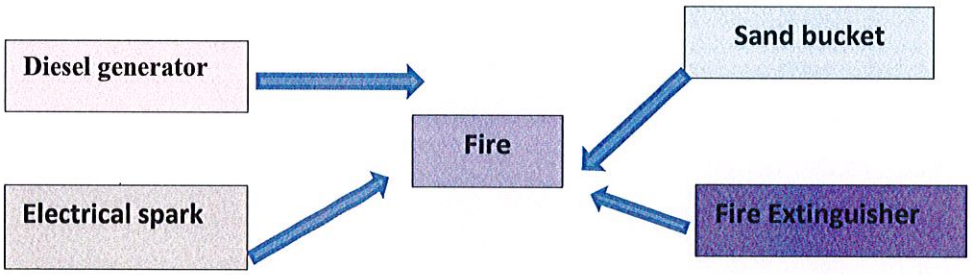


Fig 13.2: Site specific fire management plan

Any emergency situation of fire, the project people of China Electric Power Equipment and Technology Co., Ltd will give the fire message to the fire services and civil defense. There are many causes for fire incident at the project area of substation and wire house of substation materials. The fire extinguishers and sand bucket is only mitigation measure for fire incident at wire house of substation materials.



Fig 13.2: Sand bucket and Fire extinguisher for Fire safety

13.5 Emergency Response plan

Emergency Response Procedures will identify who does what and when in the event of an emergency. Responsibility for who is in charge and their coordination of emergency actions shall be identified. Nature of emergency & hazardous situations may have come at the substation project. All accidents and near-miss incidents shall be investigated to determine what caused the problem and what action is required to prevent a recurrence. Employees required to perform investigations shall be trained in accident investigation techniques. The incident/accident investigation should be a fact-finding exercise rather than faultfinding. For this project, emergency response systems should be in place to deal with dangerous goods uncontrolled releases of dust and gaseous emission, natural calamities fires burns and injuries. There are to be trained emergency response teams, specific contingency plans and incidence-specific equipment packages in place to cope with these types of emergencies. In case of an emergency, incident occurs; immediate action must be taken to mitigate the impacts. To minimize the possibility of injury to the responders and others emergency responders must follow a specific sequence of actions as stepped out in the preceding. Contact detail (Cell phone no) of health and safety officials with organogram is attached in an appendix M

13.6 Report on Emergency Response

An emergency is any immediate threat to life and/or property that requires immediate response from police, fire or Emergency Medical Services. Some examples of emergencies are crimes in progress, any kind of fire or a serious injury or illness at the Kaliganj substation areas. An emergency can be reported from any source—a worker on site, an outside agency, or the public. Remember that circumstances may change during the course of an emergency. Any procedures

develop must be able to respond to the ongoing situation. Types of emergencies to plan for may include:

- Fire;
- Explosion;
- Medical emergency;
- Rescues;
- Incidents with hazardous chemicals;
- Bomb threats; and.
- Natural disasters.

The site safety officer will be recorded any incidental event at the substation project site. site safety officer will give report on emergency response for any accidental/ incidental event occur in the Kaliganj SS areas.

For the environmental and social unit of PGCB, China Electric Power Equipment and Technology Co., Ltd will give quarterly an Environmental & social compliance report based on the quarterly environmental issues, work progress, public consultation, and GRM. By comparing the quarterly information of the substation project to the previous quarter information for the same quarter, PGCB can get rich insight into the work performance and growth of China Electric Power Equipment and Technology Co., Ltd.

Chapter 14

Base Line Study of substation Project Area

14.0 Base Line Study of substation Project Area

Information on the baseline environmental status of the Kaliganj substation project areas is required for the impact assessment process, to assess and predict the possible environmental consequences of the project interventions. Based on the existing environmental scenario, the potential impacts of subprojects were identified and accordingly an environmental management plan. In the context of a substation project, Construction Environmental and Social Management Plan (CESMP) are concerned with the implementation of the measures necessary to minimize or offset adverse impacts and to enhance beneficial impacts. In this report, the standard procedure of substation construction will format. All the measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of the host country in this case Bangladesh. The baseline environmental conditions will help in comparing and monitoring the predicted negative and positive impacts resulting from the project during the pre-construction, construction and operation phases. The impact assessment focused on the direct adverse changes that might be caused by project activities, including effects on the quality of habitats, flora, fauna and humans, socio-economic conditions, current use of land and resources, climate change aspects, physical and cultural heritage properties and biophysical surroundings.

The environmental management plan has to be considered as part of the plant's overall management and it would be part of the plant operational manual.

Monitoring the performance of a plant is very important and sometimes vital. Substation in the project area generally does not monitor the environmental parameters related to plant operation, thereby neglecting the environment. For surveillance of the environmental performance of the substation area and monitoring of the quality of the local environment, the environment in the work zone and the general impact zone have to be performed regularly. A management setup has to be created for the environmental monitoring program which can ensure compliance with national environmental standards. Any additional monitoring required should be defined and resources allocated for the purpose. The quarterly and annual monitoring reports will also be placed on the company website for public scrutiny. In preparation of the basement study of the substation area, Environmental components, sub-components, and major activities of the project are identified. Probable impacts of the activities on the environment and their magnitude and duration are also identified.

14.1 Mitigation/Benefit Enhancement Measures

Mitigation normally involves measures that reduce and/or minimize impacts within the site boundary such as changes to timing, engineering design, and sediment by-passing to avoid sediment loss or reductions to the extent of a project. However, there will circumstances where there are impacts that affect mobile species and functionally linked habitats, which may involve measures to address these impacts beyond the boundaries of designated sites.

During the implementation of CESMP there will come a point when the likely implications of a project are sufficiently well understood to place them in the context of the potential for securing

consent for the development. It has to be recognized from the outset that in some instances the impacts may be so severe that it is unlikely that consent will grant. Ideally, this situation should not happen as projects of this type really should not progress as far as detailed CESMP. A broad-scale analysis, in conjunction with dialogue with the China Electric Power Equipment and Technology Co., Ltd should screen out such options. In other cases, impacts are significant enough to require a package of compensation or mitigation measures to secure a neutral effect on the sustainable environment.

14.2 Monitoring Requirement

Priority should be given to the avoidance of impacts at source, whether through the re-design of a project or by regulating the timing or location of activities. If it is not possible to avoid significant negative impacts, consideration should be given to ways of minimizing the impacts by changes to design, timing or working practices, ideally to the point that they are no longer significant. These measures should be designed to meet specific ecological objectives that will deliver measures that specifically address the negative impacts that are predicted. The objectives may include:

- High level objectives related to the reasons for offsetting impacts, gross area of habitat proposed to be created or restored and its overall quality; and
- Detailed objectives comprising specific ecological requirements for the habitat created or restored in terms of, for example, the number of birds and the habitat attributes that they require.

Offsetting measures carry a degree of uncertainty. Furthermore, even when they are effective, there may be a temporary or permanent loss of ecological value due to a time lag between damage occurring and new habitats becoming fully functional and/or species becoming established. Forward planning is essential in order to have compensating habitats in place as soon as possible. Follow up monitoring will require establishing the level of success of compensation.

The uncertainty associated with a project will vary according to a number of factors, including the:

- technical feasibility of what is proposed (*e.g.* experience of projects where the proposed mitigation has been employed or carried out);
- Overall quantity of what is proposed (*e.g.* is it large enough to be viable; is it of at least equivalent extent to that of the lost habitat?);
- Overall quality of what is proposed (*e.g.* does it compare favourably with features lost and those whose loss or damage is to be compensated?);
- level of commitment provided to achieve what is proposed (*e.g.* is there a realistic understanding of what resources and effort will require to achieve predicted outcomes and
- Timescale over which predicted benefits are expected to be realized.

Offsetting measures should be presented in the context of site integrity or conservation status of the features to which it applies. Evidence should be provided to explain current understanding of their effectiveness and the extent to which their success can be guaranteed, for example, mitigation may be designed to ensure that the status of a species' population can be maintained following development.

In the above circumstance, China Electric Power Equipment and Technology Co., Ltd has taken an initiative to monitor maximum number of environmental parameters, samples, indication during construction stage of substation project area. The air noise and water samples will collect at pre construction stage as a base line study of the Kaliganj project locations. The air, noise and water samples will collect in same way during operation phase of Kaliganj substation. The comparable any deviation or variation between two results of environmental monitoring will give idea to PGCB for further modification

14.3 Monitoring Indicators

Environment monitoring and its associated development of datasets and indicators is one of the challenging and exciting priorities for China Electric Power Equipment and Technology Co., Ltd in the project construction period for substation. Monitoring targets key indicators that not only help track the state of the environment, but also the contribution of environmental resources and services to the economic and social well-being of indoor and outdoor population around the project area of China Electric Power Equipment and Technology Co., Ltd. The Environmental indicators are as following:

Air Quality: Main concerns relate to the effects of air pollution on human health, ecosystems, and buildings, and to their economic and social consequences. Human exposure is particularly high in urban areas where economic activities and road traffic are concentrated. Causes of growing concern are concentrations of fine particulates (PM10 & PM2.5), NO_2, toxic air pollutants, and acute ground-level ozone pollution episodes in both urban and rural areas. SOx emissions have decreased significantly in many countries and have been successfully decoupled from fossil fuel use and economic growth (absolute decoupling). The main challenges are to further reduce emissions of NOx and other local and regional air pollutants in order to achieve stronger decoupling of emissions from GDP and to limit the exposure of the population to air pollution. This implies implementing appropriate pollution control policies, technological progress, energy savings, and environmentally sustainable transport policies.

Water quality: Main concerns relate to the potential impact from inappropriate waste management on human health and on ecosystems (soil and water contamination, air quality, land use and landscape). Water is a vital issue in the ecosystem. Water quality parameters will be monitoring as per DOE standard in at ground water and surface water from the nearby cannel.

Sound level: Noise is a vital parameter in the environment. Noise will monitor at the workplace, generator area, and outside of the workplace where people live apart from TL.

Occupational health and safety monitoring:

The Health and Safety officer of China Electric Power Equipment and Technology Co., Ltd will set out a technical approach to monitoring progress against the site occupational health and safety measurement. The occupational aspects are PPEs, work place noise, dust level, biological hazards, work on height, EMF etc. China Electric Power Equipment and Technology Co., Ltd will check all health and safety aspects for all occupants like labours, visitors, stakeholders, and engineers.

Monitoring of health and safety training: Health and Safety officer will give instruction about the training especially to the non- qualified labours at the SS yards. Besides, training on wok on height, fire incident, mug-drill of fire & earthquake will also monitor

Community health and safety monitoring: The Community Health and Safety Standard recognize that project substation construction activities, equipment, and infrastructure can increase community exposure to risks and impacts. Potential negative impacts affecting health and safety may arise from a broad range of supported activities, including from substation construction activities, changes in the nature and volume of traffic and transportation, water and sanitation issues, use and management of hazardous materials and chemicals, impacts on natural resources and ecosystems, the influx of project labour, and potential abuses by security personnel. China Electric Power Equipment and Technology Co., Ltd will monitor all above aspect including the COVID 19 aspect. Monitoring of traffic Congestion: China Electric Power Equipment and Technology Co., Ltd will monitor the traffic congestion during the construction period of substation and substation materials transportation. China Electric Power Equipment and Technology Co., Ltd may include the traffic police during the project period of the road. The safety Training on Substation Construction is attached in appendix T

Chapter 15

Impact Assessment and Mitigation Measures of substation project

15.0 Impact Assessment and Mitigation Measures of substation project

The main purpose of the substation project is the development of infrastructure to transmit electrical power from one location to another through a substation. Nevertheless, the electrical transmission system is more complex and dynamic than other utilities, such as water or natural gas Electricity flows from power plants, through transformers, transmission lines to substation, distribution lines and then to the consumer. The transmission system is highly interconnected, not just transmission lines to load centers but also to other transmission lines to assure the smooth flow of power in the grid. The power entering the system flows along all available paths i.e. the flow of high voltage from one location to another grid substation. The anatomy of a substation project can be represented by the following components:

- Project land
- Foundations;
- Transformer
- Railway slipper for keeping Transformer
- Cable drainage system
- Towers for cable erection
- 132 , 230 kV gantry foundation
- Control building
- Capacitor stations;
- Substation terminations.

Specific components of a transmission tower and line are:

- small towers;
- Conductors;
- Earth wires;
- Insulators; and
- Wave traps and other hardware.

Table 15.1 Checklist of potential impacts/issues assessment with mitigation measured at the substation project

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
Preconstruction/Construction Stage				
1	Land acquisition/ requisition	Loss of 18.05 acres of land for the construction of Kaliganj substation permanently at substation sites. Temporary loss of land (requisition) for construction camps etc.	Prior to commencement of construction activities, the owners of the affected lands must be notified and provided proper compensation in time as per the government and ADB guidelines. As per the government and ADB guidelines, RP should be prepared for land acquisition/ requisition/ compensation and follow it.	DC and PGCB
2	Top soil	As the lands, are paddy fields removal of top soil might not be required before the land filling	Site specific mitigation measures will be required in Kaliganj substation lands including leveling, sloping, and compaction of sand as per requirement of contract of the SS project.	China Electric Power Equipment and Technology Co., Ltd
3	Cutting of trees/ Clearing of vegetation	Lands selected for the construction of Kaliganj substation are paddy fields, including small extents of marshy lands and water-bodies. Only the land earmarked for Kaliganj-2 substation (Dhaka) is a highland. Loss of standing crops (if any), grass and bushes at substation sites and construction camp sites is anticipated.	Prior to the start of removal of trees/ clearing of vegetation, provide adequate compensation to the owners.	China Electric Power Equipment and Technology Co., Ltd
4	Fauna (Wildlife)	Disturbance of wildlife due to project activities such as earthworks, moving of project equipment and transports,	DC shall ensure the compensation is for restoration of lost low land with restoration of new water bodies at same size prior to the old water bodies to be filled up. Prepare construction	China Electric Power Equipment

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
		especially during night time.	management plan (CMP, by the contractor) to be approved by PGCB before access to site is permitted and follow it properly. Follow the government rules and regulations, EHS guidelines and WHO noise guidance whichever is more stringent on noise. Project workers should not disturb or kill any wildlife. Fishing is not allowed.	and Technology Co., Ltd
5	Construction Waste	Generation of construction wastes from the construction materials.	Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time. Provision of facilities for handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements. Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials. Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste. Use of construction materials containing recycled content when possible and in accordance with accepted standards. Adequate collection, separation, and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated, licensed, engineered and sanitary landfills shall be provided.	China Electric Power Equipment and Technology Co., Ltd
6	Drainage congestion and flooding	Reducing floodplain storage area and increase local flooding, due to earth filling of substation sites and access roads above highest flood level (HFL). This will be a major	Provide culverts enough for accommodating flood flows in the access road of the substation. Ensure timely monitoring, especially if construction works are carried out during the monsoon period. Provision for pumping of congested water, if needed. No	China Electric Power Equipment and Technology Co., Ltd

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
		environment impact as the 5 lands selected for construction of substation consist of paddy lands, marshes and water bodies. Drainage congestion if the surrounding sites are blocked by the earth embankment.	discharge to the surface water. Consideration of the HFL during design of substation, to avoid inundation. Substation civil designs will include drainage and flood control measures to avoid adverse impacts by land filling in new substation lands and also specify that the soil/sand shall be sourced only from existing licensed suppliers who are authorized by the government to supply soil/sand for land filling.	
7	Noise level	Noise pollution due to construction activities, generators and construction vehicle movement.	Use of noise reducers in heavy construction equipment. It is required that no construction should be allowed during night time (9 PM to 6 AM). As per EHS guidelines, avoid prolonged exposure to noise (produced by equipment) by workers. Regulate use of horns and avoid use of hydraulic horns in project vehicles. Generators should be placed within rooms (concrete walls with roof). Noise levels will continue to be monitored in pre-construction and construction, and if there is exceedance at the village edges, noise baffles will be constructed.	DOE, China Electric Power Equipment and Technology Co., Ltd
8	Air quality and dust	Air pollution and dust generation due to construction activities especially due to the underground cabling, generators and construction vehicle movements.	All vehicles (e.g., trucks, equipment, and other vehicles that support construction works) shall be well maintained and not emit dark or smoky emissions in excess of the limits described in the EQS. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Drivers of vehicles used during construction will be under strict instructions to minimize unnecessary trips	DOE, China Electric Power Equipment and Technology Co., Ltd

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
			and minimize idling of engines. Dust suppression facilities (water sprayer) shall be available where earth and cement works are required. Spray water on dry and loose surfaces of the construction sites regularly. Maintain adequate moisture content of soil to minimize dust during transportation, compaction and handling. Construction materials (sand, gravel, and rocks) and spoil materials will be transported in trucks covered with tarpaulins. Sprinkle and cover stockpiles of loose construction materials (e.g., fine aggregates, sand). Avoid use of equipment such as stone crushers at the sites, which produce significant amount of particulate matter. N95 masks should be provided to all personnel in areas prone to dust emissions throughout the period of construction.	
9	Soil Quality	Soil pollution	Laboratory analysis of the river bed materials to be confirmed prior to starting collection from the river by existing licensed suppliers. Prevention of spillage and leakage of liquids at construction sites and camp. Ensure no use of transformers containing PCB to avoid soil and air pollution. Oil storage in drums stored on impermeable surface with 110% bonded capacity.	China Electric Power Equipment and Technology Co., Ltd
10	Siting of construction camps	Removal of vegetation such as grass, standing crops (if any)	Prior to the start of clearing of vegetation, provide adequate compensation to the owners in time.	

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
		shrubs and trees. Environmental pollution (such as air/dust, noise, water, wastes, excess soil) affecting nearby the settlements.	Locate construction camps away from residential settlements, cultural sites, water bodies, etc. (minimum 0.5 km). Try to use fallow land to avoid crop damage. Just after completion of the construction, hand over the camp sites to the owners as in earlier condition.	
11	Traffic congestion/ road accident	Traffic congestion and road accidents due to movement of construction vehicles.	Follow Bangladesh Road Traffic Authority (BRTA) traffic rules and regulations to develop a traffic plan. Schedule deliveries of materials/ equipment during off-peak hours. Engage flagmen especially at the entry of the substation sites and construction camps for traffic control. Engage experienced drivers to drive project vehicles. Arrange for signal lights at night. Prepare and follow proper traffic management to be approved by PGCB before the access to site granted. Avoid stockpiling of materials, especially at the road sides, that could disturb traffic movement.	Local traffic & China Electric Power Equipment and Technology Co., Ltd
12	Pollution due to wastes	Pollution due to wastes (construction wastes from construction activities and general wastes from workers' camps)	Solid wastes collection system will be essential, which should include separation and collection of solid wastes in the dustbins/waste containers throughout the work sites, construction yard/ labour camps. Wastes such as pieces of rods and wood, newspapers, containers etc. can be sold to the vendors and the rest of the waste must be taken to the licensed, engineered sanitary landfill by the contractor or licensed third party. A log of the disposal of toxic and other waste materials is to be kept by the Contractors.	China Electric Power Equipment and Technology Co., Ltd

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
			Prior to the start of construction, contractor should prepare waste management plan (WMP) based on the EMP, for approval by PGCB before access to site reflecting national and EHS guideline requirements.	
13	Community health and safety (H&S)	Community H&S nearby the substation site could be affected.	Safety barriers and warning signs surrounding the construction site. Generators should be placed in closed rooms. Formulate and implement an emergency risk management plan, for approval by PGCB before access to site reflecting national and EHS Guideline requirements.	China Electric Power Equipment and Technology Co., Ltd
14	Occupational health and safety (H&S)	Health and safety risks of construction workers.	An experienced Health & Safety (H&S) Manager must be engaged on each works package with appropriate qualifications and experience and not doubling up on any other job by the contractor prior to start of construction. Before access to site granted, contractor to prepare H&S plan based on risk assessment for approval by PGCB following national and EHS guideline requirements. Only permit trained and certified workers to work with any electrical equipment. Safety induction by the H&S Manager should be provided for the workers and visitors before they will be allowed to access the site. Prior to starting work, a tool box meeting should be arranged by the H&S Manager for the workers. First Aid Box and personal protective equipment, PPE (such as safety helmets, safety shoes, eye protection glasses, ear plugs/muffs, waist belts, masks, hand gloves,	China Electric Power Equipment and Technology Co., Ltd

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
			body protective aprons and insulating boots) must be provided to the workers and ensure their use by the workers. Safety signs, health signs, prohibition signs, warning signs, mandatory signs, emergency escape signs, first-aid signs, information signs, signboards, supplementary signboards, safety collar, symbol, pictogram, illuminated signs, acoustic signals, verbal communication and hand signals must be fitted at the designated sites of the subproject areas.	
15	Physical Cultural Resources	Possibility of damage to Physical Cultural Resources.	Chance Find Procedure to be developed following the IFC Guidance Note 8 and BAN regulations	China Electric Power Equipment and Technology Co., Ltd
16	Employment generation/ income	Employment opportunities for the local people, especially for PAPs.	Employ local people, especially PAPs, for the project activities (as much as possible).	China Electric Power Equipment and Technology Co., Ltd
17	Tree replantation	A total of 75,000 indigenous tree species (three times the number of affected trees from both substation and transmission line) can be planted in home gardens and govt. lands	Planting of 75,000 saplings to replace felled trees, on the side slopes of the access roads, during the monsoon period. The number of saplings which die within 3 years of planting should be replaced by new saplings. Nursing period of planted saplings should not less than 3 years.	China Electric Power Equipment and Technology Co., Ltd
18	Drainage congestion	Drainage congestion could occur in the surface drains within the	Clean the drains, especially during the monsoon, regularly.	China Electric Power Equipment

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
		substation area, if proper O&M is not done regularly.	Ensure adequate monitoring.	and Technology Co., Ltd
19	Community health and safety	Community H&S nearby the substation site.	Safety barriers and warning signs surrounding the substation sites with awareness raising program. Generators should be placed in the closed rooms. Operational H&S risk assessment to be undertaken.	China Electric Power Equipment and Technology Co., Ltd
20	Safety and security of workers	Risk to continuous power supply and even damage of substation.	Ensure security of substation in collaboration with law enforcement agencies. Keep complaint book in the substation for recording of people's complaints. Ensure availability of adequate safety gear for substation operations.	China Electric Power Equipment and Technology Co., Ltd
21	Power Supply	Due to adequate reliability of power supply, social life and economic condition of the people will be improved.	O&M of the substation should be done in time for adequate power generation	China Electric Power Equipment and Technology Co., Ltd
22	Short Circuit/Accident	Due to a possible short circuit of the substation, disruption of power and accident could occur.	O&M of substation should be done in time by experienced personnel.	China Electric Power Equipment and Technology Co., Ltd
23	Pesticide Use and Management	Impacts of dangerous species	There are no pesticides/herbicides used at the project site. Only phenol is used for the management of project site snake at the substation project. Phenol is hazardous material and given up the training on how used phenol at the project site subdomain.	China Electric Power Equipment and Technology Co., Ltd
24	Watershed	Water pollution	At the substation site have khals, pond, and much low	

Sl No	Topic / Potential Impact / Issue	Impacts	Mitigation Measured	Responsibility
			land. China Electric Power Equipment and Technology Co., Ltd do not polluted the water body by damping waste materials from the project site. China Electric Power Equipment and Technology Co., Ltd	
25	Use of Forest Resources, Hunting and Poaching	Biodiversity impacts	China Electric Power Equipment and Technology Co., Ltd did not used forest recourses and Hunting and Poaching of any this near the project area of substation	FD and China Electric Power Equipment and Technology Co., Ltd
26	Avian Protection	Biodiversity impacts	Bird mainly live in a locality where the tree, sufficient food and locality area where human beings are available. China Electric Power Equipment and Technology Co., Ltd will install bird diverter devices as per the plan (if have) of PGCB at the substation project area.	FD and China Electric Power Equipment and Technology Co., Ltd
27	Fire	Fire incident	A fire management plan to minimize the risk of forest fires and will be developed and implemented by the China Electric Power Equipment and Technology Co., Ltd during the construction phase of the substation. PGCB will take initiation for fire management at the operation phase of substation	Fire Service and Civil Defence and China Electric Power Equipment and Technology Co., Ltd
28	EMF	Health hazards	Power Grid Company of Bangladesh (PGCB) will give a provision about the measurement of EMF after operation of the substation grid.	FD and China Electric Power Equipment and Technology Co., Ltd

15.2 Table Budget for Environment Management Plan (EMP) implementation

The EMP implementation budget will be followed as per IEE of DWZTGEP. The following table represents a sample of implementation budget on approximated basis which will be updated & revised accordingly.

SN	Aspects/activities/ issues	Approximate Budget BDT	Implementation agency
1	Land acquisition/ requisition		It is GoB budget, DC office of Gazipur
2	Top soil leveling, sloping, and compaction of sand of SS yard	300,000.00	China Electric Power Equipment and Technology Co., Ltd
2	Cutting of trees/ Clearing of vegetation It not included for the Kaligonj SS project	-	China Electric Power Equipment and Technology Co., Ltd
4	Fauna (Wildlife)-make a temporary boundary wall	500,000.00	China Electric Power Equipment and Technology Co., Ltd
5	Construction Waste – boxes is need for collection waste and vehicles will need for disposal and transportation	500,000.00	China Electric Power Equipment and Technology Co., Ltd
6	Drainage congestion and flooding- it will need for storm water management during the construction period	100,000.00	China Electric Power Equipment and Technology Co., Ltd
7	Noise level – new engine will purchase for the construction of project and make temporary barricade at high noise level area	500,000.00	China Electric Power Equipment and Technology Co., Ltd
7	Air quality and dust - new water pump will install at the SS side for water spraying	150,000.00	China Electric Power Equipment and Technology Co., Ltd
8	Soil Quality- make temporary barricade to oil storage area	20,000.00	China Electric Power Equipment and Technology Co., Ltd
9	Siting of construction camps – labour camp will make at the appropriate location SS area along with making toilet, bath are, kitchen shad	200,000.00	China Electric Power Equipment and Technology Co., Ltd
10	Traffic congestion/ road accident – a flag man cum security will	50,000.00	China Electric Power Equipment and Technology Co., Ltd

	recruit for local and internal traffic management		
11	Pollution due to wastes- budget will need for waste collected and disposal	5,0000.00	China Electric Power Equipment and Technology Co., Ltd
12	Community health and safety (H&S) – including public consultation at the project side locality	50,000.00	China Electric Power Equipment and Technology Co., Ltd
13	Occupational health and safety (H&S) – Project will need qualifications and experience health & safety officer at the project, purchase of PPE,	10,0000.00	China Electric Power Equipment and Technology Co., Ltd
14	Physical Cultural Resources –cost adherent to National celebration days (international language day, independent days etc.)	50,000.00	China Electric Power Equipment and Technology Co., Ltd
15	Tree replantation – about 178 trees plant will need to plantation	50,000.00	China Electric Power Equipment and Technology Co., Ltd
16	Fire- purchase of fire extinguishers, sand bucket etc.	100,000.00	China Electric Power Equipment and Technology Co., Ltd

Chapter 16

Site Specific Environmental Management Plan

16.0 Site Specific Environmental Management Plan

16.1 Introduction

This Site Specific Environmental Management Plan has been prepared for the construction of Kaliganj substation projects and installation of electrical equipment in the appropriate place of the Kaliganj substation yards. The basis for preparing SSEMP is IEE developed in 2019 and approved by DOE. SSEMP will only be applied to specific sites of construction works. The project will be carried out in 400/230 kV substation at Kaliganj. The document specifies detailed actions to be taken to ensure that all mitigation measures will undertake.

16.2 Organization and Personal

The Project implementation unit (PIU) of China Electric Power Equipment and Technology Co., Ltd and Construction Supervision of PGCB will have the necessary education and experience in order to objectively asses the requirements of the Kaliganj substation project. **ESHS of China Electric Power Equipment and Technology Co., Ltd** will directly responsible for the environmental performance of the project during the phases of construction and operation. PGCB will follow up the performance of the **China Electric Power Equipment and Technology Co., Ltd's.** Site Manager is also responsible for the development and implementation of project management systems, including the site-specific environmental management plan. Implementation of SSEMP will be continuously monitored and updated through the project implementation cycle by Project Director of PGCB with the assistance of **China Electric Power Equipment and Technology Co., Ltd's** environmental specialist. It is also responsible for management of the environment, with the following specific responsibilities:

- Provide with all the requirements of the EMP and mitigation measures which are included in the project documentation.
- Obtain necessary permits and / or licenses.
- Ensure that contractors understand their responsibilities to mitigate the environmental issues associated with the construction activities and ensure the training of their staff on the implementation of the EMP, in case of need.
- Monitoring the implementation of the EMP by the contractor in accordance with the plan.

China Electric Power Equipment and Technology Co., Ltd's environmental specialist performs on the implementation of environmental management plan services and preparation of reports on implementation of the EMP in accordance with the requirements of ADB:

- ❖ Supervision on implementation of environmental control plans by contractor in accordance with EMP on project;
- ❖ Monitoring the contractor's activities to comply with the international regulations on safety and health.

China Electric Power Equipment and Technology Co., Ltd shall perform the activities and strictly comply with the measures listed in the EMP. Work with the list of contractual requirements and other bid conditions with PGCB. In case of discrepancy / inconsistencies,

conduct a study, and submit reports on mitigation measures and implement corrective measures to reduce an impact. **China Electric Power Equipment and Technology Co., Ltd has obligation to implement the EMP as following aspect**

- Check that all construction materials of suppliers have valid licenses and all the necessary permits.
- Make sure that the EMP is performed effectively throughout the entire construction period of Kaliganj substation. **China Electric Power Equipment and Technology Co., Ltd** will responsible for the implementation of the EMP and risk reduction measures identified in SSEMP.

16.3 Site Specific Environmental Management Plan (SSEMP)

Requires the establishment of an environmental management system to help projects to anticipate environmental risks posed by their activities and avoid, minimize, for such site specific environmental impacts as necessary. A good environmental management system provides for consultation with stakeholders and a means for complaints from workers and local communities to be addressed.

Potential adverse environmental impacts associated with the construction of the existing facilities for Kaliganj substation have been identified in this section along with environmental management plan. The management plan including dust control, effluent treatment, solid waste management and health & safety from the civil work and installation of electrical equipment. The following environmental impacts along with management plans has mainly been proposed only for managing the environmental situations arising from the construction phase of substation project with existing facilities. Since Occupational health & safety hazards & emergencies, air, water & acoustic are environment of major concern only the following main management plan have been proposed here:

- Environmental Management Plan
- Health, Safety & Emergency Management Plan
- Air pollution Management Plan
- Wastewater Management Plan
- Solid Waste Management Plan
- Noise Management plan

The project management unit (PMU) PGCB and China Electric Power Equipment and Technology Co., Ltd will recruit specialists, engineers to manage day-to-day coordination, implementation and environmental monitoring and administration activities of the substation project. The PIU of China Electric Power Equipment and Technology Co., Ltd will be assisted by PGCB. **China Electric Power Equipment and Technology Co., Ltd also** will dedicate to environmental specialist for the project. **China Electric Power Equipment and Technology Co., Ltd are** providing the progress report of the construction activities of the project, and quarterly environmental reports on monitoring. Environmental specialists will use their

knowledge of the natural sciences to protect the environment and human health. They may clean up polluted areas, advise policymakers, or work with a project to reduce waste. Environmental scientists and specialists typically do the following:

- Determine data collection methods for research projects, investigations, and surveys
- Collect and compile environmental data from samples of air, soil, water, and other materials for scientific analysis
- Analyze samples, surveys, and other information to identify and assess threats to the environment
- Develop plans to prevent, control, or environmental problems, such as land, dust noise ande water pollution
- Provide information and guidance to environmental impacts and also possible to reduce the environmental hazards and adverse impacts
- Prepare technical reports and presentations that explain their project of substation
- Trained up the site project manager for the project of existing environment of the substation project

During the process of development and implementation of above 400/230 kV Kaligonj substation projects, China Electric Power Equipment and Technology Co., Ltd and PGCB will be concluded a contract with an objective that, all specialists are qualified; professional authority of China Electric Power Equipment and Technology Co., Ltd will provide PGCB with high quality of the construction, and as per technical proposals perform all necessary works due diligently with high level of professionalism.

Work will be implemented as per the regulations of PGCB, and regulations under Environmental Conservation Rule (ECR), 1997 as well as in accordance with the special contract conditions and technical specifications which have been set by the PGCB.

16.3.1 Management of Pollution Prevention

China Electric Power Equipment and Technology Co., Ltd shall take the necessary measures to ensure that pollution to air, water, or land is prevented or, where this is not possible, reduced, and mitigated the environmental impacts and risk as far as practicable during the construction phase. China Electric Power Equipment and Technology Co., Ltd will develop a pollution prevention Plan for managing:

- Liquid effluents
- Air emissions
- Noise and vibration management
- Vehicle and equipment maintenance and selection
- Fuel, oil and chemical storage and handling
- Ensure safety for labours and stakeholders

China Electric Power Equipment and Technology Co., Ltd shall ensure that all appropriate environmental protection measures are adopted during the clean-up process after termination of works and that clean-up activities are appropriately documented.

16.3.2 Management of Wastewater and Effluents

There is more chance to re-use the water in the substation project. Water is withdrawn from ground water source through deep-tube well; this water is used for pilling civil work for the construction of SS project. Wastewater from piling site is stored in a reservoir for settling. After settling, this water is 100% re-used for another pilling civil work. This above mentioned matter might be followed for the construction of SS project, so that waste water is not discharged to the outside boundary of the substation area as a part of watercourse management. Effluents consist of liquid discharges with cement, including infiltration, from project area of substation, transporting a pollutant (dissolved, colloidal or particles). A pollutant might be a given chemical compound that is at a concentration greater than the limit value established for that compound according to work activities of the substation project. Effluents may discharge from pilling site, generator room (oil, lubricant) and transformer drum during filling time. Waste water which will be generated from substation project during construction site, China Electric Power Equipment and Technology Co., Ltd will have to take remedy for waste water management. The drainage water from pilling site or generator room will be tested to see the level pollution. As per DOE, pH, TDS, DO, BOD and COD are existing water quality parameters for any treated water.

16.3.3 Atmospheric Emissions and Dust Management

Emissions refer to any discharge into the air of solid emissions and substances, aerosols, gases, radiation, energy, whether point sources (e.g. incineration stack) or diffuse (e.g. fugitive dust emissions from road use by trucks). China Electric Power Equipment and Technology Co., Ltd will use equipment and adopt construction and transport methods with atmospheric emissions which are not in excess of the threshold emission values recommended by the Bangladesh standards.

Once having received the agreement from the PGCB, China Electric Power Equipment and Technology Co., Ltd will document the maintenance records for its fleet of vehicles, machinery, and equipment. The records will be in the language of communication of the contract, or any other language approved by the PGCB. The fleet of vehicles or equipment emitting combustion gases will be maintained at the intervals and according to the methods specified by the manufacturer.

Visual inspections of atmospheric emissions shall be conducted, especially dust and emissions from vehicles and machinery. The inspections shall identify areas where the implementation of dust reduction measures will required, when storage, transport, and handling of bulk materials will be made in the open air and exposed to the wind, the China Electric Power Equipment and Technology Co., Ltd implements the necessary dust abatement measures.

China Electric Power Equipment and Technology Co., Ltd shall exercise care to minimize emissions of dust from its activities, including traffic, at work sites, in residential areas and on

access roads. China Electric Power Equipment and Technology Co., Ltd shall apply water to reduce dust and controlling vehicle speeds to reduce traffic-induced dust dispersion and re-suspension by setting and enforcing speed limits. During this rainy season in Bangladesh, dust pollution is naturally prevented by the heavy rainfall at the project sites.

16.3.4 Noise Level Management

China Electric Power Equipment and Technology Co., Ltd will uses new equipment and adopt construction and transport methods, so not to generate noise levels in excess of values recommended by the Bangladesh (ECR 1997) regulations. China Electric Power Equipment and Technology Co., Ltd will plan high noise generating works (e.g. pile driving, blasting, rock clearing, drilling, percussion drilling) is SS area with national regulations and respect maximum ambient noise-levels. China Electric Power Equipment and Technology Co., Ltd shall locate stationary equipment (such as power generators and compressors) as far as possible from nearby receptors (e.g. worker resting areas, populated areas and environmentally sensitive areas). Equipment known to emit noise strongly in one direction, whenever possible, will be orientated so that the noise is directed away from sensitive receptors. The use of heavy vehicles at night is specified time of the respective project areas of substation. Standard noise abatement equipment shall be fitted to equipment by the China Electric Power Equipment and Technology Co., Ltd, used, and maintained in accordance with manufacturers' instructions.

16.3.4.1 Workplace Noise

OSHA sets legal limits on noise exposure in the workplace. These limits are based on a worker's time weighted average over an 8 hour day. With noise, OSHA's permissible exposure limit (PEL) is 90 dBA for all workers for an 8 hour day. The OSHA standard uses a 5 dBA exchange rate. The noise level is 95 dBA, the working will half of time weight average (8 hours). The NIOSH Recommended Exposure Limit (REL) for occupational noise exposure is 85 decibels, A-weighted, as an 8-hour time-weighted average (85 dBA as an 8-hr TWA) using a 3-dB exchange rate. Exposures at or above this level are considered hazardous for any work place like substation project. The work place people may receive high level noise as part of occupational noise. The PEL of noise will keep within the limit 90 dBA as per OHSA and 85 dBA as per NIOSH. As per Special Regulations regarding Health, Health Rules and Safety in Bangladesh Labour Rules (BLR) 2015 "Manufacturing environment where the sound level is more than 80 decibels.

16.4 Solid Waste Management

No material is to be abandoned on the site. China Electric Power Equipment and Technology Co., Ltd will responsible for all expenses involved in collecting, moving, cleaning and disposal of waste. Receptacles must be placed around the site for collection of waste materials
Waste Minimization measures include: -

- Obtaining construction materials, paints, lubricants and other liquids in reusable packaging or containers
- Segregating and recycling solid wastes generated by construction activities, offices
- Collecting lubricating oil from the construction vehicle fleet and sending it to be cycler or appropriate agencies who are handling the same.
- Any solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining or agricultural operations which are discarded. This is usually an incidental by-product of the operation. Discarded material must be treated as follows:
- Disposed of, and not used, reused, reclaimed, or recycled
- Burned or incinerated, except where the material is being burned as a fuel for the purpose of recovering usable energy
- Physically, chemically, or biologically treated (other than burned or incinerated) in lieu of or prior to being disposed off.

For proper handling and disposal, wastes shall be well defined at source and the definition transmitted along with the wastes to the final disposal points. Basic information that must be provided as a minimum for adequate definition of wastes include: Waste type identification-The major categories of wastes envisaged from the substation are outlined as follows:

Solid wastes: - These include felled vegetation/trunks, obsolete transformers, CBs, CTs, etc, woods from crates, metals, papers, printer cartridges and other office equipment scraped which are due to be removed during site clean-up, domestic waste (waste generated from camp kitchens, packing materials, boxes and plastics).

Liquid wastes: - These include non - hazardous operational waste generated from work construction sites e.g. lubes, lubricants, sanitary water, paints etc.

Gaseous wastes: - These include combustion products from construction engines, welding gas, natural gas leaks etc.

Hazardous waste: - any gaseous, liquid or solid, which due to quantity, physical, chemical or infectious characteristics have the potential to harm human health, environment when improperly handled, stored, disposed, transported or treated e.g. acids, lead phenols, etc.

Waste minimization implies reduction to the greatest extent possible of the volume or toxicity of waste materials. The four principles of waste minimization -- reduce, reuse, recycle and recover -- shall be adopted as applicable. The key elements of the four waste minimization/management principles practices are outlined.
Minimization. Definition Reduce Process modification / design change Material Elimination Inventory control and management Material substitution Improved housekeeping Reuse - Chemical /Oil containers Recycle / Recover - Recycle scrap materials, Recycle paper, Waste lubricating oil for energy recovery

Waste segregation and characterization shall be carried out on wastes that are similar and may be combined to simplify storage, treatment, recycling and effective implementation of appropriate waste disposal methods. Wastes shall be segregated, preferably at source into clearly designated bins at strategic locations. Particular attention shall be given to the work area where a variety of wastes including packet packaging shall be generated. The site H & S Coordinator of **China** Electric Power Equipment and Technology Co., Ltd shall be responsible for maintenance of the waste segregation scheme at the site.

Wastes in transits shall be accompanied and tracked by waste disposal notes. The note shall contain such information as date of dispatch, description of wastes, waste quantity, container type, designated disposal site and method, consignee name, means of transport and confirmation of actual disposal time and date. Special attention will accord to transformers removed from the sites and also drums of transformer oil that might contain PCBs; these are to be transported to a site designated **China Electric Power Equipment and Technology Co., Ltd** for safe storage and subsequent testing prior to disposal waste management audit of facilities shall be carried out in consultation, and findings shall be properly documented and followed up. Accommodation, catering services areas and work site shall maintain acceptable standard of hygiene and good house-keeping.

Color-coded containers are based on the country laws set by DOE. Yellow Bin - Waste for Incineration/ Secured Landfill Disposal Human anatomical waste, microbiological, pathological, cytotoxic and discarded medicines Red Bin - Waste for Non-incineration Treatment Disposal Infected plastics, syringes, tubings, catheter, gloves, blood bags, urine bags, cotton dressings, etc. Green Bin - Waste requiring no Treatment Vegetables, fruit peels leftover food, leaves and garden wastes, etc. China Electric Power Equipment and Technology Co., Ltd might be produced solid waste which may be belonging to yellow and green color code.

The main solid waste of the substation project are wood, sludge from piling area, bamboo, house keep materials, iron road, solid waste from kitchen from labour rental house/labour camp, wastage papers, poly-ethylene, plastic materials, packaging materials of Al-wire etc. All solid waste of this project has economic value. Nature and amount of solid waste is not possible to measure in the planning period. The solid waste will store in the site storage area at specific locations. Collected solid waste will sell at open tenders to approved vendors, who have valid trade license and DOE approved solid waste management approval/clearance certificate. In this case, final disposal of solid waste will be maintained by vendor through approval process of DOE. Sludge wills main solid waste where effluent of will settle down near at the construction site. When effluent will settle down, the sludge will remove and transport to another place of low-land for fill-up. Bangladesh Standards and Guidelines for Sludge Management (2015) is described various methods of sludge treatment and disposal. Labeling of wastage collection boxes as per color code is attached in appendix F

16.4.1 Management of Fuel, oil or hazardous materials

Fuel, oil, or hazardous materials required to be temporarily stored onsite shall be stored within secondary containment located greater than 100m from a watercourse or water body. Fuel and hazardous chemical storage areas shall not be allowed within 30 m of a minor watercourse, within 100m of a major watercourse, within a floodplain or where there is the potential for spilled fuel to enter groundwater All fuel and hazardous chemical storage facilities shall be located on flat or gently sloping ground and shall be contained within a bund designed to contain at least 110% of the total capacity of the storage containers plus 10% of the aggregate tank volume within the containment area or as otherwise specified by regulatory requirements. The bund walls and floor shall be constructed of concrete or other suitably impermeable material. The filling connection must be within the bund. No drain valves or other connections through the bund walls shall be permitted. Tanks shall be fitted with a gauge to allow the fill level to be monitored during refilling and preferably with a high-level alarm. Hydrocarbons, lubricants, paints, solvents and batteries are transported in drums to suitable waste management facilities in the substation areas.

Table: 16.1 List of Hazardous Materials with Uses as a Single Phase of construction work

SN	Name of Hazardous Materials	Uses as a single phase of construction work
1	Diesel	Generator at substation and Diesel engine and vehicles
2	Lubricant	Generator at substation and Diesel engine
3	Aerosol spray receptacles	household cleaners, disinfectants, hairspray, spray paint and Insect killer
4	Carbolic acid	Used for snake removal from SS area
5	LPG/ CNG	Used for cooking purposes at labour shad

The SOP for hazardous materials is attached in an appendix T

Hazardous materials of all kinds used during the construction of the Project shall be stored and handled to avoid loss and to allow containment and recovery in the event of a spill in accordance with all applicable legislation. These include, but are not limited to, fuels and oils required for construction of substation.

- Site personnel shall be adequately trained in the handling and transportation of hazardous materials of all kinds used during construction.
- Hazardous Waste generated in the course of construction activities shall be disposed of in compliance with all applicable legislation and the Hazardous Waste Regulation under the Environmental Management Act. Hazardous Wastes include, but are not limited to asbestos, oils, greases, lubricants, solvents, batteries, PCBs, paints and used spill cleanup materials.

- Hazardous materials including, but not limited to, fuels, bitumen's, cement, paints, solvents, cleaners, dust suppressants, used fuel and oil filters, and other construction materials shall be stored and handled to minimize loss and allow containment and recovery in the event of a spill.
- Onsite areas required for the transfer and limited temporary storage of hazardous and potentially hazardous materials and wastes shall be designated, clearly labeled and appropriately controlled.
- Environmental and Disposal Liabilities (EDL) may inspect designated area at any time and may require the prompt removal of any—Dangerous Goods or —Controlled Products which are not in active use.

Concrete, cement, mortars, grouts and other Portland cement or lime-containing construction materials are basic or alkaline and are highly toxic to fish. Isolation of concrete works is needed so that the pH value in any surrounding water-bodies does not become more alkaline during construction. During concrete work within 20 meters of any watercourse or wetland, pH shall be monitored in any surrounding water-bodies and best practices shall be implemented to meet the requirements of applicable legislation:

Concrete, cement, mortars and other Portland cement or lime-containing construction materials shall not be deposited into or near any watercourse or wetland. So that concrete materials remain inside formed structures, all forms shall be examined by the Environmental Monitor prior to concrete pours to verify they are tight.

- Providing containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment
- Completely isolate all concrete work from any water.
- Where work occurs within 30 meters of any watercourse or wetland, frequently monitor the pH immediately downstream of the work site until completion of the concrete work. Emergency measures shall be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of ± 0.2 pH units from the background level, or is recorded as below 6.0 or above 9.0 pH units.
- Preventing any water that contacts uncured or partly cured concrete during activities like exposed aggregate wash-off, wet curing, or equipment washing from directly or indirectly entering any water-body.
- Maintain complete isolation of cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours.

16.4.2 Oil-filled Equipment Management

Oil filled equipment management system is used to maintain, control and monitor oil consumption and stock in any type of construction side. Oil when spilled at soil on substation yard, it spread out on the upper portion. The following measures are applicable to work involving oil-filled equipment. Also refer to the sections above for general requirements related to oil storage, oil handling, and waste management from oil-filled equipment (diesel engine, vehicles crane etc). Oil, lubricant,

and grease may be used in engines at the substation work site. Any linkage of oil tank of equipment, it may contaminate the topsoil of cropland. Oil leaks are a common symptom of oil filled equipment. The equipment which will use at the project site, it will check first leak and should be used the protection spill oil, so that there will not be a chance to contamination of topsoil.

16.4.3 Fuelling, Fluid Handling and Transfers

The following steps shall be followed during oil transfer from/to transformers and other oil filled equipment:

- Inspect all temporary and permanent oil storage tanks to verify there are no potential leaks prior to, during and after filling.
- Wrap hose connections with sorbent material to catch any leaks and drips during oil transfer to/from the storage tanks. If a leak is observed from any equipment while on-site, stop the equipment and place drip trays and/or sorbent matting under the leak immediately. Repair the leak.
- Do not fill tanks to the top. Leave adequate head-space so that overfilling does not occur.

16.4.4 Transportation of Hazardous Construction Wastes Materials Management

Contractors shall inspect all equipment prior to transportation to verify it is free of waste oil. They shall provide fully stocked Spill Kits adequate to deal with emergencies on the road, including provision of Spill Kits within vehicles used for the transport of equipment, waste, and hazardous materials. An experienced / licensed waste contractor shall transport Hazardous Wastes such as Waste Oil. Both the shipper (consignor) and the carrier (driver) of Dangerous Goods and Hazardous Wastes should be qualified, experienced, and/or certified.

16.4.5 Disposal of Hazardous Construction Wastes Materials Management

All used insulating oil, if generated, shall be sent to an approved location for recycling. Oil destined for recycling and/or waste oil is considered Hazardous Waste, and should have an appropriate Hazardous Waste Manifest and labeling. China Electric Power Equipment and Technology Co., Ltd shall properly contain, label and secure all materials being transported for offsite disposal.

16.4.6 Temporary Storage of Oil Filled Equipment and Tanks

If oil filled equipment and/or tanks must be temporarily stored on-site, they shall be stored in designated areas where oil containment is already provided or in temporary storage areas constructed with a heavy-grade, ultraviolet resistant polyethylene liner adequately beamed at the sides to provide containment. Containment areas shall be protected from weather by covering with a tarp to avoid rainwater accumulation. All containment basins shall be inspected daily for

leaks and wear points. Containment basins shall be cleaned regularly and any accumulated water shall be removed. Contaminated water shall be removed via pump truck or other means which meet the water quality guidelines contained in this CESMP. Where leaks and/or wear points are found, they shall be repaired promptly to restore full containment. The SOP of Fuel oil, lubricant & Transformer oil is attached in appendix S

16.5 Hazard Identification, Risk Assessment, and Risk Control

This procedure describes the process to identify hazards and associated risks, to apply methods for rating the significant risks and implement the controls required to ensure the risks are reduced to a level that is reasonably practicable. Project Managers are to carry out risk assessment in their area of responsibility to ensure that all hazards are identified and associated risks are controlled by suitable and sufficient methods.

16.5.1 Hazard identification

Safety hazards will identify through a review that includes the following areas:

- ✓ Inspection and observation of ongoing work activities.
- ✓ Results of physical inspections and audits.
- ✓ Legal and other requirements.
- ✓ Health and Safety policy.
- ✓ Monitoring data.
- ✓ Incident investigation.
- ✓ Activities of contractors.
- ✓ Non Conformances.
- ✓ Communication with employees and other interested parties.
- ✓ Information from safety officers.
- ✓ Information on best practices.
- ✓ Planned changes to the projects / processes.

16.5.2 Risk Assessment

- ✓ **Identifying risks**
- ✓ Risks pertaining to the recorded hazards are to be identified. Where several risks are associated with a particular hazard, all of them are to be recorded.
- ✓ **Rating risks**
- ✓ Assessment of the risk is made using the 'Probability' and 'Severity' matrix on a scale of 5x5 as follows:

a. Probability

Very high	Event is likely to occur very frequently, maybe several times a day.
High	Event is likely to occur very frequently, maybe once a day.
Medium	Event is likely to occur frequently, maybe once a week.
Low	Event is likely to occur rarely maybe once a month.

Very low	Event is likely to occur very rarely, maybe once a year.

b. Severity

Extremely harmful: Imminent danger exists. Hazard capable of causing death.

Very harmful	: Imminent danger exists. Hazard can result in permanent disability.
Harmful	: Serious danger exists. Hazard capable of causing serious injury.
Less harmful	: Danger exists. Hazard capable of causing Lost Time Injury.
Slightly harmful	: Danger exists. Hazard capable of causing Medical Treatment Injury

16.5.3 Procedure for Risk Assessment

Project Manager along with the site in charge shall conduct the Risk Assessment of their respective sites with the support of the safety officer or any other authorized representative. The Risk Assessment is carried out with Proper records of the same area to be maintained by the Project Managers.

The Risk Assessment is to be carried out before commencement of work on the project. The contractors are to be issued a copy of the Risk Assessment and their signature obtained as receipt of the same. Records of the same are to be maintained by the Project Managers.

16.5.4 Identifying of Control Measures

If the existing control measures are not sufficient, an action plan will be implemented by initiating management program to bring down the risk to acceptable levels. Use best judgment and experience to set suitable and attainable control measures or seek advice from Safety Officer.

Control measures must be considered in the following order of preference

- Eliminate the hazard - engineer it out.
- Substitute the hazard with a lesser hazard.
- Enclose - people or process.
- Develop safe systems of work.
- Training.
- Personal Protective Equipment.

16. 6 Management of Waste Disposal

China Electric Power Equipment and Technology Co., Ltd **will** responsible for identifying; collecting, transporting and treating all waste produced on the substation project Areas. China Electric Power Equipment and Technology Co., Ltd shall minimize the generation of waste and reuse, recycle, and recover waste in a manner that is safe for human health and the environment.

China Electric Power Equipment and Technology Co., Ltd shall establish a waste management practice to manage non-hazardous and hazardous waste with the local legislations and adapted to the level of danger for human health or the natural environment. In absence of adequate legislation, waste shall be managed according to the guidance provided in the respective sections of the General World Bank Group EHS Guidelines with the objective of protecting soil and water resources. The waste management practice shall include provisions for the training of workers.

Waste register and categorization

China Electric Power Equipment and Technology Co., Ltd will establish and maintains a waste register, which is at the disposal of the Engineer. This register will record all waste management operations: production, collection, transport, treatment. It will be available as of the Contractors mobilization to Kaliganj substation project areas. Waste shall be categorized according to the following definitions:

a) Non-hazardous solid waste generated at construction and decommissioning sites includes excess fill materials from grading and excavation activities, scrap wood and metals, and small concrete spills. Other non-hazardous solid wastes include office, kitchen, and dormitory wastes from accommodation area when these types of operations are part of construction project activities. b) Hazardous solid waste includes contaminated soils, which could potentially be encountered on-site due to previous land use activities, or small amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill clean-up materials from oil and fuel spills.

The following aspects are documented in this register:

a) Type of waste
b) Waste quantities;
c) Name and address of the third party waste management facilities receiving waste or parties taking possession of the substances no longer considered as waste;
d) Name and address of waste transport Contractors;
e) Planned waste treatment.

In accordance with national regulations, China Electric Power Equipment and Technology Co., Ltd files and maintains at the disposition of the waste manifests for the collection, transport, treatment, and/or elimination of waste. Waste will store separately prior to removal from Kaliganj substation project areas, depending on the level of danger, phase (liquid, solid or gas), the waste management solution to be applied and its potential in terms of recycling or reuse. Waste is collected from each Kaliganj substation project areas at the same rate that it is produced and is placed in temporary locations meeting the following criteria: It shall be located at a distance of over 100 m from any natural sensitive area and over 500 m from any socioeconomic sensitive area (school, market, healthcare center, water well or catchment area), with the exception of waste storage area in camps; and on a flat impervious surface to prevent infiltrations. China Electric Power Equipment and Technology Co., Ltd will not be incineration of any waste in the project area. The use of third party waste management services is subject to a

documented prior audit of the treatment, storage and recycling facilities by the China Electric Power Equipment and Technology Co., Ltd, to guarantee the conformity with the provisions of the present ESHS Specifications on waste. Landfilling will be at other sites than accredited third party waste management facilities. The documentation includes a plan showing the location of landfill sites. The document is provided to the competent local authorities whose jurisdiction covers the landfill sites.

16.7 Management of sulfur hexafluoride (SF_6) from GIS Substation

Gas-insulated switchgear (GIS) is a very compact form of switchgear. Because of the use of SF6 (sodium hexafluoride) insulation, the size of the switchgear reduces drastically. This product is normally used in medium and high-voltage applications. GIS is more safe, compact and maintenance-free as compared to AIS. Substation project has used SF6 in circuit breakers, gas-insulated substation and other switchgear used in the transmission system to manage the high voltages carried between generating stations and customer load centers. Disconnections and ground switches use SF_6 primarily for insulation, and individually, they contain only slightly less SF_6 than a circuit breaker. These devices are used to isolate portions of the transmission system where the current flow has been interrupted (using a circuit breaker). Gas-insulated substation also uses a significant amount of SF_6, and GIS installations house SF6-insulated circuit breakers, bus bars and monitoring equipment. The largest use of SF_6 occurs in high-voltage circuit breakers, where, in addition to providing insulation, SF_6 is used to quench the arc formed when an energized circuit breaker is opened. Sulfur hexafluoride (SF_6) is a synthetic fluorinated compound with an extremely stable molecular structure. Because of its unique dielectric properties, electric utilities rely heavily on SF6 in electric power systems for voltage electrical insulation, current interruption, and arc quenching in the transmission and distribution of electricity. Yet, it is also the most potent greenhouse gas known to date. Over a 100-year period, SF_6 is 22,800 times more effective at trapping infrared radiation than an equivalent amount of carbon dioxide (CO_2). SF_6 gas leakage may be an important concern on numerous levels including the environmental effects, degradation of the GIS insulation system integrity and gas cost. The use of sulfur hexafluoride in the substation project should have taken care of it's used and check the leakage in switchgear, circuit breaker etc.
SF_6 is used to insulate certain high-voltage electrical equipment called gas-insulated switchgear (GIS). This equipment is used in large electricity generation, transmission, and distribution facilities, not in homes or other types of businesses.

Specifically, the regulation defines GIS to include "switches, stand-alone gas-insulated equipment, and any combination of electrical disconnects, fuses, electrical transmission lines, transformers and/or circuit breakers used to isolate gas-insulated electrical power system equipment." China Electric Power Equipment and Technology Co., Ltd will control gas-insulated switchgear (GIS) that contains SF6. The regulation refers to these entities as "GIS owners" and includes the following requirements.

- The GIS has a maximum annual SF6 leak rate of 1%, as represented by the GIS's manufacturer;
- PGCB must maintain their GIS in accordance with maintenance procedures or industry best practices that have the effect of reducing leakage of SF6;
- If, beginning with the second time adds SF6 to a GIS unit, or group of commonly-owned, leased, operated, or controlled GIS, PGCB becomes aware that the annual average leakage rate for the new GIS equipment is greater than 1%;
- PGCB must record, no less than annually, the amount of SF6 added to each piece of active GIS equipment

16.8 Management of Vegetation Clearing

The works, including the opening up of substation worksites (e.g. camps, access roads, and storage yards) may require vegetation clearance in work areas. Vegetation includes crops, trees, shrubs, bushes, grasses and other minor vegetation. Supervisors shall be trained in the controlled felling of trees to prevent impacts beyond worksites. They shall also be trained on the importance of identification and preservation of wild fauna encountered and disturbed during the stripping operation. The following specification will be

- Vegetation clearing using chemicals is not permitted.
- Vegetation clearing using bulldozer is not permitted in zones less than 30 m from areas designated as sensitive by the Engineer, where only manual clearing is authorized.,
- Where it is not possible to restrict the timing of construction practices, vegetation shall be removed outside the breeding period so that works can carry on into this period unhindered.

16.9 Management of Substation Biodiversity

China Electric Power Equipment and Technology Co., Ltd shall ensure that all personnel are informed and aware of the importance to protect species, habitats, fauna, and flora and are informed about wildlife encounter procedures. Information and awareness training is documented. PGCB will provide a range of ecological surveys prior to the start of construction. These will include but not be limited to the type and location of identified species and habitats of conservation interest within the Project Area of substation, and any resulting measures that are required by China Electric Power Equipment and Technology Co., Ltd. PGCB will provide a constraints map, showing the areas where sensitive, endangered or breeding species are known to occur, including protected areas, sites of importance for nature conservation, wildlife refuges, nature and national parks, important bird areas. PGCB will inform about seasons for the protection of birds and wildlife. As a result of protecting birds and wildlife, construction is restricted during a certain period and/or the China Electric Power Equipment and Technology Co., Ltd must take precautionary measures in compliance with respective national laws and/or as stipulated by the respective local authorities. The proposed location has some small flora, before

started the civil and electrical work, China Electric Power Equipment and Technology Co., Ltd will carefully clean the grass from the yard of substation.

16.10 Management of Erosion and Sediment transport

Erosion and sediment control shall be taken into consideration from the beginning of the construction phase, i.e. from site clearance. China Electric Power Equipment and Technology Co., Ltd plans earthworks and optimizes the management of space to ensure that all cleared surfaces and areas exposed to soil erosion are minimized on all substation project areas and erosion is minimized as far as practical. China Electric Power Equipment and Technology Co., Ltd shall determine the appropriate locations and the type of erosion control measures required, to be agreed with the Engineer. For the soil erosion, China Electric Power Equipment and Technology Co., Ltd will be designed the boundary wall for Kaliganj substation.

16.11 Wildlife Management Plan at SS side

The wildlife impacts of sub-station construction and operation include bird electrocutions and collisions, changes in predator-prey relations in and the edges of the Kaliganj substation, destruction or alteration of wetland and aquatic environments, and increases in hunting and fishing enabled nearby the sites of substation project during the construction phases. Kaliganj substation area has only domestic animals (goat, cow, hen), dogs, foxes like wildlife. The temporary tin shed wall for the Kaliganj construction of sub-station area will be sufficient for save or protect them for wildlife impacts. Before started work, China Electric Power Equipment and Technology Co., Ltd will give barricade to protect wild life and soil erosion.

16.12 Dangerous Spices Management Plan

The project site is open space of all sides. Any dangerous species like snake may be enter to the project yard. It may note that by biting of snake, any workers will be died. Carbolic acid may be used for the protection of snake at the Kaligonj project sites of substation during the construction period.

Table 16.1: Site Specific Environmental Management Plan

SN	Environmental activities /aspects/imapcts	Management plan	Responsible	Monitoring Responsibility
1	Liquid effluents	It will settle in reservoir for settling before discharge. The settled water will re-use in the civil work during construction	CET	PGCB
2	Dust Emission	CET will spray water to mitigate dust emission	CET	PGCB
3	Noise Management	CET will monitor noise and always use new machinery for the	CET	PGCB

		reduction of noise		
4	Vehicle and equipment maintenance	CET will check vehicles, construction equipment at the SS side	CET	PGCB
5	Fuel, oil and chemical storage and handling	Fuel, oil will be store in a separated location with appropriate mitigation measure to protect soil contamination	CET	PGCB
6	Ensure safety for labours and stakeholder	CET will supply appropriate PPE for labours, visitors and stakeholder during the entry point of SS area	CET	PGCB
7	Vegetation Clearing	Vegetation shall be removed outside the breeding period so that works can carry on into this period unhindered.	CET	PGCB
8	Soil Erosion	Erosion and sediment will control through appropriate barricade	CET	PGCB
9	Wildlife Management	CET will make temporary boundary to protect the wild life near the project side	CET	PGCB
10	Dangerous Spices	Carbolic acid may be kept at labour shad to remove snake	CET	PGCB

16.13 Site Specific Social Management Plan (SSSMP)

16.14.1 Management of Labour Conflict

Labor- conflict generally refers to disputes between a project proponent and a group of project labous, while a conflict between project proponent (CET) and a single labour acting alone is usually referred to as an "employment" dispute. In particular, three types of conflict are common in any project side: task conflict, relationship conflict, and value conflict. Conflict will come from labours dissatisfaction or complaints (e.g. favoritism, workplace harassment, or wage cuts). There are five major styles of conflict management -collaborating, competing, avoiding, accommodating, and compromising. For the management of such types of conflicts, maintain the code of conduct and appropriate training to the substation labours may be reduced this phenomenon.

16.14.2 Management of Grievance from the Local Community

Community Grievance Mechanism at substation project is a process for systematically receiving, investigating, responding to and closing out complaints or grievances from affected communities, local people in a timely, fair and consistent manner. Local community may give complaints or grievances to the PMU, PGCB about project proponent (CET) or stuffs or also labours to the PMU, PGCB. Community people may take a GRM form and give a written

complain about the Kaligonj substation project. At this moment local GRC (which is approved by PGCB, Appendix D) of Dhaka and Western Zone TransmissionGrid Expansion Project will try to minimize the complaint and if not, it will go the project level GRC for the further minimization

16.14.3 Public Consultation and Disclosure

Public consultation and Disclosure is a part of social aspect or issues. The positive impact of a substation project will take for the creation of job for the local community. Some aspects are always constant such as land acquisition, traffic congestion, recharged of ground water etc. But some social and environmental impacts are mitigated by the PMU, PGCB. To get direction to the local, public consultation programs will organize to get people's advice for the project. It will be an inventory program for finding social impacts. Information of historical background, type of land, natural issue, flora and fauna of the project area will come from the consultation program. Well-conducted consultations provide project affected people with a clear understanding of how the project, and the changes it will bring about, will have an impact on them, as well as meaningful ways to influence decision-making during project design and preparation. According to the Environmental Assessment Policy requires that project-affected groups (public) and local people will consult during the impact assessments process about the project's potential environmental and social impacts. The purpose of this consultation will be to take local views into account in designing the environmental and social management plans as well as in project design during the construction phase of substation. The guidelines emphasize the needs for the project sponsor to ensure that the process of public consultation will accessible to all potentially affected parties, from national to local level. Emphasis will place on the engagement of local stakeholders, namely people who are likely to experience the day-to-day. The main objective of the public consultation will be the compensation aspect of landowners for the substation project and negative impacts of the substation the project. Qualitative data will collect near the 400 kV substation project at Kaligonj during the construction phase.

Chapter 17

Environmental Monitoring Plan (EMoP)

17.0 Environmental Monitoring Plan (EMoP)

Environmental Monitoring Plan (EMoP) and the costs for supporting the activities of EMoP will be paid by **China Electric Power Equipment and Technology Co., Ltd**. Environmental monitoring reports will submit to PGCB on a semi-annual/quarterly basis by the Design and Supervision Consultant (DSC) & PGCB. It is important for the facility management to set up regular monitoring programs to assess parameters of the environment as stipulated in ECR 1997. This monitoring program will help to identify changes in the environmental situations giving opportunities for adopting appropriate control measures. A comprehensive checklist must be developed for operational usage. The basic activities for a sound-monitoring program should at least include:
This would be the responsibility of the Environment Management cell.

- Collection and analysis of relevant environmental data of the project area;
- Preparation of proper effluent monitoring program; and
- Proper Risk Assessment programs

It is mentioned here that the monitoring program will such so that it can ensure compliance with national environmental regulations and standards. The importance of this monitoring program is also for ensuring that the project does not create adverse environmental changes in the area and providing a database of operations and maintenance, which can be utilized if unwarranted complaints are made. China Electric Power Equipment and Technology Co., Ltd will do regular monitoring (as per EMP implementation) of the possible change in environmental parameters to be undertaken during the construction phase of the project. Dust suppression measures will be carried by spraying water on the substation yard (off-monsoon). Labour camps with facilities of water, sanitation, mosquito net and bins for collecting solid waste from the kitchen of labours camp will include in the environmental & social monitoring. Waste disposal facilities, health safety signboard, tree plantation, portable toilet facilities will also be checked in the monitoring.

To be an environmentally acceptable limit, China Electric Power Equipment and Technology Co., Ltd will have its own environmental monitoring unit with trained manpower with the necessary equipment and other logistics along with EMP implementation budget. The monitoring unit (or a third party) is discussed in the ESHS Resources in the next chapter. Hence, China Electric Power Equipment and Technology Co., Ltd will undertake the activity of monitoring the water quality (potable water), ambient air quality, noise level etc. Regular monitoring of environmental parameters will carry - out to find out any deterioration in environmental quality and also to take corrective steps, if required, through respective internal departments or third party. The compliance department will also collect data about the health of workers etc.

As per EMP implementation of substation project (P5), the environmental samples, monitoring parameters, frequency of sampling will carry out during the project construction period (30 months) from monitoring plan of Laboratory-based Environmental Monitoring from IEE. High

volume sampler will run 4 hours at a single location to collected ambient air selected location as per instruction of PGCB & ADB. China Electric Power Equipment and Technology Co., Ltd will compare the air quality values with different standard levels (ECR 1997, WHO). The water quality parameters will compare with island surface water schedule 10 rule 13 as per ECR 1997 and quality parameters of groundwater will be compared with island surface water schedule 3 rules 12, ECR 1997. The above-mentioned all environmental parameters (air, noise, soil, water) will compare with test reports of IEE report in DWZTGEP.

Table 17.1: Checklist of Environmental Monitoring Plan

Environmental Parameter	Monitoring Parameter	Standards / Guidelines	Means of Monitoring	Frequency	Location	Implementing Agency	Monitoring Agency
Ambient Air Quality Parameters	SPM, PM10, PM2. 5, SOx, O_3 NOx, Co & Pb-24hr monitoring	EQS/DOE Standards	Sampling/ laboratory analysis	Before construction & then quarterly	Kaligong SS site	CET	PGCB
Noise level monitoring	Leq day and Leq night Ambient Noise Level	EQS/DOE Noise pollution control Rules, 2006	Measurement	Before construction & then quarterly	Kaligong SS site	CET	PGCB
Surface Water Quality Monitoring	pH, Turbidity, BOD5, COD, TDS, TSS, DO, Total Coliform, Ammonia	EQS/DOE Standards	Sampling/ laboratory analysis	Before construction & then quarterly	Near pond and canal of Kaligong SS site	CET	PGCB

	- Nitrogen, Oil and grease						
Ground Water Quality	pH, Turbidity, manganese, Iron, Arsenic, EC, Chloride	EQS/DOE Standards	Sampling/ laboratory analysis	Before construction & then quarterly	Groundwater sources from Kaligong SS site	CET	PGCB
Soil Pollution	pH, Texture, Organic content, Lead, Copper, Chromium, Cadmium	EQS/DOE Standards	Sampling/ laboratory analysis	Before construction & then quarterly	Cropland from Kaligong SS site	CET	PGCB

China Electric Power Equipment and Technology Co., Ltd will monitor environmental samples (air, water, and noise level) at the selected site prior to approval from PMU, Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP). **China Electric Power Equipment and Technology Co., Ltd** will be communicated with PMU, Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP) by letter for environmental sampling. The date and sampling time will mention in the letter. As per date and time, China Electric Power Equipment and Technology Co., Ltd will finish the environmental sampling at the substation area.

During the construction phase, China Electric Power Equipment and Technology Co., Ltd will take responsibility of the majority of the environmental and social mitigation and monitoring actions. In the monitoring actions, the cost for air quality monitoring as per ECR,1997 at the project sites, monitoring of noise level, surface and groundwater quality parameters as per ECR 1997. The monitoring of soil quality parameters will estimate as per PGCB requirement. The laboratory cost for environmental samples (air, soil, water, noise,) and third-party inspection of welding, crane, site generator emission, and concrete basement column will include in the cost schedule. To mitigate the soil erosion, transportation cost of land, soil, effluent sludge along tree plantation cost will list in the cost schedule.

Table 17.2: Probable cost for Environmental monitoring

Impact activity	Parameters	Cost in BDT	Cost in USD
Air pollution	SPM, PM10, PM2.5, SOx, NOx, Co & Pb- 24hr monitoring	150000	1800
Noise level	Leq day and Leq night Ambient Noise Level at the substation sites Kaligonj	100000	1200
Surface Water	pH, Turbidity, BOD5, COD, TDS, TSS, DO, Total Coliform, Ammonia-Nitrogen, Oil andgrease at the substation sites (Kaligonj)	1,200,000	14,200
Ground Water Quality	pH, Turbidity, manganese, Iron, Arsenic, EC, Chloride at the substation sites (Kaligonj)	1,200,000	14,200
Soil Pollution	pH, Texture, Organic content,Lead, Copper, Chromium, Cadmium at the substation sites Kaliganj	1,500,000	18000

Laboratory analysis will be carried out as per EMP of IEE and the budget presented is on an approximate basis as per IEE of DWZTGEP.

Basis of the above mentioned cost for environmental monitoring will environmental sampling collection and analysis of the Kaligonj SS area. Department of Environment and Bangladesh Accreditation Board (BAB) laboratories or DPHE (Tongi and Mohakhali) and BCSIR, Dhaka are the right people for environmental monitoring and inspection of environmental parameters (air, noise, soil, water). But air samples collection for 4 hours for the Department of Environment (DOE) is not agreed to such type of monitoring and it is a time being matter. The cost of sampling and cost of analysis is important issues for the basis of the basic cost of environmental monitoring. China Electric Power Equipment and Technology Co., Ltd will engage with a private laboratory [Bangladesh Accreditation Board (BAB)] for such environmental monitoring and the monitoring based results will be submitted to PGCB.

17.1 Logistics & Environmental Quality Standard (EQS)

Globalization has made speed, efficiency, and flexibility necessities for logistics companies looking to prosper in the 21st century. A common denominator among these characteristics is effective logistics communication, which has become increasingly difficult as managing supply chains have become easier.

With regard to overhead electric transmission, environment, social, health and safety aspects/hazards, and its management system, China Electric Power Equipment and Technology Co., Ltd shall establish, implement, and maintain a procedure(s) for:

a. internal communication among the various levels and functions of China Electric Power Equipment and Technology Co., Ltd communication with labour, workers and other visitors to the workplace,
b. Receiving, documenting, and responding to relevant communication from external interested parties.
c. China Electric Power Equipment and Technology Co., Ltd shall decide whether to communicate externally about its significant environment, health and safety aspects/hazards, and shall document its decision. If the decision is to communicate, China Electric Power Equipment and Technology Co., Ltd shall establish and implement a method(s) for this external communication.

The first set of ambient air quality standards for Bangladesh was defined in the Environment Conservation Rules of 1997. These ECR 1997 standards were recently replaced by a new set in July 2005 based on the proposal of the World Bank-funded AQM Project which reviewed the old standards. The new standards for NO_2, SO_2 , CO, and ozone (O_3) are the same as the Ambient Air Quality standards set by US EPA and the standard for Pb is equivalent to the guideline value set by WHO. The standards for CO, NO_2, SO_2, and O_3 are seen to be more lenient than the guidelines set by WHO. The basis for discussion of air quality has been the data collected from the Air Quality monitoring Network stations under DoE. The data have been quality controlled and the air pollution levels have been compared to the Bangladesh Ambient Air Quality Standard as adopted in 2005. Table 1.10 represents the current and approved air quality standards for Bangladesh.

Table 17.3: Ambient Air Quality Standards for Bangladesh (2022).

Pollutants	Standard level	Average time
SO_2	80 µg/m^3	24 Hours
CO	5 mg/m3	8 Hours
NOx	80 µg/m3	24 Hours
O_3	100 µg/m3	8 Hours
PM2.5	65 µg/m3	24 Hours
PM10	150 µg/m3	24 Hours
Pb	0.5 µg/m^3	24 hours
Ammonia	400 µg/m^3	24 hours

As per the IFC-Environmental, Health, and Safety General Guidelines, Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that: · Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources; Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general

rule, this Guideline suggests 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed.

Table 1.1.1: WHO Ambient Air Quality Guidelines[7,8]

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

Noise is known as unwanted sound. The difference between sound and noise depends upon the listener and the circumstances. Noise is one of the most common occupational health hazards. Noise at the workplace that exceeds the exposure standard and is not controlled is a major cause of hearing loss to workers. A significant loss of hearing contributes to social isolation and reduced quality of life, career prospects, increased absenteeism, worker turnover and lowered work performance. It can also be a contributing factor to workplace injuries and accidents. In order to determine the existing work place sound level at before, during and after construction by measuring with a Sound Level Meter.

Table 17.4: Standards for Sound

SN	Category for sound	Standards determined (dBA unit)	
		Day	Night
a.	Silent Zone (Sensitive areas such as parks, school, hospitals and mosques)	45	35
b.	Residential areas	50	40
c.	Mixed areas(mainly residential area, and also simultaneously used for commercial and industrial purposes)	60	50
d.	Commercial areas	70	60
e.	Industrial areas	75	70

Source: Schedule 4, Environmental Conservation Rules, 1997

Notes:

1. The time from 6 a.m. to 9 p.m. is counted as daytime.
2. The time from 9 p.m. to 6 a.m. is counted as night time.
3. Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/ establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

As per (Fig 1.3 and 5.1) of 400/230 kV Kaliganj GIS SS, households is far distance is beyond the 100 meter at the north-west corner. For this reason, the noise level is categorized in silent zones. The traffic noise of Kaliganj express high way road may be contributed traffic noise on the Kaliganj substation.

Table 17.5 Standards for Drinking Water

SN	Parameter	Unit	Standards as per ECR 1997
1	**2**	**3**	**4**
1	Arsenic	"	0.05
2	Chloride	"	150 – 600*
3	Coliform (fecal)	n/100 ml	0
4	Coliform (total)	n/100 ml	0
5	Iron	"	0.3 – 1.0
6	Manganese	"	0.1
7	pH	"	6.5 – 8.5
8	Total dissolved solids (TDS)	"	1000
9	Turbidity	JTU	10

Table 17.6 Standards for surface water

SN.	Name of the Parameter	Unit	DoE (Bangladesh) Standard for Inland surface water
1	pH	-	6.0 – 9.0
2	Turbidity	JTU	10 JTU
3	TDS	mg/l	2100 mg/l
4	DO	mg/l	4.5-8.0 mg/l
5	BOD_5 at 20 ^0C	mg/l	50 mg/l
6	COD	mg/l	200 mg/l
7	TSS	mg/l	150
8	Total Coliform	mg/l	200
9	Ammonia- Nitrogen	mg/l	50
10	Oil & Grease	mg/l	10 mg/l

Texture is indicated mesh size of the soil quality and small size of soil particles can retain water in between the soil. International standards for heavy metals of the river bed materials are given table 3.7

Table 17.7: USA EPA, 2000 Standard Value of Heavy Metals of River Bed Materials (Sand)

Sl No	Name of the Parameters	Unit	US EPA Standard 2000 (river bed)
1	Soil pH	-	7.7 to 8.5
2	Organic matter,	%	NF
3	Lead	mg/Kg	128
4	Copper	mg/Kg	144
5	Chromium	mg/Kg	111
6	Cadmium	mg/Kg	4.98

Source: IEE of Enhancement and Strengthening of Power Network in Eastern Region Project, page 36, December, 2019

17.2 In situ noise, air quality, soil parameters and water quality measuring methodology

Only potable equipment or different meter should be used for in situ monitoring for dust and noise level at the selected substation locations. Only calibrated noise meter may be used for measurement of noise level.

Noise monitoring may be carried out for the purposes of establishing the existing ambient noise levels in the area of the proposed or existing facility, or for verifying operational phase noise levels. Noise monitoring programs should be designed and conducted by trained specialists.
In general, the noise level limit is represented by the background or ambient noise levels that would be present in the absence of the facility or noise source(s) under investigation. During the construction period and as per EMoP of IEE, environmental sampling will carry out at substation land and surroundings

Air pollution is an important environmental aspect. Department of Environment, Govt. of Bangladesh has given standard pollution level of certain parameters (ambient air quality standard 2022). Particulate matter and gaseous pollutants will be measured in situ location where the substation will construct. Water (both surface and groundwater) will collect in polyethylene container for further laboratory analysis. Soil sample will collect from the substation land. Only in situ results of noise level will give at the SS project location. Other quality parameters of air water and soil samples will report for further laboratory analysis.

17.3 Methodology Associated with Instruments for Laboratory Based Environmental Analysis

Environmental monitoring is a tool to assess environmental conditions and trends, support policy development and its implementation, and develop information for reporting to national policymakers, international forums and the public. Environmental samples (Air water noise and soil) have been collected from Kaliganj locations under the DWZTGEP.

17.3.1 Ambient Noise Level Monitoring

Noise is an important environmental pollutant. Noise pollution can cause health problems for people and wildlife, both on land and in the sea. The noise will generated from project traffic noise, construction noise, noise from engine at the Kaligonj SS area. The following method will consider for the measurement of noise



Fig: 17.1. Noise Level Monitoring Meter

Table 17.8: Method of Noise level measurement

SL No	Name of the parameters	Methodology
1	Noise Level	The methods and procedures of BS 7445-1 that are practiced when measuring noise at outdoor area Outdoor measurements will also involve the following procedures: • The measurement should be attained more than 3.5m from a reflective structure (if possible) • The ideal measurement height ranges between 1.2m and 1.5m • The assessment time & date should be carefully selected to evaluate ambient and background noise conditions during appropriate meteorological conditions

17.3.2 Gaseous pollutant and Particulate Matter Monitoring (SPM, PM_{10} and $PM_{2.5}$)

Particulate monitoring is accomplished with a High Volume sampler, which is a vacuum type device that draws air with particulate matter through a filter paper. Particles within the range of 100 to 0.1 microns diameter are ordinarily collected on glass fiber filter. The instrument sucks the ambient air with a blower at a flow rate that allows suspended particles to pass to the filter surface. This sampling filter paper is dried up in the laboratory and the weight difference is the amount of SPM, PM_{10} or $PM_{2.5}$ content measured in micro grams per cubic meter of air collected over a period of 24 hours. If particulate level is high, a satisfactory sample may be obtained in 6 to 8 hours or less. At the same time gaseous pollutants will be collected by respective absorbing solution for gaseous attachment in High Volume sampler. The following method will consider;

Table 17.2: Methods of laboratory based air quality monitoring

Ambient Air Quality Parameters		
SL No	Name of the parameters	Methodology
1	PM10, $PM_{2.5}$ & SPM	Gravimetric method; Air sampler is the simplest of the direct weight methods and has been adopted by the USEPA and British Standard Intuition (1969). Typically, EPA's validated reference test methods for PM (EPA Methods 5 and 17) measure only material that is collected on and ahead of the filter media of a sampling device.
2	SO_2	This methodology has been adopted as a BS method (WSL. 1966) and by the OECD (OECD, 1964). The USEPA[1] has previously adopted the pararosaniline method of determination (USEPA 1971) where SO2 is absorbed from sampled air by a solution of potassium tratechloroomercurate and a dichlorosulphitomercurate complex is formed.
3	NOx (NO & NO_2)	This is a rapid, simple, selective, sensitive, and Chemiluminescent analyzer (Colorimetry) method for the spectrophotometric determination of nitrite in air samples. It is a Colorimetry-USEPA Method (353.2.). This method is adopted by Association of London Chief Environmental Health Officers and Greater London Council Scientific Services Branch (1985/86). A principal shortcoming is that are not convenient for routine short-term measurement (stack point emission)
4	O_3	The principle of the UV spectrometric method for ozone is given in CARB, 1987, McElroy, et al., 1997, and U.S. EPA, 1996. Calibration techniques and other quality control and quality assurance methods. Ozone exhibits a strong absorption band in the ultraviolet region at 254 nm. This feature is the basis of the photometric measurement method for ozone
5	CO	Iodine pentoxide easily oxidizes carbon monoxide to carbon dioxide at room temperature: $5CO + I_2O_5 \rightarrow I_2 + 5CO_2$ This reaction can be used to analyse the concentration of CO in a gaseous sample. The liberate iodine finally titrated with sodium thiosulfate by starch indicator,
6	Lead	**Digestion procedure of filter paper (PM_{10} and $PM_{2.5}$):** One fourth of the glass fiber filter is cut into small pieces and taken into the Parr digestion bomb. Each filter is placed in 30 ml concentrated nitric acid (70%) and 10 ml hydrogen peroxide (30%) solution in a Parr digestion bomb. The Parr digestion bomb is placed in an oven and heated

to 180°C for about 1 h. Upon cooling of Parrdigestion bomb, 60 ml water is added and agitated carefully. The solution is filtered into a 100-ml volumetric flask, diluted to the mark with de-ionized water, and used for the trace metal analysis with AAS. One unexposed filter is prepared as a blank using the same procedure as that followed for the air-exposed filter.

Determination of Lead

Metal solutions are aspirated into the flame of the AAS, where ions are reduced to the atomic state, and absorbed light can be measured quantitatively at a particular wavelength. However, the concentrations of each metal are determined from the standard calibration curve of Pb metal. An atomic absorption spectrophotometer (AAS; model AA- 6800; Shimadzu) was used to determine the concentrations of heavy metal; Pb in the filter paper.



Fig: 17.2 Laboratory Equipment

The aerosol massed for both the $PM_{2.5}$ and PM_{10} were determined by weighing the filters before and after the exposure with OHAUS (USA) analytical 4 digit balance, model no. AR1140. Particles larger than PM_{10} was determined from initial and final weight of the dust cup vial using the same balance.

Air is drawn through a size-selective inlet and through a 20.3 X 25.4 cm (8 x 10 inch) filter at a flow rate which is typically 1.15 to 1.20 m^3/min for PM_{10}. Particles with aerodynamic diameter less than the cut point of the inlet are collected by the filter. The mass of these particles is

determined by the difference in filter weights prior to and after sampling. The concentration of PM10 in the designated size range is calculated by diving the weight gain of the filter by the volume of air sampled.

Calculation of $PM_{2.5}$ PM_{10}, and SPM (Gravimetric Method)

$$PM_{10}\ (\mu g/m3) = \frac{(W_f - Wi) \times 10^6}{V}$$

Where,
PM_{10} = Mass concentration of particulate matter less than 10 micron diameter in $\mu g/m^3$
Wi = Initial weight of filter in gm
W_f = Final weight of filter in gm
V = Volume of air sample in m^3
10^6 = Conversion of gm to µg
Same formula was used for the determination of particle larger than PM_{10}. SPM was calculated from the addition of result PM_{10} and particle larger than PM_{10} which was collected in dust cup vial. For $PM_{2.5}$ the total volume of air was calculated from the initial and final dry gas meter reading (m^3). Some formula was used for the determination of $PM_{2.5}$.

Sulfur Oxides (SO_2)

Sulphur dioxide from air is absorbed in a solution of potassium tetrachloro-mercurate (TCM). A dichlorosulphitomercurate complex, which resists oxidation by the oxygen in the air, is formed. Once formed, this complex is stable to strong oxidants such as ozone and oxides of nitrogen and therefore, the absorber solution may be stored for some time prior to analysis. The complex is made to react with pararosaniline and formaldehyde to form the intensely colored pararosanilinemethylsulphonic acid. The absorbance of the solution is measured by means of a suitable spectrophotometer. Concentration of sulphur dioxide in the range of 25-1050 µg/m3 can be measured under the conditions given are measure concentration below 25 $\mu g/m^3$ by sampling larger volumes of air, but only if, the absorber efficiency of the particular system is first determined and found to be satisfactory. Higher concentration can be analyzed by using smaller gas samples of a suitable aliquot of the collected sampler. Beer's law is followed through the working range from .03 to 1.0 absorbance unit. This corresponds to 0.8-27µg of sulfite ion in 25 ml of final solution calculated as sulphur dioxide. The lower limit of detection of sulfhur dioxide in 10 ml absorbing reagent is 0.75 µg/m3 based on twice the standard deviation, which represent a concentration of 25 µg/m3 in air sample of 30 liters.

This methodology has been adopted as a BS method (WSL. 1966) and by the OECD (OECD, 1964). The USEPA[1] has previously adopted the pararosaniline method of determination (USEPA

1971) where SO_2 is absorbed from sampled air by a solution of potassium tratechloroomercurate and a dichlorosulphitomercurate complex is formed.

Oxides of Nitrogen (NO_x)

Nitrogen oxide (NO_x) is collected by bubbling air through a solution of sodium hydrogen and sodium arsenite. The concentration of nitrite ion (NO_2) produced during sampling is determined calorimetrically by reacting the nitrite ion with phosphoric acid, sulfanilamide and N-(1–naphthyl)-ethylenediamine di-hydrochloride (NEDA) and measuring the absorbance of the highly colored azo-dye at 540 nm. This is a rapid, simple, selective, sensitive, and Chemiluminescent analyzer (Colorimetry) method for the spectrophotometric determination of nitrite in air samples. It is a Colorimetry-USEPA Method. This method is adopted by Association of London Chief Environmental Health Officers and Greater London Council Scientific Services Branch (1985/86).

CO and O_3

The samples will transport to the laboratory for analysis. The content of these samples will measure in micro grams per cubic meter/ppm. The CO will be analyzed by electrochemical sensor method/Colorimetric method. The manufacture's instruments will follow carefully. The air is passed through the tube by aspirator provided. After the sampling, the color of the fixed portion of the tube is matched with the given chart value and then concentration is calculated. Any water loses by evaporation during sampling is replaced by de-ionized water and mixed thoroughly. The absorbance is measured at 352 nm against the blank reagent by using Spectrophotometer. From the Calibration curve, concentration of O_3 in the absorbing reagent is measured. Then the concentration of O_3 in the air is measured by using the following calculation. Samples for Ozone analysis will carry out impinge containing solution of KH_2PO_4, Na_2HPO_4, and KI. Stack air has been passed through the above-mentioned solution. Any water loses by evaporation during sampling is replaced by de-ionized water and mixed thoroughly. The absorbance is measured at 352 nm against the blank reagent by using Spectrophotometer. From the Calibration curve, concentration of O_3 in the absorbing reagent is measured. Then the concentration of O_3 in the air is measured by using the following calculation.

The samples will transport to the laboratory for analysis. The content of these samples will measure in micro grams per cubic meter. The method finally selected will be the iodine-pentoxide method as modified by Teague,' which depends on the oxidation of carbon monoxide to carbon dioxide by iodine-pentoxide, and the accurate determination of the liberated iodine. It is based on the following reaction:

$$I_2O_5 + 5CO \text{ ------- } I_2 + 5CO_2$$

The iodine freed is absorbed in a potassium iodide solution and titrated with 0.01 N thiosulfate solutions from a micro burette, a few drops of starch solution being added towards the end of the

titration. 1 cc of 0.001 N thiosulfate solution is equivalent to 0.056 cc of carbon monoxide in air at 0 ^{0} C and 760 mm Hg.

Some instruments will be used for collecting ambient air. These instruments will have calibration certificates.

17.3.3 Water quality Parameters

A lot of water quality parameters have to quantify it level. The results also be cooperated with standard limit of different agencies (WHO, EPA, ECR 1997). Different methods have been used for the same parameters. But the physico- chemical parameters (pH, TDS, EC, salinity, turbidly TSS), collected water first filter with Whatmann (no 42) filter paper to measure total suspended solid (TSS). Then pH electrode is used for measuring pH value, Then EC electrode is used for measiring EC value, Then TDS electrode is used for measuring TDS value from the water. Dissolve oxygen, BOD_5 (at 20 ° C) COD, Alkalinity, Hardness as $CaCO_3$, Iodometric titration with thiosulfate is used for DO [DO estimation by winkler's method] and BOD, by using starch indicator. Phenopthaline indicator is used in Alkalinity measuring; E Black T for Hardness as $CaCO_3$, mixed indicator for Chloride (free), Mohr Method uses silver nitrate for titration of the determination of chloride ion in water samples. Organic and oxidizable inorganic substances in the sample are oxidized by potassium dichromate in 50% sulfuric acid solution at reflux temperature. Silver sulfate is used as a catalyst and mercuric sulfate is added to remove chloride interference. The excess dichromate is titrated with standard ferrous ammonium sulfate, using orthophenanthroline ferrous complex as an indicator for measuring COD.

Table 17.3 **Method statement of laboratory based environmental ground & surface water quality monitoring**

Surface water Quality		
SL No	Name of the parameters	Methodology
1	pH	*pH* measurements will be made using an electrochemical cell with both the sensing *(pH)* and reference electrode built into a single combination electrode
2	Salinity	Multi-meter method
3	BOD_5,	DO estimation by winkler's method with 5 day incubation
	DO	winkler's method
4	COD	Reflex method with Ferro Ammonium Sulfate Solution
5	TDS	HACH sension meter for EC and TDS
6	Heavy metal; Arsenic, Lead,Iron Chromium, Manganese	AAS with flame , HVG and GF
7	EC	HACH sension5 meter for EC and TDS
8	Chloride	A chloride ion is determined by subtracting the titration findings

		of the moles of silver ions that reacted with the thiocyanate from the total moles of silver nitrate added to the solution.
9	Ammonia Nitrogen	Nessler's UV visible method at 440 nm
10	Temperature	Normal calibrated thermometer method
11	Oil and grease	Method 1664A has been tested extensively and produces results that are generally comparable to results produced by methods that use CFC-113 as the extraction solvent.

Oil & Grease: Partition gravimetric method. This method involves the extraction of dissolved or emulsified oil and grease from water by using an extracting solvent.

AAS – with air acetylene flame is used for the metal ion (Pb) determination in air after digestion of filter paper

Coliform in water: Agar bed method will use for this test

Effluent (wastewater) quality parameter:

As per Department of Environment, GoB, is considered only 5 parameters for inlet and outlet water of any effluent treatment plant (ETP) or waste water treatment plant (WWTP). But DO, BOD_5 and COD are complex matter to test in the field level. pH and TDS are the important parameters for any kind of water. The abnormalities of these two parameters which might affected to another water quality parameters. TDS and pH will be done by **China Electric Power Equipment and Technology Co., Ltd** for effluent at the field level of the substation project



Fig 3.3: TDS and pH meters

17.3.4 Soil quality parameters; metal ions

Soil test results are an important component in a nutrient management plan as they will be a driver in determining if a nutrient application is needed and if so what quantity of nutrients should be applied. As per ESU, PGCB, selected metal ions will measure from the topsoil from the substation project area. The sand filling is the important aspect of the substation project. But

the soil sample will collect from the project area cropland/agriculture land, so that substation project activities do not contaminate the zonal area land. The soil sample will collect from 15 cm depth from the sub-surface of the cropland/agriculture land nearby the substation project area in polyethylene bag and bag will air- proof. The results will express in dry weight basis.

Table 17.11 **Method statement of laboratory based environmental soil quality parameters**

SL No	Name of the parameters	Methodology
1	pH	pH measurements will be made using an electrochemical cell with both the sensing (pH) and reference electrode built into a single combination electrode
2	Texture	Sif method with differemesh size
3	Organic content	Dry combustion in muffle furnace at 800 ° C
4	Lead, Copper, Chromium, Cadmium	AAS with flame and GF after digestion 1 g dry soil sample with nitric acid – perchloric acid mixture (3:2)

Soil Digestion for metal ions: soil samples are first weighted initially and finally to determine water content at the constant position. Then dried soil samples are digested by nitric acid and perchloric acid (3:2) with a gentle heat on the hot place for 3-4 hours. After digestion, filter it by Whatmann filter paper (No 42) and then it will ready for metal ions. AAS – with air acetylene flame is used for metal ions, AAS – with hydride vapor generator for arsenic.

17.4 Checklist for Environmental Monitoring Plan.

Environmental checklist provides general environmental items to be checked especially during the construction phase of substation project. It is important to protect the environment and make sure operatives are aware of their environmental responsibilities. China Electric Power Equipment and Technology Co., Ltd will put together an environmental checklist to make sure that all aspects of the environment including health & safety, social issues (GRM) will consider during work commencing on site. There are five main types of environmental monitoring: air, soil, water, waste, and noise, all of which are vital in providing key information about the environment. Additionally effluent from pilling side, dust from the SS yard, noise from the vehicles & engines as well as labour accommodation area and their safety aspect will consider in the checklist. The Checklist for Environmental Monitoring Plan is attached in Appendix U

Chapter 18

Conclusion & Recommendation

18.0 Conclusion & Recommendation

The package 5 substation under PGCB is financed by ADB and AIIB. The engineering consultation is given by approved consultant of PGCB. The project is located at locations under Kaliganj police station of Gazipur District and constructed Kaliganj substation under **China Electric Power Equipment and Technology Co., Ltd.** An IEE has already been carried out for the project according to the requirement of PGCB and ADB for necessary environmental and social clearances. At substation project, Environment, Social, Health and Safety (ESHS) Management System (MS) is a comprehensive system of policies, procedures, and standard procedures that is developed and implemented to manage ESHS hazards and risks related to the development. So, it is felt that PGCB requires carrying out corrective measure mentioned in the corrective action plan (CAP) for compliance in regards of EHS safeguards. **China Electric Power Equipment and Technology Co., Ltd will** follow policies, regulations, mitigation measures of negative impact during the construction for of 400/230 kV substation at Kaliganj.
CESMP is a living document that will revise according to the basic and detailed design of the project is developed and modified. CESMP report is work progress design of substation with mitigation measure of all aspects/activities/impacts of substation construction. Fire hazard, health and safety issues, EMF hazard, and impacts due to solid wastes will the major impacts associated with any phase of the substation project. This may create long-term and irreversible effects to a limited degree on the receiving environment if no mitigation measures are adopted.

However, in the case of **China Electric Power Equipment and Technology Co., Ltd** all necessary implementation measures to mitigate adverse environmental and health and safety impacts have already been taken to meet National Environmental Quality Standards. On the other hand, the plant has a positive impact in terms of employment in the operation phase. Further, this will indirectly help in boosting up the national economic condition through foreign investment. An outline of environmental and social management plans have been given in the present report to mitigate/enhance the impacts, which generally occurs during the operation phase of substation

18.1 Recommendations

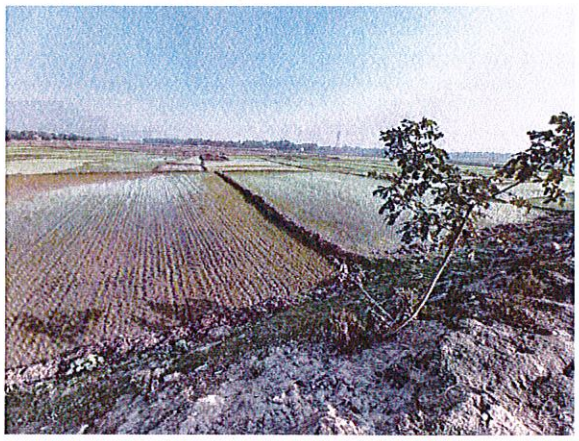
China Electric Power Equipment and Technology Co., Ltd already has an own manual for developing 400/230 kV substation, under this package of Dhaka and Western Zone Transmission Grid Expansion Project (DWZTGEP). CESMP report as a live document, China Electric Power Equipment and Technology Co., Ltd will maintain and supply the safety issue for workers, grievance mechanism, wage control for labours, hazardous materials controls; various traffic and driving regulations, solid waste collection and storage, codes and restrictions; security, hygiene condition, ergonomics, medical and first aid information; etc. China Electric Power Equipment and Technology Co., Ltd will construct the 400/230 kV Kaligonj SS as per scope of work and

specification of the contract document of PGCB. China Electric Power Equipment and Technology Co., Ltd will follow all components of CESMP report during the construction phase. China Electric Power Equipment and Technology Co., Ltd shall have an Occupational Health & Safety officer and Accidents Prevention officer, who shall establish the necessary policies and the staff's obligation to know, comply with, and respect these policies.

- China Electric Power Equipment and Technology Co., Ltd will give the facilities of accommodation for labour, ensure good food, pure drinking water. hygienic sanitation facilities and appropriate PPE for the construction of Kaliganj substation projects,
- The China Electric Power Equipment and Technology Co., Ltd shall oblige its employees, suppliers and agents related to the contract execution to comply with all conditions relating to occupational health, safety, and accident prevention, as established by the contract documents.
- The China Electric Power Equipment and Technology Co., Ltd shall inform the PGCB in writing of any accident occurring at the work sites. China Electric Power Equipment and Technology Co., Ltd shall also keep a register of all occupational illnesses occurring among the personnel and damages caused to property or public goods. Monthly and quarterly reports on these topics shall be prepared.
- The management team of China Electric Power Equipment and Technology Co., Ltd shall be equipped with personal and mass protection equipment appropriate for the risk of works (proper clothing, helmet, gloves, boots, goggles, ear protection, when necessary, etc.). The protective equipment shall be of good quality and shall be periodically checked to guarantee their proper condition.
- Warning and informative signals and signboard shall be placed at important places at Kaliganj substation projects to avoid accidents, hazardous slopes and, in general, in places representing any kind of hazard.
- China Electric Power Equipment and Technology Co., Ltd will give progress report of substation project to PGCB and PGCB will also monitor and consult with China Electric Power Equipment and Technology Co., Ltd for the work progress.
- This CESMP is a living document and China Electric Power Equipment and Technology Co., Ltd will followed and regulated by CESMP document at the work period of substation.

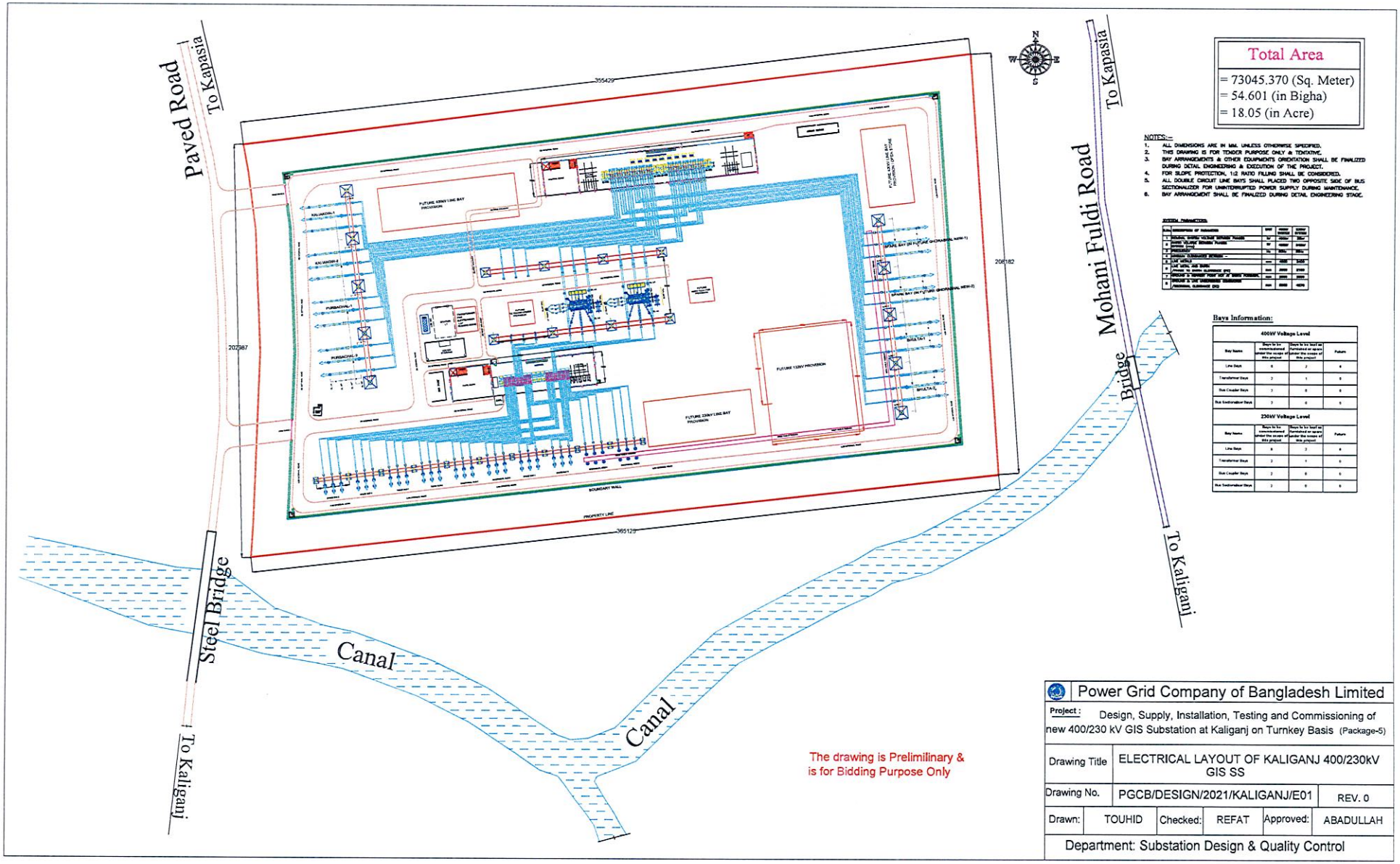
Field Photographs



Figures:- SS site photographs.

P-5 Layout



Total Area
= 73045.370 (Sq. Meter)
= 54.601 (in Bigha)
= 18.05 (in Acre)

NOTES:–

1. ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE SPECIFIED.
2. THIS DRAWING IS FOR TENDER PURPOSE ONLY & TENTATIVE.
3. BAY ARRANGEMENTS & OTHER EQUIPMENTS ORIENTATION SHALL BE FINALIZED DURING DETAIL ENGINEERING & EXECUTION OF THE PROJECT.
4. FOR SLOPE PROTECTION, 1:2 RATIO FILLING SHALL BE CONSIDERED.
5. ALL DOUBLE CIRCUIT LINE BAYS SHALL PLACED TWO OPPOSITE SIDE OF BUS SECTIONALIZER FOR UNINTERRUPTED POWER SUPPLY DURING MAINTENANCE.
6. BAY ARRANGEMENT SHALL BE FINALIZED DURING DETAIL ENGINEERING STAGE.

SYSTEM PARAMETERS			
SL No.	DESCRIPTION OF PARAMETER	UNIT	400kV SYSTEM
1	NOMINAL SYSTEM VOLTAGE BETWEEN PHASES	kV	400kV
2	HIGHEST SYSTEM VOLTAGE BETWEEN PHASES	kV	420kV
3	FREQUENCY	Hz	50Hz
4	MINIMUM CLEARANCE BETWEEN		
a	LIVE METALS	mm	4200
b	LIVE METAL AND EARTH	mm	4200
c	PHASES TO PHASE CLEARANCE (PTP)	mm	4200
d	SPACING B/W PHASE AXIS OF BUS1 TO BUS2	mm	8400
e	MINIMUM HEIGHT OF BUS BAR	mm	12600

Bays Information:

400kV Voltage Level			
Bay Name	Bays to be commissioned under the scope of this project	Bays to be kept as provision or spare under the scope of this project	Future
Line Bays	6	2	4
Transformer Bays	2	1	0
Bus Coupler Bays	1	0	0
Bus Sectionalizer Bays	1	0	0

230kV Voltage Level			
Bay Name	Bays to be commissioned under the scope of this project	Bays to be kept as provision or spare under the scope of this project	Future
Line Bays	6	2	4
Transformer Bays	2	1	0
Bus Coupler Bays	2	0	0
Bus Sectionalizer Bays	2	0	0

The drawing is Prelimilinary & is for Bidding Purpose Only

Power Grid Company of Bangladesh Limited					
Project : Design, Supply, Installation, Testing and Commissioning of new 400/230 kV GIS Substation at Kaliganj on Turnkey Basis (Package-5)					
Drawing Title	ELECTRICAL LAYOUT OF KALIGANJ 400/230kV GIS SS				
Drawing No.	PGCB/DESIGN/2021/KALIGANJ/E01				REV. 0
Drawn:	TOUHID	Checked:	REFAT	Approved:	ABADULLAH
Department: Substation Design & Quality Control					

Total Appendix_P5_Kaliganj SS

Appendix A

北京中建协认证中心有限公司

质量管理体系认证证书

注册号：02320Q20303R3M

兹　证　明

中国电力技术装备有限公司

（统一社会信用代码：91110000100015357H）

地址：北京市西城区南横东街8号都城大厦10层；　邮编：100052

质量管理体系符合 GB/T19001-2016/ISO 9001:2015 标准的要求

特发此证，并予注册。

本证书覆盖范围：电力工程总承包；电力设备成套及集成技术咨询服务；进出口贸易

体系覆盖的多现场组织见附件

发证日期：2020 年 06 月 26 日

有 效 期：2020 年 06 月 26 日至 2023 年 06 月 25 日

在适用的法律法规要求的行政许可证明、资质证书、强制性认证证书等有效期内，接受例行年度审核并经评定合格的情况下本证书方可保持有效。本证书有效性信息可扫描下方二维码、登陆我公司网站 www.jccchina.com，或国家认证认可监督管理委员会网站 www.cnca.gov.cn 查询。

北京中建协认证中心有限公司

（地址：北京市朝阳区南湖东园122号博泰国际大厦A座20层）

董事长

中国认可
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管理体系
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CNAS C023-M

NO.B0104567

北京中建协认证中心有限公司

质量管理体系认证证书

（副本） 注册号：02320Q20303R3M

兹 证 明

中国电力技术装备有限公司

（统一社会信用代码：91110000100015357H）

地址：北京市西城区南横东街8号都城大厦10层； 邮编：100052

质量管理体系符合 GB/T19001-2016/ISO 9001:2015 标准的要求

特发此证，并予注册。

本证书覆盖范围：电力工程总承包；电力设备成套及集成技术咨询服务；进出口贸易

体系覆盖的多现场组织见附件

发证日期：2020 年 06 月 26 日

有 效 期：2020 年 06 月 26 日至 2023 年 06 月 25 日

在适用的法律法规要求的行政许可证明、资质证书、强制性认证证书等有效期内，接受例行年度审核并经评定合格的情况下本证书方可保持有效。本证书有效性信息可扫描下方二维码、登陆我公司网站 www.jccchina.com，或国家认证认可监督管理委员会网站 www.cnca.gov.cn 查询。

北京中建协认证中心有限公司

（地址：北京市朝阳区南湖东园122号博泰国际大厦A座20层）

董事长

中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.B0104569

北京中建协认证中心有限公司

环境管理体系认证证书

注册号：02320E20278R3M

兹　证　明

中国电力技术装备有限公司

(统一社会信用代码：91110000100015357H)

地址：北京市西城区南横东街8号都城大厦10层；　邮编：100052

环境管理体系符合 GB/T24001-2016/ISO14001:2015 标准的要求

特发此证，并予注册。

本证书覆盖范围：电力工程总承包；电力设备成套及集成技术咨询服务；进出口贸易及相关的环境管理活动

体系覆盖的多现场组织见附件

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北京中建协认证中心有限公司

(地址：北京市朝阳区南湖东园122号博泰国际大厦A座20层)

董事长

中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.B0104577

北京中建协认证中心有限公司

环境管理体系认证证书

（副本） 注册号：02320E20278R3M

兹 证 明

中国电力技术装备有限公司

（统一社会信用代码：91110000100015357H）

地址：北京市西城区南横东街8号都城大厦10层； 邮编：100052

环境管理体系符合 GB/T24001-2016/ISO14001:2015 标准的要求

特发此证，并予注册。

本证书覆盖范围：电力工程总承包；电力设备成套及集成技术咨询服务；进出口贸易及相关的环境管理活动

体系覆盖的多现场组织见附件

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北京中建协认证中心有限公司

（地址：北京市朝阳区南湖东园122号博泰国际大厦A座20层）

董事长

中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.B0104579

北京中建协认证中心有限公司

职业健康安全管理体系认证证书

注册号：02320S20284R3M

兹　证　明

中国电力技术装备有限公司

(统一社会信用代码：91110000100015357H)

地址：北京市西城区南横东街8号都城大厦10层；　邮编：100052

职业健康安全管理体系符合 GB/T45001-2020/ISO45001:2018 标准的要求

特发此证，并予注册。

本证书覆盖范围：电力工程总承包；电力设备成套及集成技术咨询服务；进出口贸易及相关的职业健康安全管理活动

体系覆盖的多现场组织见附件

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北京中建协认证中心有限公司

(地址：北京市朝阳区南湖东园122号博泰国际大厦A座20层)

董事长

CNAS 中国认可 管理体系 MANAGEMENT SYSTEM CNAS C023-M

NO.A0104117

北京中建协认证中心有限公司

职业健康安全管理体系认证证书

（副本） 注册号：02320S20284R3M

兹 证 明

中国电力技术装备有限公司

（统一社会信用代码：91110000100015357H）

地址：北京市西城区南横东街8号都城大厦10层； 邮编：100052

职业健康安全管理体系符合 GB/T45001-2020/ISO45001:2018 标准的要求

特发此证，并予注册。

本证书覆盖范围：电力工程总承包；电力设备成套及集成技术咨询服务；进出口贸易及相关的职业健康安全管理活动

体系覆盖的多现场组织见附件

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北京中建协认证中心有限公司

（地址：北京市朝阳区南湖东园122号博泰国际大厦A座20层）

董事长

中国认可
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.A0104119

CERTIFICATE

QUALITY MANAGEMENT SYSTEM CERTIFICATION

Registration No.02320Q20303R3M

This is to certify that the quality management system of

CHINA ELECTRIC POWER EQUIPMENT AND TECHNOLOGY CO.,LTD.

(Unified Social Credit Code:91110000100015357H)

Address:10F, Ducheng Building, No.8 Nanheng East Street, Xicheng District, Beijing; Zip code:100052

Has been found to conform to Quality Management System Standard:

GB/T19001:2016/ISO9001:2015

The scope of this certificate covers

General Contracting of Power Engineering Project; Consulting and Service of Electric Power Equipment Completion and Integration Technology; Import and Export Trade

Issue Date: 2020-06-26

Validity Date: 2020-06-26 ~ 2023-06-25

In the valid period of administrative license, certificate of qualification, compulsory certification etc. which in accordance with the applicable laws and regulations, and through the routine annual review and qualified, the certificate can remain valid. This certificate validity information can be inquired by scanning the two-dimensional code below, landing our company website www.jccchina.com or Certification and Accreditation Administration of the People's Republic of China website www.cnca.gov.cn.

Beijing Zhong Jian Xie Certification Centre Co., Ltd. (JCC)

Address: 20th Floor Botai International Tower A, 122 Nanhudongyuan, Chaoyang District, Beijing

Chairman of JCC

中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.B0104634

CERTIFICATE

QUALITY MANAGEMENT SYSTEM CERTIFICATION

(copy) Registration No.02320Q20303R3M

This is to certify that the quality management system of

CHINA ELECTRIC POWER EQUIPMENT AND TECHNOLOGY CO.,LTD.

(Unified Social Credit Code:91110000100015357H)

Address:10F, Ducheng Building, No.8 Nanheng East Street, Xicheng District, Beijing; Zip code:100052
Has been found to conform to Quality Management System Standard:

GB/T19001:2016/ISO9001:2015

The scope of this certificate covers

General Contracting of Power Engineering Project; Consulting and Service of Electric Power Equipment Completion and Integration Technology; Import and Export Trade

Issue Date: 2020-06-26

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Address: 20th Floor Botai International Tower A, 122 Nanhudongyuan, Chaoyang District, Beijing

Chairman of JCC

中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.B0104635

CERTIFICATE

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATION

Registration No.02320E20278R3M

This is to certify that the environmental management system of

CHINA ELECTRIC POWER EQUIPMENT AND TECHNOLOGY CO.,LTD.

(Unified Social Credit Code:91110000100015357H)

Address:10F, Ducheng Building, No.8 Nanheng East Street, Xicheng District, Beijing; Zip code:100052

Has been found to conform to Environmental Management System Standard:

GB/T24001-2016/ISO14001:2015

The scope of this certificate covers

Environmental Management Actions Relating to General Contracting of Power Engineering Project; Consulting and Service of Electric Power Equipment Completion and Integration Technology; Import and Export Trade

Issue Date: 2020-06-26

Validity Date: 2020-06-26 ~ 2023-06-25

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Beijing Zhong Jian Xie Certification Centre Co., Ltd. (JCC)

Address: 20th Floor Botai International Tower A, 122 Nanhudongyuan, Chaoyang District, Beijing

Chairman of JCC

中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.B0104636

CERTIFICATE

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATION

(copy) Registration No.02320E20278R3M

This is to certify that the environmental management system of

CHINA ELECTRIC POWER EQUIPMENT AND TECHNOLOGY CO.,LTD.

(Unified Social Credit Code:91110000100015357H)

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Beijing Zhong Jian Xie Certification Centre Co., Ltd. (JCC)

Address: 20th Floor Botai International Tower A, 122 Nanhudongyuan, Chaoyang District, Beijing

Chairman of JCC

中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.B0104637

CERTIFICATE

OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT CERTIFICATION

Registration No.02320S20284R3M

This is to certify that the occupational health and safety management system of

CHINA ELECTRIC POWER EQUIPMENT AND TECHNOLOGY CO.,LTD.

(Unified Social Credit Code:91110000100015357H)

Address:10F, Ducheng Building, No.8 Nanheng East Street, Xicheng District, Beijing; Zip code:100052
Has been found to conform to Occupational Health and Safety Management System Standard:

GB/T45001-2020/ISO45001:2018

The scope of this certificate covers

Occupational Health and Safety Management Actions Relating to General Contracting of Power Engineering Project; Consulting and Service of Electric Power Equipment Completion and Integration Technology; Import and Export Trade

Issue Date: 2020-06-26

Validity Date: 2020-06-26 ~ 2023-06-25

In the valid period of administrative license, certificate of qualification, compulsory certification etc. which in accordance with the applicable laws and regulations, and through the routine annual review and qualified, the certificate can remain valid. This certificate validity information can be inquired by scanning the two-dimensional code below, landing our company website www.jccchina.com or Certification and Accreditation Administration of the People's Republic of China website www.cnca.gov.cn.

Beijing Zhong Jian Xie Certification Centre Co., Ltd. (JCC)
Address: 20th Floor Botai International Tower A, 122 Nanhudongyuan, Chaoyang District, Beijing

Chairman of JCC

中国认可
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.A0104170

CERTIFICATE

OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT CERTIFICATION

(copy) Registration No.02320S20284R3M

This is to certify that the occupational health and safety management system of

CHINA ELECTRIC POWER EQUIPMENT AND TECHNOLOGY CO.,LTD.

(Unified Social Credit Code:91110000100015357H)

Address:10F, Ducheng Building, No.8 Nanheng East Street, Xicheng District, Beijing; Zip code:100052

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GB/T45001-2020/ISO45001:2018

The scope of this certificate covers

Occupational Health and Safety Management Actions Relating to General Contracting of Power Engineering Project; Consulting and Service of Electric Power Equipment Completion and Integration Technology; Import and Export Trade

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Chairman of JCC

中国认可
管理体系
MANAGEMENT SYSTEM
CNAS C023-M

NO.A0104105

Appendix B

Annexure-2

Government of the People's Republic of Bangladesh
Department of Environment
Head Office, E-16 Agargaon
Dhaka-1207, Bangladesh
www.doe.gov.bd

Memo No: 22.02.0000.018.72.055.20. 160 Date: 28/07/2020

Subject: **Environmental Clearance for Dhaka and Western Zone Transmission Grid Expansion Project of Power Grid Company of Bangladesh Ltd. (PGCB).**

Ref: Your Application dated 10/06/2020 and 19/07/2020.

With reference to the above, the Department of Environment (DOE) is pleased to award the Environmental Clearance in favor of the Dhaka and Western Zone Transmission Grid Expansion Project of Power Grid Company of Bangladesh Ltd. (PGCB) subject to fulfilling the following terms and conditions:

1. The activity under this Project shall not result in the loss of containment of any materials that would affect health or will have damaging impact on the environment or natural resources.
2. Proper and adequate sanitation facilities shall be ensured in labor camps throughout the proposed Transmission Pipeline construction program.
3. No solid waste can be burnt in the project area. An environment friendly solid waste management should be in place during whole the period of the project in the field.
4. Proper and adequate on-site precautionary measures and safety measures shall be ensured so that no habitat of any flora and fauna would be demolished or destructed.
5. All the required mitigation measures suggested in the EMP report along with the emergency response plan are to be strictly implemented and kept operative/ functioning on a continuous basis.
6. To reduce dust, spraying of water over the earthen materials should be carried out from time to time.
7. Resettlement plan should be properly implemented and people should be adequately compensated.
8. After the construction work, top soil should be properly restored. No wetland should be filled up.
9. Construction material should be properly disposed off after the construction work is over.
10. As described in the report environmental monitoring should be strictly followed and monitoring report should be shared with DOE to ensure the environmental management properly.
11. At the time of commissioning of the Transmission Pipeline and other facilities utmost precautionary measures should be taken to reduce the possibility of accident.
12. The Environmental Management Plan (EMP) included in the EMP Report shall strictly be implemented and kept functioning on a continuous basis.

13. In case of any emergency, the following information shall immediately be reported to Headquarter of the Department of Environment (DOE) simultaneously
    a) Nature of incident (fire, accident, collision, etc.)
    b) Personnel affected (injured, missing, fatalities, etc.)
    c) Emergency support available and its location (standby transport, medical facilities, etc.)
    d) Weather conditions
    e) Current operations (abandoning the site, fire fighting, etc.)
14. All pollution incidents shall be reported immediately and simultaneously to the nearby Office of the Department of Environment.
15. Full and adequate utilization of the techniques for mitigation of pollution and environmental damage as well as that for treatment of wastes shall be ensured.
16. Power Grid Company of Bangladesh Ltd (PGCB) shall submit a detail work plan with time schedule of development activities at least 7(seven) days ahead of the work commences in the field to Headquarter of the Department of Environment (DOE) simultaneously.
17. On completion of the Transmission Pipeline and other construction, the project authority shall hand-over and leave the land to the actual land-owner in a replenished condition in terms of fertility and topography.
18. Comprehensive Environmental Performance report shall be submitted on a monthly basis to the DOE Headquarter including actual intervention and the rehabilitation, mitigation and treatment options adopted at the project site.
19. All parameters of effluent, gaseous emission, noise, solid waste, hazardous waste, etc. shall be within the limits in the Environment Conservation Rules (ECR) 1997. In case of non-coverage of ECR 1997 the World Bank Environment, Health and Safety Guideline shall be adhered to.
20. There shall be specific format for Environment Monitoring. Environmental Monitoring Reports shall be made available to DOE Head Quarter on a monthly basis during the whole period of the well development project.
21. Rehabilitation of human settlement or compensation for any sort of activity which will incur damage or loss of public or private property or any natural resources shall be addressed as per Government of Bangladesh rules and regulations;
22. No activity of cutting/razing/dressing of hill or hilly land is endorsed under this clearance without due permission/clearance of the concerned authority of the Government of Bangladesh.
23. Appropriate permission would be required to obtain from the forest department in favor of cutting/felling of any plant/tree/sapling forested by any individual or government before doing such type of activity.
24. Power Grid Company of Bangladesh Ltd (PGCB) shall extend active cooperation to DOE officials to facilitate their visit to the site as and when necessary.
25. This clearance is valid only for the said component of Power Grid Company of Bangladesh Ltd (PGCB)as figured out in the EMP report submitted to this department.

26. This clearance is valid for one year from the date of issuance and the project authority shall apply for renewal to the Head Office of DoE with a copy to the divisional/Regional offices of DoE concerned at least 30 days ahead of expiry.

27. Violation of any of the above mentioned conditions shall render this Environmental Clearance as void and legal action will be taken as per Environmental Conservation Act, 1995 and Environmental Conservation Rules, 1997.

28. This Environmental Clearance Certificate has been issued with the approval of the appropriate authority.

28.07.2020

(Syed Nazmul Ahsan)
Director (Environmental Clearance)
Phone # 8181673

Project Director (Chief Engineer)
Dhaka and Western Zone Transmission Grid Expansion Project
Power Grid Company of Bangladesh Ltd (PGCB)
NLDC Bhaban (8th floor), Avenue-3, Jahurul Islam City
Aftabnagar, Badda, Dhaka-1212.

Copy Forwarded to :

1) PS to Secretary, Ministry of Environment, Forest and Climate Change, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Dhaka Regional/ Rajshahi/ Khulna/ Barishal/ Rangpur Divisional Office, Dhaka/ Rajshahi/ Khulna/ Barishal/ Rangpur.
3) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

গণপ্রজাতন্ত্রী বাংলাদেশ
পরিবেশ পরিদপ্তর

Government of the People's Republic of Bangladesh
Department of Environment
Head Office, Paribesh Bhaban
E-16 Agargaon, Dhaka-1207
www.doe.gov.bd

Memo No: 22.02.0000.018.72.055.20 .115 Date: 11/08/2021

Subject: Renewal of Environmental Clearance for Dhaka and Western Zone Transmission Grid Expansion Project of Power Grid Company of Bangladesh Ltd.

Ref: Your Application dated 14/07/2021.

With reference to your above application, the Department of Environment hereby renews the Environmental Clearance Certificate in favor of Dhaka and Western Zone Transmission Grid Expansion Project of Power Grid Company of Bangladesh Ltd. The terms and conditions stated in the Environmental Clearance Certificate of the above project issued on 28/07/2020 vide memo no. 22.02.0000.018.72.055.20.160 shall remain valid for the renewed period.

2. This renewal is valid until 27 July, 2022. An application for further renewal along with a) the renewal fees (as per the ECR, 1997) b) VAT on renewal fees (in separate Treasury Chalan) and c) all associated documents shall be submitted to the Head Office of DoE with a copy to Concerned Regional/Divisional Offices at least 30 days ahead of expiry date.

11.08.2021

(Masud Iqbal Md. Shameem)
Director (Environmental Clearance)
Phone: 8181673

Project Director (Chief Engineer)
Dhaka and Western Zone Transmission Grid Expansion Project
Power Grid Company of Bangladesh Ltd (PGCB)
PGCB Bhaban, Avenue-03, Jahurul Islam City
Aftabnagar, Badda, Dhaka.

Copy Forwarded to:

1) PS to the Hon'ble Secretary, Ministry of Environment, Forest and Climate Change, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Dhaka Regional/Rajshahi/Khulna/Barishal/Rangpur Divisional Office, Dhaka, Bogura, Khulna, Barishal, Rangpur
3) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

শেখ হাসিনার বাংলাদেশ
পরিচ্ছন্ন পরিবেশ

Government of the People's Republic of Bangladesh
Department of Environment
Head Office, Paribesh Bhaban
E-16 Agargaon, Dhaka-1207
www.doe.gov.bd

Memo No: 22.02.0000.018.72.055.20. 132 Date: 14/08/2022

Subject: Renewal of Environmental Clearance for Dhaka and Western Zone Transmission Grid Expansion Project of Power Grid Company of Bangladesh Ltd.

Ref: Your Application dated 04/07/2022.

With reference to your above application, the Department of Environment hereby renews the Environmental Clearance Certificate in favor of Dhaka and Western Zone Transmission Grid Expansion Project of Power Grid Company of Bangladesh Ltd. The terms and conditions stated in the Environmental Clearance Certificate of the above project issued on 28/07/2020 vide memo no. 22.02.0000.018.72.055.20.160 shall remain valid for the renewed period.

2. This renewal is valid until 27 July, 2023. An application for further renewal along with a(the renewal fees (as per the ECR, 1997) b) VAT on renewal fees (in separate Treasury Chalan) and c) all associated documents shall be submitted to the Head Office of DoE with a copy to Concerned Regional/Divisional Offices at least 30 days ahead of expiry date.

14.08.22

(Masud Iqbal Md. Shameem)
Director (Environmental Clearance)
Phone: 8181673

Project Director (Chief Engineer)
Dhaka and Western Zone Transmission Grid Expansion Project
Power Grid Company of Bangladesh Ltd (PGCB)
PGCB Bhaban, Avenue-03, Jahurul Islam City
Aftabnagar, Badda, Dhaka.

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1) PS to the Hon'ble Secretary, Ministry of Environment, Forest and Climate Change, Bangladesh Secretariat, Dhaka.
2) Director, Dhaka Regional/Rajshahi/Khulna/Barishal/Rangpur Divisional Office, Department of Environment.
3) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

Appendix B

একই তারিখ ও স্মারকে স্থলাভিষিক্ত
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
পরিকল্পনা বিভাগ
এনইসি-একনেক ও সমন্বয় অনুবিভাগ
একনেক শাখা-১
শেরে বাংলা নগর, ঢাকা।

অতি জরুরি
বিশেষ বাহক মারফত

স্মারক : ২০.০০.০০০০.৪১১.১৪.১১৯.১৯-৩৯৪

তারিখ: ১৫.১২.২০১৯

বিষয় : একনেক কর্তৃক অনুমোদিত "ঢাকা এবং পশ্চিমাঞ্চলীয় গ্রীড সঞ্চালন ব্যবস্থা সম্প্রসারণ" শীর্ষক প্রকল্প অনুমোদন।

সূত্র : একনেক সভার কার্যবিবরণী নং- ২০.০০.০০০০.৪১২.০৬.০২৭.১৯-১০৪, তাং ১০.১২.২০১৯

উপর্যুক্ত বিষয় ও সূত্রের পরিপ্রেক্ষিতে নির্দেশক্রমে জানানো যাচ্ছে যে, "ঢাকা এবং পশ্চিমাঞ্চলীয় গ্রীড সঞ্চালন ব্যবস্থা সম্প্রসারণ" শীর্ষক প্রকল্পটি গত ২৬.১১.২০১৯ তারিখে অনুষ্ঠিত একনেক সভায় অনুমোদিত হয়। প্রকল্পটির মোট প্রাক্কলিত ব্যয় ৫৯৪৯৯৫.২৩ লক্ষ (পাঁচ হাজার নয়শত উনপঞ্চাশ কোটি পচানব্বই লক্ষ তেইশ হাজার টাকা) টাকা। প্রকল্পটি জিওবি ১৪১৫৯৫.৯৬ লক্ষ (এক হাজার চারশত পনের কোটি পচানব্বই লক্ষ ছেয়ানব্বই হাজার) এবং প্রকল্প ঋণ (এডিবি ও এআইআইবি) ৪২১২৩০.৪১ লক্ষ (চার হাজার দুই শত বার কোটি ত্রিশ লক্ষ একচল্লিশ হাজার) এবং সংস্থান নিজস্ব অর্থায়ন (পিজিসিবি) ৩২১৬৮.৮৬ লক্ষ টাকা (তিন শত একুশ কোটি আটষট্টি লক্ষ ছেয়াশি হাজার) অর্থায়নে বাস্তবায়িত হবে।

২। প্রকল্পটির অনুমোদিত বাস্তবায়ন মেয়াদকাল ০১ অক্টোম্বর ২০১৯ হতে ৩০ জুন ২০২৪।

৩। প্রকল্পটির অনুমোদিত অঙ্গ ও অঙ্গভিত্তিক বিস্তারিত ব্যয় বিভাজন নিম্নরূপ: (লক্ষ টাকায়)

ক্রঃনং	অঙ্গের নাম	সংখ্যা/ পরিমাণ	জিওবি	পিজিসিবি	প্রকল্প ঋণ	মোট ব্যয়
(ক) রাজস্ব ব্যয় :						
১.	কর্মকর্তাদের বেতন	৮২ জন	০.০০	২৪৯১.৪৬	০.০০	২৪৯১.৪৬
২.	কর্মচারীদের বেতন	৫ জন	০.০০	৭১.০১	০.০০	৭১.০১
৩.	যাতায়াত ভাতা	৭৭ জন	০.০০	১৬৪.৭৩	০.০০	১৬৪.৭৩
৪.	দৈনিক ভাতা	৮১ জন	০.০০	৫৩৮.৯৭	০.০০	৫৩৮.৯৭
৫.	বাড়িভাড়া ভাতা	৮৭ জন	০.০০	১৫৩৭.৪৮	০.০০	১৫৩৭.৪৮
৬.	চিকিৎসা ভাতা	৮৭ জন	০.০০	৯২.৬৮	০.০০	৯২.৬৮
৭.	মোবাইল/সেল ফোন ভাতা	৪০ জন	০.০০	২৯.৩৬	০.০০	২৯.৩৬
৮.	টিফিন ভাতা	৭৪ জন	০.০০	১৬.৮৭	০.০০	১৬.৮৭
৯.	উৎসব ভাতা	৮৭ জন	০.০০	৪৬৯.৭৯	০.০০	৪৬৯.৭৯
১০.	ওভারটাইম	থোক	০.০০	৪৭.৫২	০.০০	৪৭.৫২
১১.	অন্যান্য ভাতা	৮৭ জন	০.০০	৩৮৮.০৮	০.০০	৩৮৮.০৮
১২.	পরিস্কার পরিচ্ছন্নতা	১৭১ জনমাস	০.০০	২৯.০৭	০.০০	২৯.০৭
১৩.	ক্ষতিপূরণ	৪০৮ কিঃমিঃ	৪৪১৬.৩২	০.০০	০.০০	৪৪১৬.৩২
১৪.	হায়ারিং চার্জ	৩৪২ জন	০.০০	৬২৯.৮৫	০.০০	৬২৯.৮৫
১৫.	ভাড়া-অফিস	৫৭ মাস	০.০০	২৮.৫০	০.০০	২৮.৫০
১৬.	রেজিস্ট্রেশন ফি	১৮ টি	০.০০	৯.০০	০.০০	৯.০০
১৭.	টেস্টিং ফি	৪০৮ কিঃমিঃ	০.০০	০.০০	১৭৫.৮০	১৭৫.৮০
১৮.	ব্যাংক চার্জ	থোক	০.০০	২৮৬.৪৯	০.০০	২৮৬.৪৯
১৯.	অভ্যন্তরীণ ভ্রমণ ব্যয়	থোক	০.০০	৬০.৭০	০.০০	৬০.৭০
২০.	গ্যাস ও জ্বালানি	থোক	০.০০	১২৬.৪৬	০.০০	১২৬.৪৬
২১.	নিরাপত্তা প্রহরী	৪৫৬ জনমাস	০.০০	৬৮.৪০	০.০০	৬৮.৪০
২২.	কম্পিউটার	থোক	০.০০	২৭.৩৬	০.০০	২৭.৩৬
২৩.	অন্যান্য স্টেশনারী	থোক	০.০০	১৯.৫৪	০.০০	১৯.৫৪
২৪.	পরামর্শক	থোক	০.০০	০.০০	৫৯৩.৬১	৫৯৩.৬১
২৫.	সার্ভে	৪০৮ কিঃমিঃ	০.০০	০.০০	১৭৪.০১	১৭৪.০১
২৬.	সম্মানী ভাতা/ফি/ পারিশ্রমিক	থোক	০.০০	১৮.৬২	০.০০	১৮.৬২
২৭.	মটর যানবাহন মেরামত	থোক	০.০০	৩৬.২৭	০.০০	৩৬.২৭
২৮.	কাস্টম ডিউটি	থোক	৫২৬৪৫.৭৯	০.০০	০.০০	৫২৬৪৫.৭৯
২৯.	ভ্যাট	থোক	৬৫১১৭.৮২	০.০০	০.০০	৬৫১১৭.৮২
৩০.	ভ্যাট (অন্যান্য ট্যাক্স/ভ্যাট)	থোক	০.০০	৬২৬৩.৯৭	০.০০	৬২৬৩.৯৭
৩১.	মোটর যান বীমা	১৮ টি	০.০০	২৮.৭১	০.০০	২৮.৭১

ক্রঃনং	অঙ্গের নাম	সংখ্যা/ পরিমাণ	জিওবি	পিজিসিবি	প্রকল্প ঋণ	মোট ব্যয়
৩২.	আইডিসি	থোক	০.০০	১৫২১০.৩৪	২৩৫২৫.১৯	৩৮৭৩৫.৫৩
	উপ-মোট (রাজস্ব ব্যয়) (ক):	-	**১২২১৭৯.৯৩**	**২৮৬৯১.২৪**	**২৪৪৬৮.৬১**	**১৭৫৩৩৯.৭৭**
(খ) মূলধন ব্যয় :						
৩৩.	আবাসিক ভবন	থোক	০.০০	১৯৬২.০০	০.০০	১৯৬২.০০
৩৪.	অনাবাসিক ভবন	থোক	০.০০	০.০০	২৭৪১১.৫৬	২৭৪১১.৫৬
৩৫.	ভূমি উন্নয়ন	থোক	০.০০	০.০০	৮৫০৭.৭৩	৮৫০৭.৭৩
৩৬.	বৈদ্যুতিক স্থাপনা	থোক	০.০০	০.০০	৫৮৬৯৩.৪৯	৫৮৬৯৩.৪৯
৩৭.	মটর যান ক্রয়	১৮টি (জীপ-৩টি, মোটরসাইকেল-১৫টি)	০.০০	২৩৭.৯০	০.০০	২৩৭.৯০
৩৮.	বৈদ্যুতিক সরঞ্জাম	থোক	০.০০	০.০০	২৮০৫৭০.২১	২৮০৫৭০.২১
৩৯.	অফিস সরঞ্জাম	১ লট	০.০০	২৫.৮৫	০.০০	২৫.৮৫
৪০.	আসবাবপত্র	১ লট	০.০০	১৪.৬০	০.০০	১৪.৬০
৪১.	কম্পিউটার সফট্ওয়ার	১ লট	০.০০	০.০০	৫৩৭৭.৬৫	৫৩৭৭.৬৫
৪২.	ভূমি অধিগ্রহণ	৮০.৯২ একর	১৩৯৭০.০৩	০.০০	০.০০	১৩৯৭০.০৩
৪৩.	**উপ-মোট (মূলধন ব্যয়) (খ):**	-	**১৩৯৭০.০৩**	**২২৪০.৩৫**	**৩৮০৫৬০.৬৩**	**৩৯৬৭৭১.০২**
(গ)	ফিজিক্যাল কনটিনেজেন্সী ২%	থোক	২৭২৩.০০	৬১৮.৬৩	৮১০০.৫৮	১১৪৪২.২২
(ঘ)	প্রাইস কনটিনেজেন্সী ২%	থোক	২৭২৩.০০	৬১৮.৬৩	৮১০০.৫৮	১১৪৪২.২২
	সর্বমোট (ক+খ+গ+ঘ):	-	**১৪১৫৯৫.৯৬**	**৩২১৬৮.৮৬**	**৪২১২৩০.৪১**	**৫৯৪৯৯৫.২৩**

৪। অনুমোদিত ডিপিপি'র (প্রত্যেক পাতায় স্বাক্ষরিত) এক প্রস্থ এতদসঙ্গে পরবর্তী ব্যবস্থা গ্রহণের জন্য সংযোজিত হল।

৫। দ্রুততার সাথে প্রকল্প বাস্তবায়নের কাজ শুরু করতে হবে এবং নির্ধারিত সময়ের মধ্যে প্রকল্পের বাস্তবায়ন সম্পন্ন করার লক্ষ্যে প্রয়োজনীয় উদ্যোগ গ্রহণ করতে হবে।

Tahmina
১৬/১২/১৯

(তাহমিনা তাছলীম)
সিনিয়র সহকারী প্রধান
ফোন: ৯১৮০৮৮৩

সিনিয়র সচিব
বিদ্যুৎ বিভাগ
বিদ্যুৎ, জ্বালানি ও খনিজ সম্পদ মন্ত্রণালয়
বাংলাদেশ সচিবালয়, ঢাকা।

স্মারক : ২০.০০.০০০০.৪১১.১৪.১১৯.১৯-

তারিখ: ১৫.১২.২০১৯

সদয় অবগতি ও প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য অনুলিপি (জ্যেষ্ঠতার ক্রমানুসারে নয়) :

১। সদস্য (সিনিয়র সচিব), সাধারণ অর্থনীতি বিভাগ, পরিকল্পনা কমিশন, শেরে বাংলা নগর, ঢাকা।
২। সদস্য, কার্যক্রম বিভাগ, পরিকল্পনা কমিশন, শেরে বাংলা নগর, ঢাকা।
৩। সদস্য, শিল্প ও শক্তি বিভাগ, পরিকল্পনা কমিশন, শেরে বাংলা নগর, ঢাকা।
৪। সচিব, জনপ্রশাসন মন্ত্রণালয়, বাংলাদেশ সচিবালয়, ঢাকা।
৫। সচিব, অর্থনৈতিক সম্পর্ক বিভাগ, অর্থ মন্ত্রণালয়, শেরে বাংলা নগর, ঢাকা।
৬। সচিব, অর্থ বিভাগ, বাংলাদেশ সচিবালয়, ঢাকা।
৭। সচিব, বাস্তবায়ন পরিবীক্ষণ ও মূল্যায়ন বিভাগ, শেরে বাংলা নগর, ঢাকা।
৮। প্রধান, শিল্প ও শক্তি বিভাগ, পরিকল্পনা কমিশন, শেরে বাংলা নগর, ঢাকা।

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
বিদ্যুৎ, জ্বালানি ও খনিজ সম্পদ মন্ত্রণালয়
বিদ্যুৎ বিভাগ, পরিকল্পনা শাখা-৩
www.powerdivision.gov.bd

নথি নং -২৭.০০.০০০০.০৮৩.০১৪.০০১.১৯-১২

তারিখ: ২৩ পৌষ ১৪২৬ বঙ্গাব্দ
০৭ জানুয়ারি ২০২০ খ্রিস্টাব্দ

প্রেরক: সাইয়েদা ফয়জুন্নেছা
সিনিয়র সহকারী প্রধান
বিদ্যুৎ বিভাগ, বিদ্যুৎ ভবন, ঢাকা।

প্রাপক: প্রধান হিসাবরক্ষণ কর্মকর্তা
বিদ্যুৎ বিভাগ, সিজিএ ভবন (৫ম তলা)
সেগুনবাগিচা, ঢাকা-১০০০।

বিষয়ঃ "ঢাকা এবং পশ্চিমাঞ্চলীয় গ্রীড সঞ্চালন ব্যবস্থা সম্প্রসারণ" শীর্ষক অনুমোদিত প্রকল্পের প্রশাসনিক আদেশ।

সূত্রঃ পরিকল্পনা বিভাগের এনইসি-একনেক ও সমন্বয় অনুবিভাগের অনুমোদনপত্র নং-২০.০০.০০০০.৪১১.১৪.১১৯.১৯-৩৯৪, তারিখঃ ২৫ ডিসেম্বর ২০১৯।

আমি, নিম্নস্বাক্ষরকারী নির্দেশক্রমে পাওয়ার গ্রীড কোম্পানি অব বাংলাদেশ লিঃ (পিজিসিবি) কর্তৃক বাস্তবায়নধীন "ঢাকা এবং পশ্চিমাঞ্চলীয় গ্রীড সঞ্চালন ব্যবস্থা সম্প্রসারণ" শীর্ষক অনুমোদিত প্রকল্পের প্রশাসনিক অনুমোদন জ্ঞাপন করছি। প্রকল্পটির অনুমোদিত মোট ব্যয় ৫৯৪৯৯৫.২৩ লক্ষ (পাঁচ হাজার নয় শত উনপঞ্চাশ কোটি পঁচানব্বই লক্ষ তেইশ হাজার) টাকা। এর মধ্যে জিওবি ১৪১৫৯৫.৯৬ লক্ষ (এক হাজার চারশত পনের কোটি পঁচানব্বই লক্ষ ছেয়ানব্বই হাজার) টাকা, প্রকল্প সাহায্য ৪২১২৩০.৪১ লক্ষ (চার হাজার দুই শত বার কোটি ত্রিশ লক্ষ একচল্লিশ হাজার) টাকা এবং পিজিসিবি'র নিজস্ব অর্থায়ন ৩২১৬৮.৮৬ লক্ষ (তিন শত একুশ কোটি আটষট্টি লক্ষ ছেয়াশি হাজার) টাকা।

২। প্রকল্পটির অনুমোদিত বাস্তবায়ন মেয়াদ ০১ অক্টোবর ২০১৯ হতে ৩০ জুন ২০২৪ পর্যন্ত।

৩। প্রকল্পটির অনুমোদিত অঙ্গ ও অঙ্গভিত্তিক বিস্তারিত ব্যয় বিভাজন নিম্নরূপঃ (লক্ষ টাকায়)

ইকনোমিক কোড/সাবকোড	অঙ্গের বিবরণ	সংখ্যা/ পরিমাণ	জিওবি	পিজিসিবি	প্রকল্প সাহায্য	মোট ব্যয়
(ক) রাজস্ব ব্যয়ঃ						
৩১১১১০১	কর্মকর্তাদের বেতন	৮২ জন	০.০০	২৪৯১.৪৬	০.০০	২৪৯১.৪৬
৩১১১২০১	কর্মচারীদের বেতন	৫ জন	০.০০	৭১.০১	০.০০	৭১.০১
৩১১১৩০২	যাতায়াত ভাতা	৭৭ জন	০.০০	১৬৪.৭৩	০.০০	১৬৪.৭৩
৩১১১৩০৩	দৈনিক ভাতা	৮১ জন	০.০০	৫৩৮.৯৭	০.০০	৫৩৮.৯৭
৩১১১৩১০	বাড়িভাড়া ভাতা	৮৭ জন	০.০০	১৫৩৭.৪৮	০.০০	১৫৩৭.৪৮
৩১১১৩১১	চিকিৎসা ভাতা	৮৭ জন	০.০০	৯২.৬৮	০.০০	৯২.৬৮
৩১১১৩১২	মোবাইল/সেল ফোন ভাতা	৪০ জন	০.০০	২৯.৩৬	০.০০	২৯.৩৬
৩১১১৩১৪	টিফিন ভাতা	৭৪ জন	০.০০	১৬.৮৭	০.০০	১৬.৮৭
৩১১১৩২৫	উৎসব ভাতা	৮৭ জন	০.০০	৪৬৯.৭৯	০.০০	৪৬৯.৭৯
৩১১১৩২৭	ওভারটাইম ভাতা	থোক	০.০০	৪৭.৫২	০.০০	৪৭.৫২
৩১১১৩৩৮	অন্যান্য ভাতা	৮৭ জন	০.০০	৩৮৮.০৮	০.০০	৩৮৮.০৮
৩২১১১০২	পরিস্কার পরিচ্ছন্নতা	১৭১ জনমাস	০.০০	২৯.০৭	০.০০	২৯.০৭
৩২১১১০৩	ক্ষতিপূরণ	৪০৮ কি.মি.	৪৪১৬.৩২	০.০০	০.০০	৪৪১৬.৩২
৩২১১১০৭	হায়ারিং চার্জ	৩৪২ জনমাস	০.০০	৬২৯.৮৫	০.০০	৬২৯.৮৫
৩২১১১২৯	ভাড়া অফিস	৫৭ জনমাস	০.০০	২৮.৫০	০.০০	২৮.৫০
৩২২১১০৪	রেজিস্ট্রেশন ফি	১৮ টি	০.০০	৯.০০	০.০০	৯.০০
৩২২১১০৫	টেস্টিং ফি	৪০৮ কি.মি.	০.০০	০.০০	১৭৫.৮০	১৭৫.৮০
৩২২১১০৮	ব্যাংক চার্জ	থোক	০.০০	২৮৬.৪৯	০.০০	২৮৬.৪৯
৩২৪১১০১	অভ্যন্তরীণ ভ্রমণ ব্যয়	থোক	০.০০	৬০.৭০	০.০০	৬০.৭০

চলমান পাতা #২

ইকনোমিক কোড/সাবকোড	অঙ্গের বিবরণ	সংখ্যা/ পরিমাণ	জিওবি	পিজিসিবি	প্রকল্প সাহায্য	মোট ব্যয়
৩২৪৩১০২	গ্যাস ও জ্বালানি	থোক	০.০০	১২৬.৪৬	০.০০	১২৬.৪৬
৩২৫৩১০৩	নিরাপত্তা প্রহরী	৪৫৬ জনমাস	০.০০	৬৮.৪০	০.০০	৬৮.৪০
৩২৫৫১০১	কম্পিউটার	থোক	০.০০	২৭.৩৬	০.০০	২৭.৩৬
৩২৫৫১০৫	অন্যান্য স্টেশনারী	থোক	০.০০	১৯.৫৪	০.০০	১৯.৫৪
৩২৫৭১০১	পরামর্শক	থোক	০.০০	০.০০	৫৯৩.৬১	৫৯৩.৬১
৩২৫৭১০৪	সার্ভে	৪০৮ কি.মি.	০.০০	০.০০	১৭৪.০১	১৭৪.০১
৩২৫৭২০৬	সম্মানী ভাতা/ফি/ পারিশ্রমিক	থোক	০.০০	১৮.৬২	০.০০	১৮.৬২
৩২৫৮১০১	মটর যানবাহন মেরামত	থোক	০.০০	৩৬.২৭	০.০০	৩৬.২৭
৩৮২১১০১	কাস্টম ডিউটি	থোক	৫২৬৪৫.৭৯	০.০০	০.০০	৫২৬৪৫.৭৯
৩৮২১১০৪	ভ্যাট	থোক	৬৫১১৭.৮২	০.০০	০.০০	৬৫১১৭.৮২
৩৮২১১০৪	ভ্যাট (অন্যান্য ভ্যাট/ট্যাক্স)	থোক	০.০০	৬২৬৩.৯৭	০.০০	৬২৬৩.৯৭
৩৮২১১১৬	মোটরযান বীমা	১৮	০.০০	২৮.৭১	০.০০	২৮.৭১
৩৯১১১১১	আইডিসি	থোক	০.০০	১৫২১০.৩৪	২৩৫২৫.১৯	৩৮৭৩৫.৫৩
	উপ-মোট (রাজস্ব ব্যয়):		১২২১৭৯.৯৩	২৮৬৯১.২৪	২৪৪৬৮.৬০	১৭৫৩৩৯.৭৭
(খ) মূলধন ব্যয় :						
৪১১১১০১	আবাসিক ভবন	থোক	০.০০	১৯৬২.০০	০.০০	১৯৬২.০০
৪১১১২০১	অনাবাসিক ভবন	থোক	০.০০	০.০০	২৭৪১১.৫৬	২৭৪১১.৫৬
৪১১১৪০১	ভূমি উন্নয়ন	থোক	০.০০	০.০০	৮৫০৭.৭৩	৮৫০৭.৭৩
৪১১২৩১৮	বৈদ্যুতিক স্থাপনা	থোক	০.০০	০.০০	৫৮৬৯৩.৪৯	৫৮৬৯৩.৪৯
৪১১২১০১	মোটরযান ক্রয়	১৮ টি(জীপ-৩টি, মটরসাইকেল-১৫টি)	০.০০	২৩৭.৯০	০.০০	২৩৭.৯০
৪১১২৩০৩	বৈদ্যুতিক সরঞ্জাম	থোক	০.০০	০.০০	২৮০৫৭০.২১	২৮০৫৭০.২১
৪১১২৩১০	অফিস সরঞ্জাম	১ লট	০.০০	২৫.৮৫	০.০০	২৫.৮৫
৪১১২৩১৪	আসবাবপত্র	১ লট	০.০০	১৪.৬০	০.০০	১৪.৬০
৪১১৩৩০১	কম্পিউটার সফটওয়ার	১ লট	০.০০	০.০০	৫৩৭৭.৬৫	৫৩৭৭.৬৫
৪১৪১১০১	ভূমি অধিগ্রহণ	৮০৯২ একর	১৩৯৭০.০৩	০.০০	০.০০	১৩৯৭০.০৩
	উপ-মোট (মূলধন ব্যয়):	-	১৩৯৭০.০৩	২২৪০.৩৫	৩৮০৫৬০.৬৪	৩৯৬৭৭১.০২
	ফিজিক্যাল কন্টিনজেন্সি ২%	থোক	২৭২৩.০০	৬১৮.৬৩	৮১০০.৫৮	১১৪৪২.২২
	প্রাইজ কন্টিনজেন্সি ২%	থোক	২৭২৩.০০	৬১৮.৬৩	৮১০০.৫৮	১১৪৪২.২২
	সর্বমোট (ক+খ+গ+ঘ)		১৪১৫৯৫.৯৬	৩২১৬৮.৮৬	৪২১২৩০.৪১	৫৯৪৯৯৫.২৩

৪। অনুমোদিত ডিপিপি'র (প্রত্যেক পাতায় স্বাক্ষরিত) এক প্রস্থ এতদসঙ্গে পরবর্তী ব্যবস্থা গ্রহণের জন্য সংযোজিত হলো।

সংযুক্তিঃ বর্ণনামতে।

(সাইয়েদা ফারজুন্নেহা) 07/07/2020
সিনিয়র সহকারী প্রধান
ফোন-৯৫৫৮৮৬৭

সদয় অবগতি ও প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য অনুলিপি (জ্যেষ্ঠতার ক্রমানুসারে নয়):

০১। সদস্য, সাধারণ অর্থনীতি বিভাগ, পরিকল্পনা কমিশন, শেরে বাংলা নগর, ঢাকা।
০২। সদস্য, শিল্প ও শক্তি বিভাগ, পরিকল্পনা কমিশন, শেরে বাংলা নগর,ঢাকা।
০৩। সচিব, জনপ্রশাসন মন্ত্রণালয়, বাংলাদেশ সচিবালয়, ঢাকা।
০৪। সচিব, অর্থনৈতিক সম্পর্ক বিভাগ, শেরে বাংলা নগর, ঢাকা।
০৫। সচিব, অর্থ বিভাগ, অর্থ মন্ত্রণালয়, বাংলাদেশ সচিবালয়, ঢাকা।
০৬। সদস্য, কার্যক্রম বিভাগ, পরিকল্পনা কমিশন শেরে বাংলা নগর,ঢাকা।
০৭। সচিব, আইএমইডি, পরিকল্পনা মন্ত্রণালয়, শেরে বাংলা নগর, ঢাকা।
০৮। ব্যবস্থাপনা পরিচালক, পাওয়ার গ্রীড কোম্পানি অব বাংলাদেশ লিঃ (পিজিসিবি), আফতাব নগর, ঢাকা।

সদয় অবগতির জন্য অনুলিপি :

১। অতিরিক্ত সচিব (উন্নয়ন), বিদ্যুৎ বিভাগ, বাংলাদেশ সচিবালয়, ঢাকা।
২। মাননীয় প্রতিমন্ত্রীর একান্ত সচিব, বিদ্যুৎ, জ্বালানি ও খনিজ সম্পদ মন্ত্রণালয়, বাংলাদেশ সচিবালয়, ঢাকা।
৩। সচিব মহোদয়ের একান্ত সচিব, বিদ্যুৎ বিভাগ, বাংলাদেশ সচিবালয়, ঢাকা।

Power Grid Company of Bangladesh Ltd.
Head Office: Avenue-3, Juhurul Islam City,
Aftabnagor, Badda, Dhaka-1212.
Website: www.pgcb.gov.bd
Dhaka & Western Zone Transmission Grid
Expansion Project

Record Number: 27.21.0000.453.14.05.22.230 Date: 26/2/2023
Subject: **Comments on the Submitted CESMP**
Reference: CET/PGCB/P5/2023/007; Date: 05/02/2023

Project: Design, Supply, Installation, Testing & Commissioning of 400/230 kV GIS Substation at Kaliganj on Turnkey Basis
(Contract No. PGCB/ADB/L3853/AIIB/L8374/DWZTGEP/GIS/P5;Date:03/11/2022)

Dear Sir,

The Construction Environment and Social Management Plan (CESMP) submitted vide letter referred above has been reviewed by the competent authority of PGCB and necessary comments have been enclosed herewith. It is to be noted that a lot of unnecessary and irrelevant issues have been incorporated in the CESMP which have been pointed out in the attached comments and need to be revised properly.

Therefore, you are requested to submit the revised CESMP at the earliest.

26.02.2023
Md. Abul Kashem
Project Director (Chief Engineer)
Email: pd.dwztgep@pgcb.gov.bd

General Project Manager
China Electric Power Equipment and Technology Co., Ltd.

Record Number: 27.21.0000.453.14.05.22.230/1(4) Date: 26/2/2023

Copy to (not in accordance to seniority):

Appendix C: Environmental Code of Practices

Number	Items	Environmental code of practices
ECOP 01:	Project Planning and Design for construction of 400 kV SS	Proposed lines designs used for environmental assessment purposes must include, for each section of each alternative locations, the specific information essential to determining potential environmental impacts, including area of substation, types of electrical equipment, and area of substation. Most of impacts diminish for proper design of substation. Land use changes, Public Health (EMF), wildlife, forest, wetland and riparian impacts are the common for the long live for the substation project. Some impacts are seen during the construction substation project. Hydrologic changes, soil erosion, health, & safety, resettlement impacts. The environmental code of practice on design to be needed all potential impacts are mitigated for the construction of new substation project. The design of substation is approved by PGCB and site clearance has already given by DOE, BD after submitting IEE (June 2019)
	Impacts	Any wrong design of substation, all of the adverse impacts will be seen during the construction and operation period of substation project. Even substation locations must have an alternative site, otherwise, it may affect to the surrounding environment
	Mitigation measure	Proper design of substation at the fixed location may have mitigated all of the adverse impacts. Biodiversity resettlement, public health for EMF, wildlife (bird) will be mitigated through proper design of substation project
ECOP 02	Location Selection	The location of substation will need to be selected for minimizing the impact of existing environment and underground utilities paralleling. substation will be selected location must be mapped and identified in detail to have a smooth proceedings during coordination with other involved parties, may it be utilities, government agencies, owners, etc. This very important during acquisition of rights of way and application of necessary permits. Power grid company Bangladesh Ltd has taken permission from DOE as site clearance of the project and forest department and has bought land from land owners through appropriate way. However, any alternation and addition of substation, China Electric Power Equipment and Technology Co., Ltd will take permission from PGCB.
	Impacts	Substation location will be 400-500 meter far away from existing house hold which would negatively impact the land HHs
	Mitigation measure	PGCB will be given solution for this existing situation for the location of substation project.
ECOP-03	Tower in	Power transformers & control building is the key component for the substation project

	substation yard, transformers & control building,	
	Impacts	During the erection small towers, health & safety impacts, incidental/accident impacts might be happened. EMF will be affected from transformers. The higher EMF issues may have health effect to local people, flora and wild life.
	Mitigation measure	Proper PPE including safety belt and work permit for erection small towers are the mitigation measure of such erection. De-shielding of EMF should be done by the appropriate design and location of transformer position in the substation yard
ECOP-04	Power Cable Installation at substation	Power Cable Installation onto the erected towers or through cable trench, accessories manually or using equipment.
	Impacts	Accident at tower site due to falling of accessory, snapping of earthwire of incorrect tensioning etc. Impact on safety of workers due to lack of PPEs.
	Mitigation measure	Adequate amount of PPEs will be kept at the workplace of power cable installation. Training on work at height will be given before started work and safety protocols for earthing, accessories, and installation of small towers. Proper tension maintained between the tensioner and the puller keeps the conductor clear of the ground and other obstructions that could cause damage.
ECOP-05	Construction Camps	Camp will be made at the new substation yard of Kaliganj. The worker camps mainly migratory in nature and away from local populations.
	Impacts	Health & safety impact, dangerous species and wildlife
	Mitigation measure	China Electric Power Equipment and Technology Co., Ltd will supply pure drinking water, kept carbolic acid at the camp to remove of snake and make temporary boundary wall around the camp and worksite area. Provision of adequate washing and toilet facilities to the workers should be made obligatory by the China Electric Power Equipment and Technology Co., Ltd
ECOP-06	Waste Management	In the new substation project, solid waste, liquid and gaseous will be generated from the construction site of substation yard. Liquid waste (waste water) may be generated from pilling site of tower location. Gaseous waste (pollutants) may be generated from diesel engines, silencer pipe of vehicle's exhaust. Dust including, PM10, PM2.5 may be generated from work side due to

		digging soil at the substation site. Solid waste included sludge will be made during pilling site from project area.
	Impacts	Air pollution, soil contamination soil erection may have seen as wastage impacts to the surrounding environment.
	Mitigation measure	Solid waste will kept in boxes as per color code and sold it approved vendors (DOE approved) for further 3R policy. Sludge management will be in proper way as per guideline of department of environment (DOE) , February 2015. Spraying water to the substation yard to mitigate the dust including SPM, PM2.5 and PM10
ECOP-07	Water Bodies	Water body may have near the substation site. The construction activities of substation may be polluted this water body
	Impacts	Soil erection, water pollution and water-flora impacts may be seen
	Mitigation measure	China Electric Power Equipment and Technology Co., Ltd will not discharge any liquid, solid waste from the SS site to the water body during the period of the construction of substation project.
ECOP-08	Electromagnetic Field	The effect of electromagnetic field (EMF) may be disturbance to local community and flora & fauna. Electromagnetic radiations emitting from electrical equipment from substation which can cause childhood leukemia. According to the research of the World Health Organization, we can suffer from insomnia, anxiety, headache, skin burns, fatigue, and muscle pain because of radiations from high voltage (400/230 kV) substation. If such conditions really do occur, then electromagnetic radiations can be prevented from entering the human body by providing adequate shielding using metal. Things like buildings, trees, etc. can also serve as shielding for this purpose. In this way, we can reduce the health hazards caused by these dangerous radiations.
	Impacts	Health hazards
	Mitigation measure	EMF will be measured before and after construction of 400/230/132 substation projects. Any deviation from the two levels (before and after) will be take initiative for de-shielding to new construction of substation area.
ECOP-09	Public Health and Safety	Sometimes due to any fault or other factors electricity from substation can flow to ground through the equipment or a person near the project site HHs and APs. It can cause serious injuries or death to that person.
	Impacts	Health hazards

	Mitigation measure	Awareness program and public consultation may the mitigation measure of Public Health and Safety from the substation construction project.
ECOP-10	Material Storage, Transport & Handling,	Material Storage, Transport, & Handling are closely related to the substation construction project.
	Impacts	Fire incidence , traffic impacts
	Mitigation measure	China Electric Power Equipment and Technology Co., Ltd will keep fire extinguishers, sand bucket at the substation project material storage area and traffic will be controlled by labour or store security personnel. Traffic materials will be kept at the material storage areas, road crossing area, and especially high-way crossing areas
ECOP-11	Cutting/trimming of Trees	Tree trimming should be done under the direct supervision of an arborist or an experienced individual trained in the proper procedures for performing this work. Hazards commonly associated with tree trimming include falls, electrocution, sharp objects, and struck-by at substation before land filling
	Impacts	Possible loss of biodiversity, and interference with public utilities.
	Mitigation measure	Do not attempt to trim or climb trees during inclement or windy weather. Tree plantation will be the next steps of mitigation measure for tree removed at the substation site before construction. About 50 trees will be planted at the substation area.
ECOP-12	Biodiversity	Changes to habitat composition will also change habitat quality for plants and animals which can have a positive, negative, or neutral effect depending on the species at the substation site.
	Impacts	Lose of flora and fauna
	Mitigation measure	China Electric Power Equipment and Technology Co., Ltd will be cut and cleaning minimum of flora at the substation site
ECOP-13	Natural Habitats	While the mixture of habitats created which can allow greater density and diversity of wildlife to be present at substation. This project may also produce a negative edge effect for some species which require large, undisturbed habitat. The owl is one example of a raptor dependent on old growth forest that is negatively affected by fragmentation. Woodland caribou, which require large tracts of relatively undisturbed habitat may also be negatively affected by any habitat fragmentation effects caused by the substation project

	Impacts	Loss of Avian
	Mitigation measure	The activities of substation construction do not disturb the adjacent fauna which will be mitigation measure for natural habitats.
ECOP-14	Occupational Health and safety	Falling from height due to slips and trips from work on height at the substation project
	Impacts	Health & safety impacts
	Mitigation measure	Only exclusive trained and qualified workers will be climbed up to the tower. First aid box, tool box to talk and wear proper PPE which will be ensured by China Electric Power Equipment and Technology Co., Ltd
ECOP-15	Community Health and safety	Community Health and Safety items include public health and safety concerns that may affect labours, stakeholders during construction activities of substation, and may also impact time away from work. Health and safety, and prevent disease and promote healthy and safe living are included in community health of the project.
	Impacts	Health hazard
	Mitigation measure	Awareness, safe drinking water, musk & hand washing for COVID19

Appendix D

Annexure-1

পাওয়ার গ্রিড কোম্পানি অব বাংলাদেশ লিঃ
POWER GRID COMPANY OF BANGLADESH LTD.
(An Enterprise of Bangladesh Power Development Board)

Ref. No.:27.21.0000.453.06.001.21.122 Date: 04/03/2021

Office Order

As per approval of PGCB management a Grievance Redress Committee for "Dhaka & Western Zone Transmission Grid Expansion Project" has been formed by following members:

Sl. No.	Name & Designation	Name of the Office	Status in Committee
1.	Deputy Project Director of concerned package	DWZTGEP, PGCB	Convener
2.	Executive Engineer of concerned package	DWZTGEP, PGCB	Member
3.	Manager Accounts & Admin	DWZTGEP, PGCB	Member
4.	Sub -Divisional Engineer / Assistant Engineer/ Sub Asst. Engineer of concerned package	DWZTGEP, PGCB	Member
5.	Project Manager or representative of concerned Turnkey Contractor	Concern Turnkey Contractor	Member
6.	Representative of RAP implementation consultant	RAP implementation consultant	Member
7.	Local Union Parishad Member	Union Parishad	Member

Committee will manage construction related complaints & payment for compensation and make report time to time to undersigned.

M&Hossain 4/3/2021

(Md. Sharfuddin Hossain)
Project Director (CE)
Dhaka & Western Zone Transmission
Grid Expansion Project
Mobile No: 01713850419

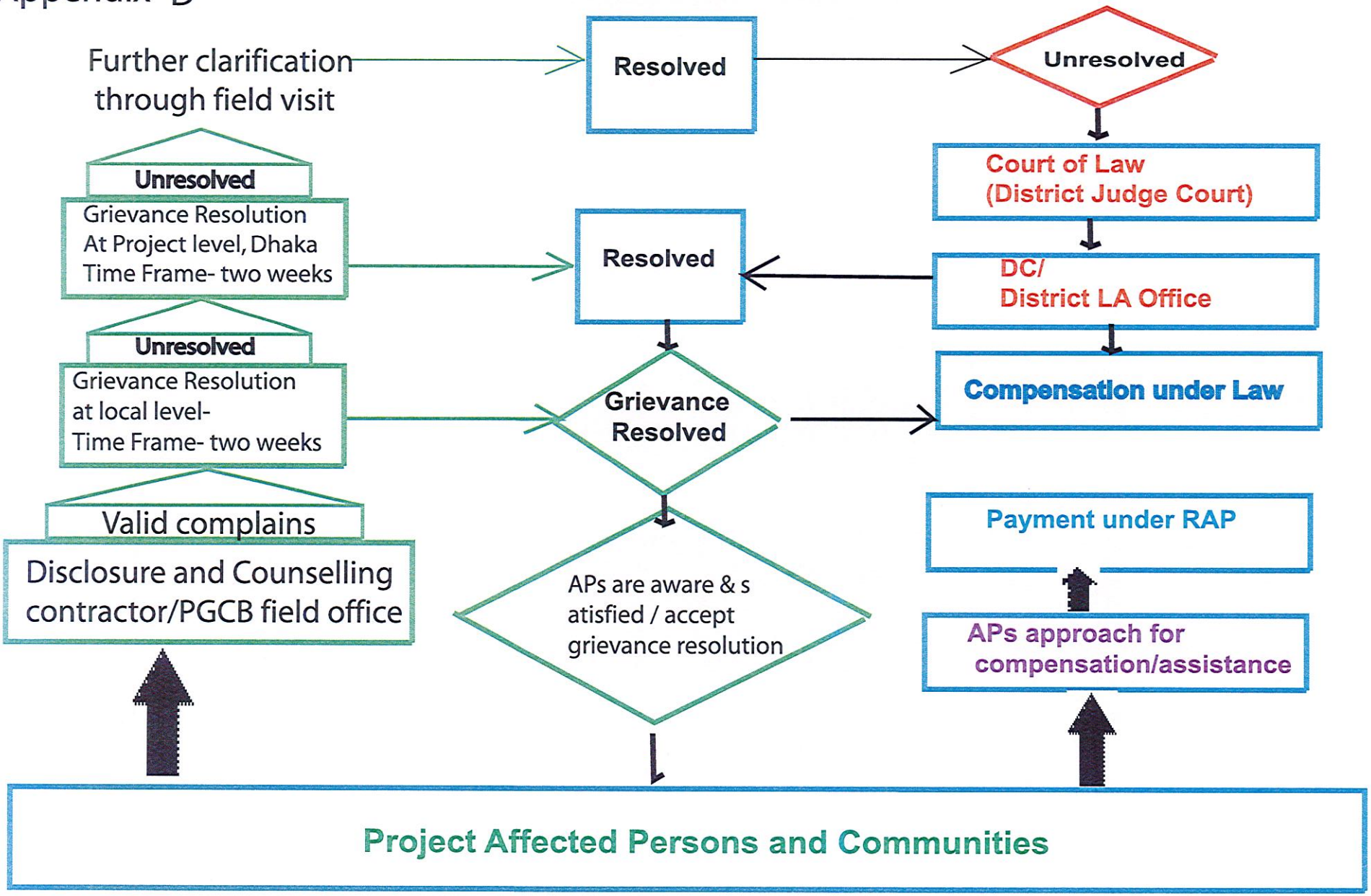
Copy to:

1. *Managing Director, PGCB*
2. *Executive Director (P&D/O&M/Finance), PGCB.*
3. *Chief Engineer, (P&D), PGCB*
4. *Mr.*.....Convener/ Member of the Committee.
5. *BRM, ADB, Dhaka.*
6. *Office Copy.*

PGCB Bhaban, Avenue-3, Jahurul Islam City, Aftabnagar, Badda, Dhaka-1212.
Web : www.pgcb.gov.bd, PABX : +88-02 55046731-35, Fax : +88-02 55046722, E-mail : info@pgcb.gov.bd

Appendix D

Grievance Redress Flow Chart



Appendix D

GRIEVANCE FORM

Indicate the Nature of Grievance(s)

Name……

1……

Address……

……

2……

Contact……

…… Name of Sub Project

3……

……

…… Date and registration of grievance

4…… ----------

……

I agree that the duration of time to solve this grievance will be no longer than three (3) months unless the Grievance Appeal Committee sees otherwise.

I agree that the Grievance Appeal Committee is the final forum for decisions on any claim for compensation of any sort and that all decisions will be guided by the applicable laws.

I will abide by the ruling of the Appeal Committee on the outcome of the grievance/complain.

---------- ---------- ----------

Signature of Complaint Signature of Agent Signature of Grievance Officer

OFFICIAL USE

The outcome of the claim is in favour of the complainant ☐

The outcome of this claim is in favour of the defendant ☐

The outcome of this claim requires further research ☐

Signature of Convener

Appendix E

Compliant form (Worker)

Worker name		Date and time submitted	
Age		Gender (F/M)	
Job title			
Worker Address		Worker Contact number	
Details of grievance			
Date, time and location of event		Witness (es) if applicable	
Description of Grievance (provide clear details of the grievance)			
Proposed solution/ Recommendation	Contractor's agency	Worker supplier	
Worker Signature		Date	
Received by: Name and Signature		Date	

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Appendix E

Incident/Accident Tracker

Date of Incident/ Accident		Time		11.30	
Name(s) of Persons Involved/ Identity of Damaged Property		Age(s)	25	Gender (M/F)	M
Address of Person(s) Involved		Work Post /Designation	Daily labour		
Supervisor		Location of Incident/ Accident			
Classification (Indicative / Serious/ Severe)					
Description of Incident/ Accident					
Nature (Work-related Injury, Non-work related injury, Illness, Environmental Harm, Damage to Property)			Not applicable		
Body Part Injured/ Part Damaged		Time Off Work (Hours/ Days/ Weeks/ Months)			
Cause of Incident/					

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Appendix E

Accident			
Direct Cause(s)		Root Cause(s)	
Notifiable/Non-Notifiable (indicate Persons or Authorities Notified)			
Actions Taken			
Immediate Actions			
Follow-Up Actions			
Police Investigation Ref: (If need)			
Mitigation Measures			
Received and Handled by:	Name of site manager		

Appendix F



Fig: Labeling wastage and hazardous materials at SS area

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Appendix G

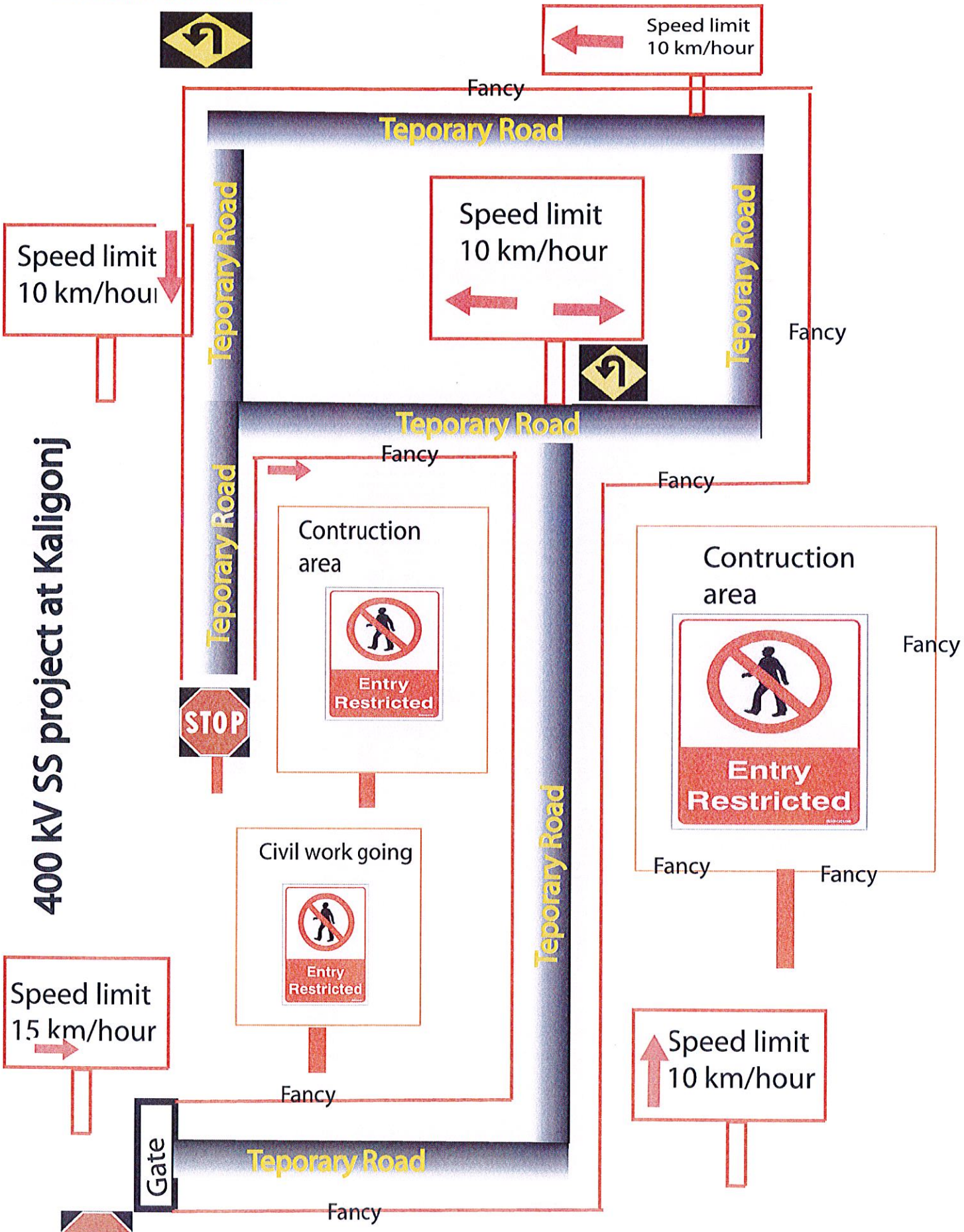


Fig: Construction Site Traffic Layout

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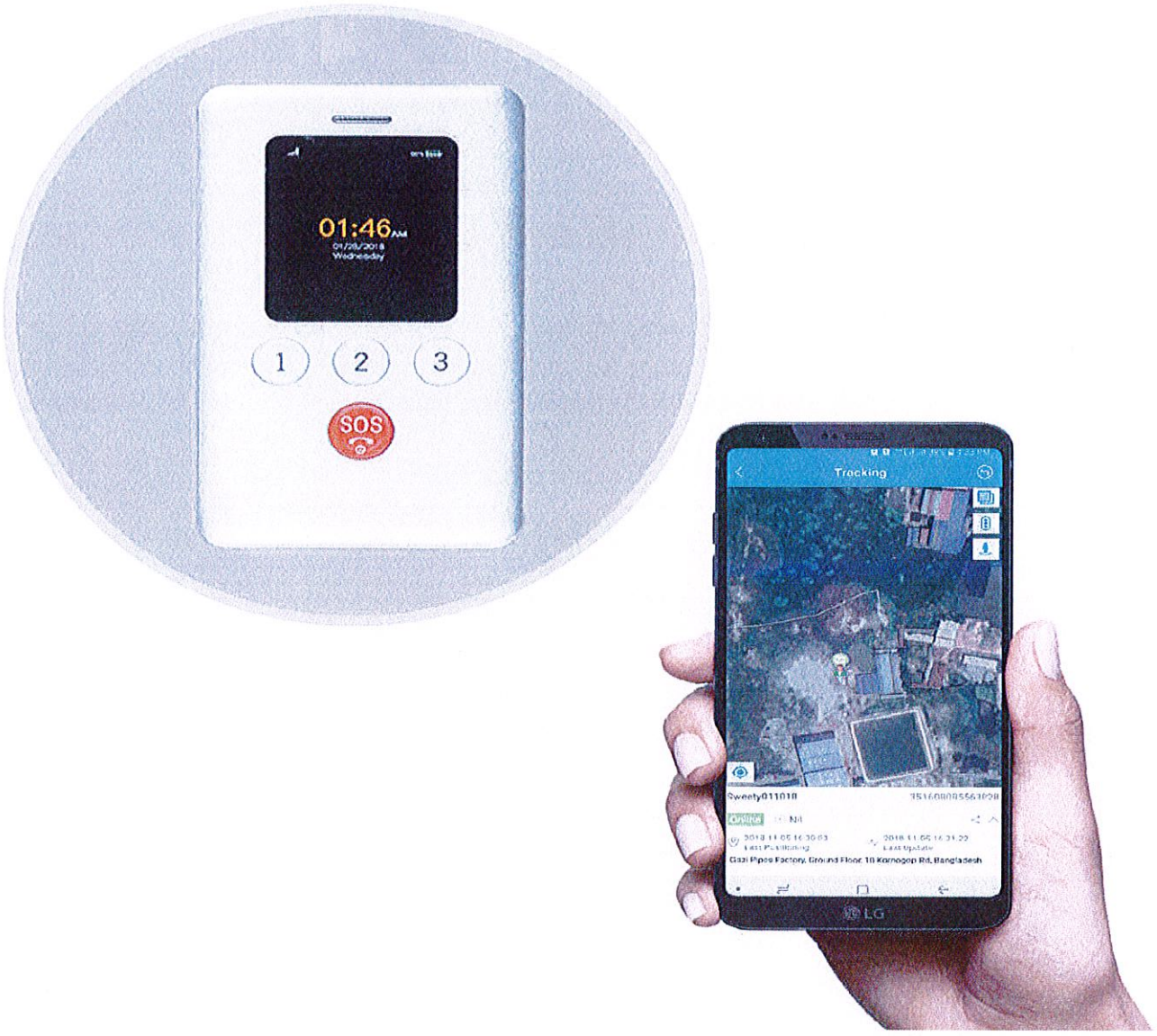
Appendix G



Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS Substation at Kaliganj on turnkey basis (Package-5)

China Electric Power Equipment and Technology Co., Ltd

Appendix H

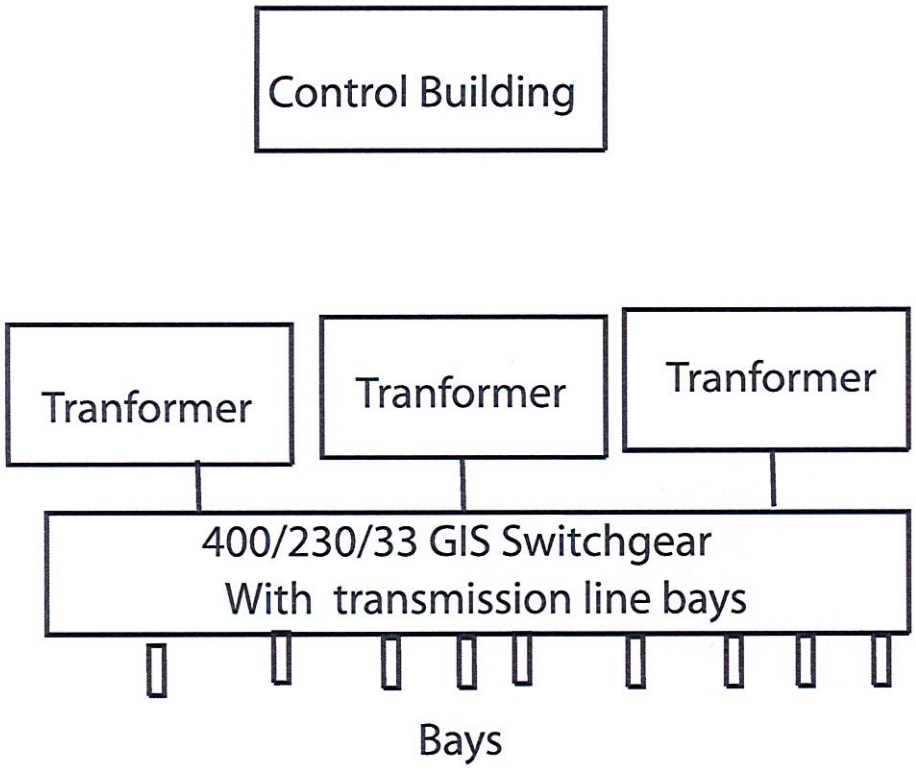


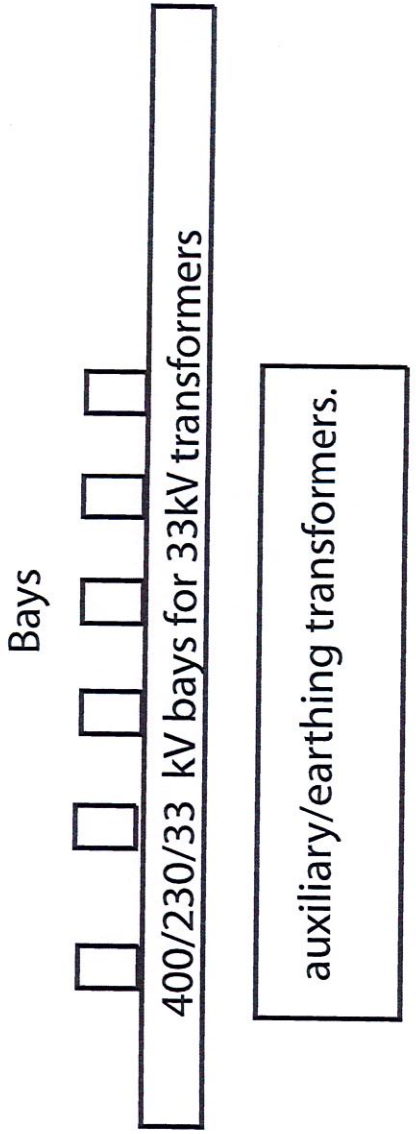
SOP

Install a GPS tracking device in each asset or location in the substation area want to track. Signals are transmitted from the satellite to the receiver. The receiver calculates the distance between itself and the satellites in real time. A report is created showing personal location and distance or movement, coordinates and speed.

Power Grid Company of Bangladesh Ltd

Appeendix I





layout plans for associated scope of work under package 5

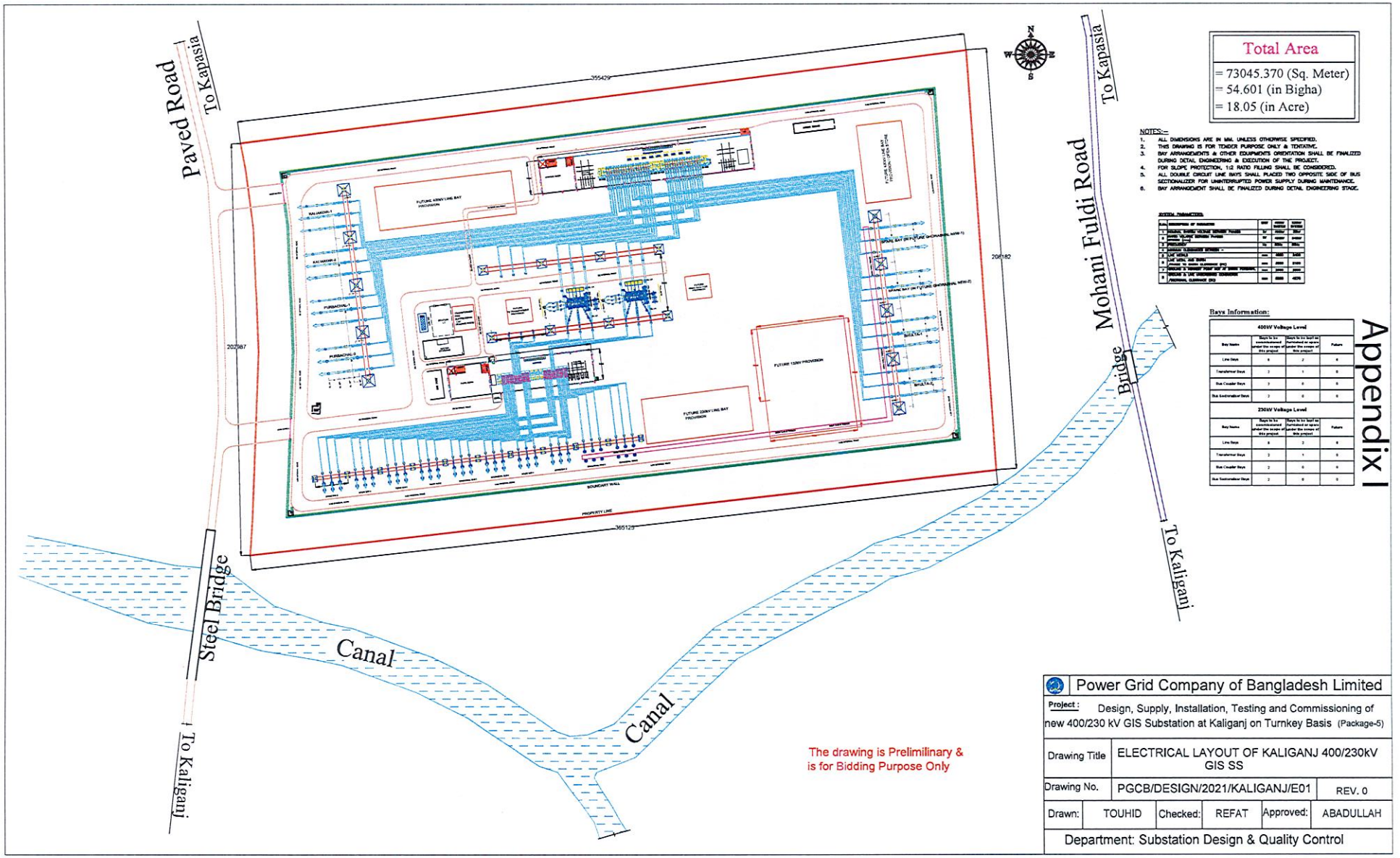
Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS Substation at Kaliganj on turnkey basis (Package-5)

China Electric Power Equipment and Technology Co., Ltd

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Appendix I



Total Area
= 73045.370 (Sq. Meter)
= 54.601 (in Bigha)
= 18.05 (in Acre)

NOTES:–

1. ALL DIMENSIONS ARE IN MM, UNLESS OTHERWISE SPECIFIED.
2. THIS DRAWING IS FOR TENDER PURPOSE ONLY & TENTATIVE.
3. BAY ARRANGEMENTS & OTHER EQUIPMENTS ORIENTATION SHALL BE FINALIZED DURING DETAIL ENGINEERING & EXECUTION OF THE PROJECT.
4. FOR SLOPE PROTECTION, 1:2 RATIO FILLING SHALL BE CONSIDERED.
5. ALL DOUBLE CIRCUIT LINE BAYS SHALL PLACED TWO OPPOSITE SIDE OF BUS SECTIONALIZER FOR UNINTERRUPTED POWER SUPPLY DURING MAINTENANCE.
6. BAY ARRANGEMENT SHALL BE FINALIZED DURING DETAIL ENGINEERING STAGE.

SYSTEM PARAMETERS:

Sl. No.	DESCRIPTION OF PARAMETER	UNIT	400kV SYSTEM	230kV SYSTEM
1	NOMINAL SYSTEM VOLTAGE BETWEEN PHASES	kV	400kV	230kV
2	HIGHEST SYSTEM VOLTAGE BETWEEN PHASES	kV	420kV	245kV
3	FREQUENCY	Hz	50Hz	50Hz
4	NOMINAL CLEARANCE BETWEEN: -			
a	LINE CONDUCTOR	mm	4000	2400
b	LINE CONDUCTOR AND EARTH	mm	3500	2100
c	PHASE TO PHASE CLEARANCE (PC)	mm	4000	2400
d	CONDUCTOR & EARTHED PART OF BAY PORTAL	mm	3500	2100
e	CONDUCTOR & LINE ENGINEERING WORKERS	mm	4000	2400
f	PERSONAL CLEARANCE (PC)	mm	4500	4570

Bays Information:

400kV Voltage Level			
Bay Name	Bays to be accommodated under the scope of this project	Bays to be built as Space for future and under the scope of this project	Future
Line Bays	6	2	6
Transformer Bays	3	1	0
Bus Coupler Bays	1	0	0
Bus Sectionalizer Bays	2	0	0

230kV Voltage Level			
Bay Name	Bays to be accommodated under the scope of this project	Bays to be built as Space for future and under the scope of this project	Future
Line Bays	8	2	6
Transformer Bays	3	1	0
Bus Coupler Bays	2	0	0
Bus Sectionalizer Bays	2	0	0

The drawing is Prelimilinary & is for Bidding Purpose Only

Power Grid Company of Bangladesh Limited					
Project : Design, Supply, Installation, Testing and Commissioning of new 400/230 kV GIS Substation at Kaliganj on Turnkey Basis (Package-5)					
Drawing Title	ELECTRICAL LAYOUT OF KALIGANJ 400/230kV GIS SS				
Drawing No.	PGCB/DESIGN/2021/KALIGANJ/E01			REV. 0	
Drawn:	TOUHID	Checked:	REFAT	Approved:	ABADULLAH
Department: Substation Design & Quality Control					

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Appendix J

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Fisrt Aid box Checklist
as per
Bangladesh Labour Law 2015

Items	Y	N
(ক) ৬টি ছোট জীবাণুমুক্ত ব্যান্ডেজ;		
(খ) ৩টি (প্রতিটি ০.৫ আউন্স) প্যাকেট জীবানুমুক্ত তুলা;		
(গ) ৩টি মাঝারি আকৃতির জীবাণুমুক্ত ব্যান্ডেজ;		
(ঘ) ৩টি বড় আকৃতির জীবাণুমুক্ত ব্যান্ডেজ;		
(ঙ) পুড়ে যাইবার ক্ষেত্রে ব্যবহার্য ৩টি বড় আকৃতির জীবাণুমুক্ত ব্যান্ডেজ;		
(চ) হিবিসল বা হেক্সাসল ভর্তি ১টি (১ আউন্স) বোতল;		
(ছ) রেকটিফাইড স্পিরিট ভর্তি ১টি (১ আউন্স) বোতল;		
(জ) এক জোড়া কাঁচি;		
(ঝ) প্রাথমিক চিকিৎসার প্রচারপত্র ১ কপি;		
(ঞ) বেদনানাশক ও এন্টাসিড জাতীয় বড়ি, পোড়ায় ব্যবহারের মলম, চোখের মলম এবং শল্য চিকিৎসার উপযুক্ত এন্টিসেপটিক দ্রবণ; এবং		
(ট) ৩টি খাবার স্যালাইন প্যাকেট।		

Appendix K

POWER GRID COMPANY OF BANGLADESH LTD.

SAFETY MANUAL

	DESIGNATION	SIGNATURE
PREPARED BY	Deputy General Manager, TSS	
REVIEWED BY	General Manager, Transmission-1	
APPROVED BY	Director Technical	

Document No:	QD-TSS-01	Revision No.:	00	Effective Date:	01/07/06

Foreword

Among our many common needs and goals are the safety and well-being of ourselves, our fellow employees, and the continuing success of our organization, Power Grid Co. of Bangladesh Ltd. (PGCB). To these ends - minimizing human suffering and economic waste-this Safety Manual is dedicated.

The material contained is based on experience of many years achieved by the parent organization BPDB and particularly by the transmission sector and some other Major Electricity utilities of the world in low, high and extra high voltage power system. Incorporated here additional information's and new themes from documents and the Accident Prevention Manual of BPA, (USA) gathered through the Managing Director, PGCB.

The mandatory rules herein express minimum requirements for dealing with the principal hazards inherent in our daily work activities. These and other written requirements neither can nor should provide complete coverage of all work situations. These must be continually reinforced through the sound and nature safety judgments of all workers on each assigned task.

The Safety Manual is divided into two distinct sections:

1. Operating Codes (abb. OC).
2. Safety Practices (abb. SP).

Others are grouped as Miscellaneous. For added awareness, more important things are marked separately. In this time of globalization, PGCB is destined to synchronise its activities with that of rest of the world. To achieve that goal and to make our work force resource personnel and real Professional Engineers, acquaintance with and compliance of national as well as international Safety rules & regulations contained in this Safely Manual would be a binding for us.

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General Provisions

1. **Duties.**

   1) It is the duty of all persons, who may be concerned with the operation and work of Power Grid Co. of Bangladesh Ltd (PGCB) systems and apparatus, to make themselves thoroughly conversant with the Statutory Requirements and Safety Rules governing any work they may have to undertake on these systems and apparatus, IGNORANCE TO THE STATUTORY REQUIRMENTS AND RULES WILL NOT BE ACCEPTED AS AN EXCUSE FOR NEGLECT OF DUTY.

   2) All persons working on electrical plant should be familiar with the methods of artificial respiration described in part 'Miscellaneous' and practice the same at annual interval.

2. **Statutory Regulations and Factories Act.**

   PGCB is required to comply with the provisions of

   1) The Electricity Act, 1910 (Act No. ix of 1910)

   2) The Electricity Rules 1937 and amendments thereof.

   (3) Official Secrets Act (Act No. Ax of 1923)

   4) The Factories Act 1965 and amendments thereof.

   It is the duty of PGCB and contractors to comply with the duty of agent's workmen and persons employed in connections with transmission and use of electrical energy to conduct their work in accordance with the Act and these Regulations. A copy of the Regulations shall be kept posted in each attended substation in the occupation of PGCB.

3. **Official Forms.**

   Forms and documents shall be kept posted, made available for inspection or issued

4. **Issue of Safety Rules.**

   A copy of the appropriate Safety rules shall be given to such employees of PGCB as may be concerned with the operation of, work on, their systems and plant, EACH EMPLOYEE SHALL SIGN A RECEIPT FOR HIS COPY, WHICH SHOULD BE KEPT IN GOOD CONDITION. Copies of these Rules shall be available for sub-stations, switching stations and control rooms of PGCB.

5. **Failure of Supply.**

   A failure of supply, from whatever cause, to or from any part of the high voltage systems shall be immediately reported to the Control Engineer. During failures of supply all apparatus, equipment and conductors shall be regarded as being LIVE until isolated.

6. **Severe Occurrences and Accidents.**

   All severe occurrence and electrical accidents on PGCB systems shall be reported immediately to the Control engineer. All dangerous accidents shall be reported in accordance with the PGCB standing instructions.

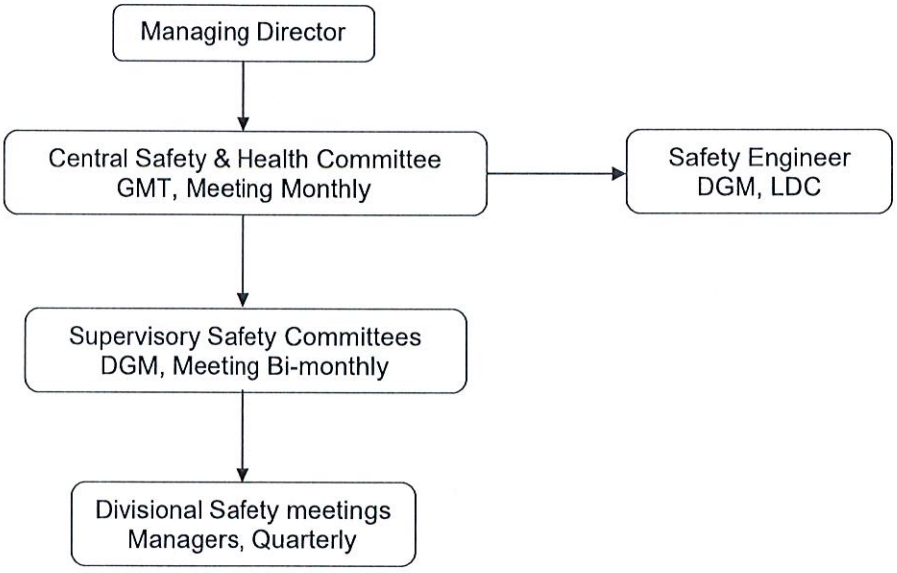
7. **Admittance to Sub-Stations.**

   No person other than Electrical inspector duly appointed by the Govt. of Bangladesh, Persons on duty roster and supervisor with authority shall enter any transforming or switching station permits belonging to, or wholly under the control of PGCB unless in possession of an official pass. Visitors other than contractor/consultants shall be allowed entry only when accompanied by authorized person possessing official pass.

8. **Variation of Rules.**

   In exceptional circumstances the PGCB Rules may vary to such extent as may be authorized in writing by the Safety Engineer of the Company.

SAFETY COMMITTEE ORGANOGRAM



Part-I

OPERATING CODES

Operating Codes

CHAPTER- 01

Departmental Regulations

SECTION 01A. Regulations

01A.01 When personnel from other Departments or outside companies are working in or around properties administered by the PGCB, they shall also be subjected to these Regulations.

01A.02 All employees when on off duty, except in case of sickness, are subject to call whenever the necessity arises.

01A.03 In emergencies, or whenever needed, employees are required to render all possible assistance and remain prepared to work overtime if necessary.

01A.04 Employees on leave of any kind must inform their superiors of their addresses & Telephone No. or such information as will assist locating them readily. Whenever an employee goes on leave his leave address should be put in his leave application.

01A.05 When an employee is unable to work because of sickness, accident or other reason he must take steps to notify his supervisor at the earliest opportunity. He must at the same time advise when he expects to report for duty.

01A.06 Smoking while on duty is discouraged. Smoking, where prohibited & marked as 'No Smoking Area', may result in disciplinary action.

01A.07 The possession, conveyance or use of intoxicating liquors or narcotics while on duty is prohibited.

01A.08 It is prohibited to hold all kinds (not only social) of gatherings in locations near control room, rooms containing live apparatus or high voltage equipment.

01A.09 Any employee reporting for duty or found on duty in an intoxicated condition will be subjected to immediate disciplinary action.

01A.10 Sleeping on duty is not tolerated. Offenders may be severely penalized.

01A.11 Employees on duty are not permitted to be interviewed by agents or solicitors other than those authorized by the PGCB.

O1A.12 Any employee must report in person, time of arrival on the job and time of departure from the job in accordance with the established local procedure.

01A.13 Every effort must be made by all employees to prove the cause of occurrence of accidents, service interruptions, operating mistakes or damage to equipment. In case where incident of this nature have occurred, employees are required to submit an immediate and accurate report of the entire occurrence to their immediate superior.

Incidents which did not but might have caused injury to personnel, interruptions to service or damage to equipment, must be reported without delay and in the same detailed manner.

Any intentional concealment of facts, changing of records or other form of deliberate false reporting, may result in disciplinary action which may lead to dismissal.

01A.14 Employee's lockers must be kept clean and orderly and will be subjected to periodic inspection by the supervisor in charge. Lunch boxes must be kept in lockers or otherwise out of sight when not in use.

01A.15 Employee must not furnish information concerning accidents or troubles to non-employees or the press unless authorized to do so by a supervisor in charge or as required by law. All inquiries in such matters should be directed to the Supervisor in charge.

01A.16 Photographs may be taken within PGCB premises only after obtaining authorization from the competent authority.

01A.17 Employees should notify their immediate supervisor of any theft as well as any trespass or encroachment of PGCB property.

01A.18 PGCB employees while working on consumer premises will be required to observe all regulations established by the consumers. This would refer specially to access to property, smoking regulations, and safety rules, PGCB employees are required to advise the consumer.

01A.19 Approved standards, design and methods must be followed and it should be the responsibility of the officer in charge to ensure.

SECTION 01B Co-operation and Courtesy

01B.01 Co-operation is necessary among employees of the Organization as well as between employees and consumers. Personal disliking, prejudice or jealousy must not be allowed to interfere in co-operation on the job.

01B.02 Employees must be courteous and considerate at all times in their dealings with one another. They must be courteous, specially, during telephone conversations.

01 B.03 Employees must remember that in their dealings with consumers, visitors or the public in general, they represent the PGCIB and that a courteous manner leaves a lasting and desirable impression.

SECTION 01C Visitors

01C.01 Unauthorized persons coming into a Sub-station are to be met by the operator-in-charge or someone delegated by him and politely referred to the proper person for permission to visit the station. In all cases, visitors, whether PGCB employees or not, must be asked to sign the visitor's book There will be one visitors room in each substation.

01 C.02 Visitors should be treated as guests of PGCB and every courtesy is to be shown by all employees who may come into contact with them.

01C.03 Except in special cases, visiting hours will be from 10:00 A. M. to 2:00 P. M. (daily) Saturday to Thursday.

01C.04 It is the duty of the operator-in-charge to see that visitors, whether PGCB employees or not, are not allowed in the control room or in dangerous sections during trouble or times of stress. It will further be his duty to see that visitors are not allowed to approach dangerous areas, or in any way interfere with operation, and he must take such steps as may be necessary in his judgment to carry out these instructions. Before occurrence of emergencies visitors already inside should be escorted to the visitor's room and be requested to wait till the emergency is over.

011C.05 During emergencies such as wartime, riots, serious plant troubles, epidemics and periods of labour unrest, all usual visitor privileges shall be cancelled for an indefinite period. Under such conditions no person is to be admitted without first producing a valid pass or proving his identity, as an employee. Any special instructions issued on such occasions must be strictly observed.

SECTION 01D Communication System

01D.01 Priority use of all communication channels will be accorded to PGCB personnel as follows-

1) Operators

2) Others

Politeness and courtesy are of the utmost importance among employees and between the employees and the public whenever use is made of any communication channel.

01D.02 Telephones installed in the stations and offices of PGCB are placed there primarily for transacting PGCB'S business. All telephones as carrier, wireless/VHF/LIHF are reserved for operation purpose only.

01D.03 Telephone must not be used for prolonged or frequent personal conversations. Employees using the telephone system for private long distance calls must make every effort to charge the call to their own personal telephone number or failing this they must notify the person in charge any pay for such calls within 48 hours after receipt of the account. All personal call must be recorded in a register to be kept for the purpose-All personal calls can only be made with the permission of station in charge/operator in charge. Any telephone with an unlisted number is not to be used for personal calls at any time except in extreme emergencies.

01D.04 Objectionable language in any form must not be used when employing any communication channel. THIS IS IMPORTANT.

CHAPTER-02

Instructions And Standards

SECTION 02 Standing instructions

02A.01 The General Regulations form the Standing Instructions of the PGCB. These Regulations must be observed by all employees especially by those of the plant, HV Substations and transmission, System Operations and Load Despatch Centre. Ignorance of these instructions will not be accepted as an excuse for noncompliance.

02B Current Instruction

02B.01 Current Instructions consist of: Standard Instructions (White Form), Standard Operating Instructions (Pink Form), Local Operating Instructions (Yellow Form) and miscellaneous written orders.

02B.02 Standard Instructions are issued from the Company and deal with policies on personnel and other subjects of general concern. They are signed by the Departmental head or other senior official.

02B.03 Standard Operating Instructions are issued by the System Operation and Load Dispatch Centre and deal with restoration of service and routine or special operating conditions.

02B.04 Local Operating Instructions are issued and signed by the station or Divisional Officer and cover operating matters which apply to and concern only the local station or his jurisdiction.

02B.05 Operating orders are signed and issued by supervisors of stations to operators-in-charge of Stations and deal with local matters of loading, switching, shutdowns, limitations and similar items.

02B.06 All Operating Instructions and operating orders must be read immediately on receipt, by all persons affected and initialed to signify that these orders of instructions have been read and understood.

02B.07 All Operating Instructions are to be kept in separate binders at each office head quarter and the station concerned. They must readily be available for reference.

02B.08 Shutdown Arrangement Forms should be used to detail unusual switching procedures.

02B.09 Employees will be periodically examined as to their knowledge of all instructions as they apply to their respective duties.

SECTION 02C Standards

02C.01 PGCB Standards committee comprised of members from appropriate departments of PGCB. The Standard committee has the responsibility to control the issue of information concerning materials, principles of design, and preferred methods of work for use within the PGCB.

02C.02 Approved Standards, as they are issued, will be made available for the use of supervisory staff and other key personnel throughout PGCB. These standards are to be used as a guide for the supply of materials, principles of design as well as construction and maintenance methods.

02C.03 It's the duty of the officer incharge to make sure that personnel under his jurisdiction are familiar with the approved standards as they apply to their works.

02C.04 A post of Safety Engineer not below the rank of DGM should be created & posted under the Chief Executive of PGCB, for proper implementation of the general regulation and standard operating code.

SECTION 02D RIGHT OF WAYS

02D.01 Right of ways, permits which may be necessary for operation and maintenance of the lines (Transmission) should be obtained by PGCB with the assistance of the Magistrate. (The electricity Act 1910 Articles 18 clause 3 and Electricity Rules 1937 and amendments thereof as reference).

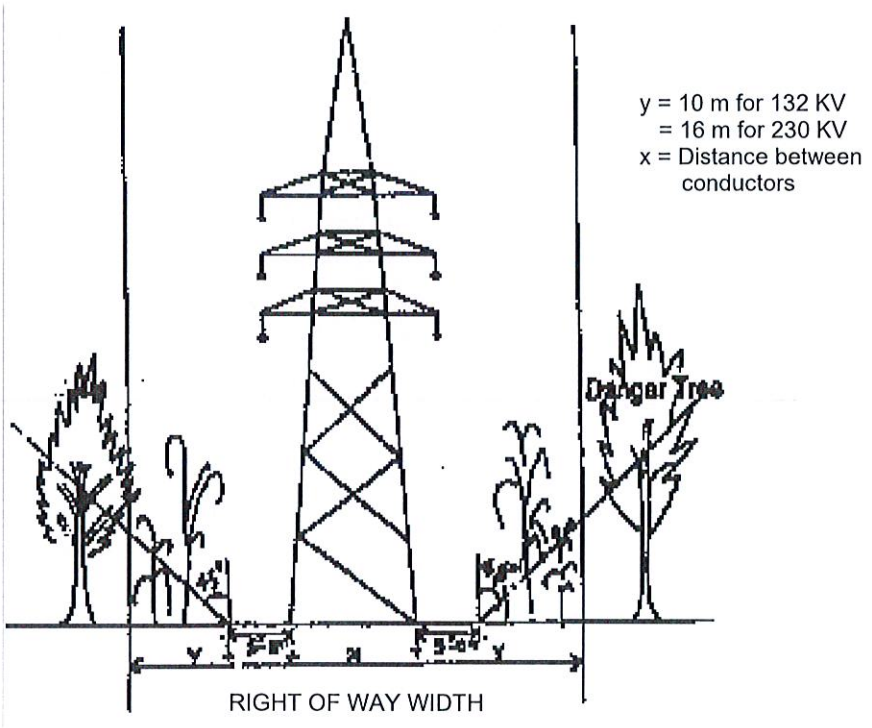
02D.02 All laws, ordinance and requirements of the Republic and local governing bodies, utilities and railways should be complied with in obtaining these documents & should be kept in a permanent file.

SECTION 02E Danger Trees

02E.01 In approximately level terrain trees which would reach within 5 ft (1.524m) of a point underneath the outside conductor are examples of danger trees.

As directed by the Engineer portions of the right of way must be cut so that stamps will not prevent the passage of tractors and trucks along the right of way.

Sketch below indicating danger trees along side, of right of way which should be removed or topped. Permission to do so must first be secured.



CHAPTER-03

Safe Working Practices General

SECTION 03 A. General Rules

03A.01 Every employee must exercise care in the performance of his duties to ensure maximum safety for himself, his fellow employees and the Public.

NO MATTER WHAT WORK IS TO BE PERFORMED, THE FIRST CONSIDERATION MUST BE THE SAFETY OF THE MEN.

03A.02 Horseplay or practical joking will not be tolerated. Any violation of this rule will be treated as a serious offence.

03A.03 Where any work is being carried out which might create a hazard to other employees or to the public, suitable and clearly visible barriers must be installed and, if necessary, and employee stationed as a watchman to provide additional protection.

03A.04 It is the duty of every employee to report to his foreman or immediate superior any unnecessary risk or hazard which exists in the area. Where an immediate hazard exists, he should warn his co-workers of the danger.

03A.05 Two or more employees must be present when an element of danger exists in the work being performed. All precautions must be taken to safeguard the employee.

03A.06 It is the right of every employee to be protected, and he may request any extra protection in methods, additional temporary grounds, equipment or time which in his opinion, is required. If the man in charge is undecided as to the reasonableness of the employee's request for extra protection, he should grant the extra protection, or obtain instructions from his supervisor.

03A.07 When any employee considers himself unqualified, to undertake a job, or believes his interactions will result in danger to himself or his fellow employees or damage to apparatus, he must so advise his immediate supervisor,

03A.08 Personnel must not approach the vicinity of live lines or equipment, unless their duties require them to do so.

03A.09 No employee shall touch or interfere with any electrical conductors or electrical apparatus unless under direct orders from the supervisor in charge.

03A.10 Employee must not use equipment with which they are unfamiliar.

03A.11 The fore man should know at all times the location and nature of all the work being done by his men.

03A.12 Be neat in your work. Do not leave loose materials lying around. Tools, plants, ropes, wires etc., must always be picked up and stored. The job is not complete until this is done. Good housekeeping and safety go together.

03A.13 Stations and Divisional officer must see that the home and office telephone numbers of the following parties are readily available in all control rooms and other central points.

- Local Fire Brigade
- Station Security Chief
- All Local Supervisory Staff
- Local Hospitals
- Local Police Station
- DGM.
- PGCB head Office.
- LDC

03A.14 DGM'S are required to see that Work Council or Safety meetings are held regularly, when possible. Prior to undertaking any new project, a special meeting is to be held with those immediately concerned to outline the scope of the project and unusual circumstances and/or special precautions which may be necessary. Meetings should be held after each total or serious accident and the reasons should be analyzed.

03A.15 Nails or other projecting objects, which may endanger employees or other, must be removed or rendered harmless.

03A.16 Hatchways, pits, manholes etc, must be guarded or roped of when the covers have been removed.

03A.17 Compressed air must never be used for cleaning or dusting clothing. When using compressed air, or working in the vicinity of compressed air equipment, extreme care must be exercised that an air jet is not directed towards anyone's body. Fatal accidents have occurred as a result of carelessness when using compressed air. Horseplay with compressed air is strictly forbidden.

03A.18 When using hot lead or solder, safety goggles must be, and every precaution should be taken to prevent spattering. Workmen should not place a cold wet ladle in hot lead or solder, nor pour it on a moist or wet surface. When soldering is being done at a height, care must be taken to prevent solder from failing on persons or equipment below. Safety goggles must also be worn while doing any welding/cutting job.

03A.19 Care must be exercised in handling gasoline and other flammable liquids, When handling such liquid, exposed flames and sources of static electricity such as belt drives, must be avoided. Fumes given off, even in small proportions, can produce a most dangerous explosion.

03A.20 When men are working above or around deep water, a serviceable lifebuoy and /or boat must be available in the immediate area. Life jackets are to be worn where practicable.

03A.21 A diver must always be attended by at least two other employees. The pump supplying air to divers must be kept in good condition at all times.

SECTION 03B Vehicle Operation

03B.01 Employees authorized to operate PGCB vehicles must be familiar with all traffic laws which apply in the territory where the employees drive, and the rules outlined in PGCB instructions.

03B.02 All drivers of PGCB vehicles will be subjected to a 'Driver's test' before being authorized to drive and as frequently thereafter as required.

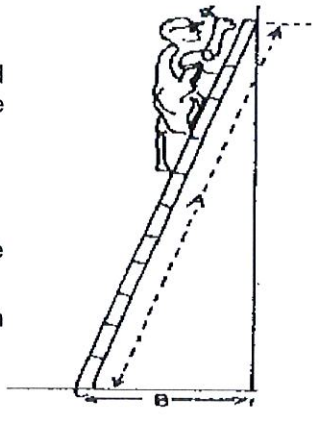
03B.03 Vehicles drivers shall operate vehicles in a safe and courteous manner in order to prevent injury to themselves and others, and to maintain good public relations.

03B.04 Before driving any vehicle, the driver is to make sure the vehicle is in good operating condition.

SECTION 03C Ladders

03C.01 Ladders must be equipped with ladder shoes and must be secured against slipping by at least one of the following methods:

1. Tying or fastening top and bottom.
2. Cross board or hooks, at the top of the rails.
3. In certain instances it may be sufficient to have the bottom or the ladder held by another employee.
4. Types of ladders to be used should be specified with insulation class.



03C.02 The slope of a ladder in use is very important. Straight portable ladders shall be placed at a safe angle to prevent breaking or slipping. The best angle for ladders is about 75 degrees with the horizontal.

The distance "B" should be about one-fourth the ladder length "A". In other words, place the base of the 12-foot ladder 3 feet from the object it leans against. Employees shall face ladders when ascending or descending them and shall have both hands free for use on either rungs or rails.

03C.03 The hoisting rope of extension ladders must be tied in such a manner as to prevent collapse of the ladder in the event that the rung supporting the hook breaks.

03C.04 Ladders must be kept in first class condition and before use, must be inspected for unsound rungs, cracks and splinters in the side rails.

03C.05 Ladders with metal reinforcement must not be used on any work around electric circuits or equipment, and they must not be allowed on PGCB'S property.

03C.06 Care should be exercised in selecting a ladder to make sure it has a suitable length for the particular work involved. Ladders must not be used as a scaffold or platform support.

03C.07 Ladders should be hung vertically for storage. When this is not possible and they are stored in the horizontal position they should be properly supported at intervals to prevent sagging. When not in use they should be protected from the weather.

SECTION 03D Elevated Structures.

03D.01 Any employees required to work on elevated supports such as ladders, scaffolds, bo sun chairs etc., must first inspect such support and make they will withstand the strain to which they may be properly subjected. Material must not be allowed to accumulate on such supports. Overloading of such support must be prevented during the progress of the work.

03D.02 Safety belts or harnesses with rope must be used when working on elevated structures, roof, girders, sloping roofs, river crossing carriages, dams or other places where a slip could lead to a serious accident.

03D.03 When working in elevated positions, tools and materials must be so secured that they cannot fall accidentally.

03D.04 Built-up scaffolding must conform to the Bangladesh Building code. Great care must be used in the moving and erection of metal or scaffoldings over two meters in height must have a guard rail 90 cm. high. Overloading must be prevented.

SECTION 03E Trench Excavation

03E.01 When men are required to work in an excavation in soil over 1.5 meter deep and when the depth is greater than the width, shoring is required to prevent killing.

03E.02 Whenever one or more men are working in excavation which exceed two meters in depth, at least one man shall be in attendance outside of the excavation to render assistance in case of need and a ladder must be provided as a means of exit.

03E.03 Material shall not be stored nor vehicles allowed to approach within 1.5 meter from the edge of the trench so that stability of the walls of the trench will not be endangered by vibration.

SECTION 03F Personal and Protective Clothing and Equipment.

03F.01 Finger rings of any kind should not be worn by employees engaged in manual work.

03F.02 Loose clothing must not be worn when work in around moving machinery. A one-piece overall suit is most suitable.

03F.03 Heavy shoes preferably safety shoes, should be worn when operating power lawn movers and when handling heavy material and equipment. Light or sloppy footwear

must not be worn on the job. All rubber boots worn on the job are to be of the safety toe type.

03F.04 Safety hats must be worn by all employees whenever danger from falling tools or other material exists and in all cases when so stipulated by the supervisor in change.

03F.05 Suitable goggles, guards of shields must be worn by employees while engaged in chipping, spray or overhead painting, grinding, sandblasting, handling of acid or caustic solutions and at all times when there is any likelihood of eye damage from foreign particles, dangerous heat or light rays.

03F.06 Welding goggles or hand shields must be used when doing any electrical welding, gas welding, or acetylene torch work and suitable screens must be placed around the work for the protection of others. A fire extinguisher must be within reach of the welder whenever welding is being carried out.

03F.07 When work involving the use of safety belts is contemplated, no work is to commence until they safety belts of all employees

03F.08 Hand gloves should be worn when doing any electrical works.

SECTION 03G TOOLS AND EQUIPMENT.

03G.01 All tools, equipment and clothing of a workman shall be subject to inspection at any time and if any article is deemed unsafe by the controlling officer or supervisory personnel, its use be discontinued until repaired or replaced.

03G.02 Any tools or equipment and edged tools must be properly protected or stored when not in use.

03G.03 Metallic tapes, metal rules or metal edged rules, are prohibited for general use in generating stations, sub-stations or around any electrical apparatus, When the use of such tools is absolutely necessary they may be used but only with the permission of the work must be carried out under the direct supervision of the supervisor.

03G.04 When a machine or apparatus is equipped with guards and it becomes necessary to remove such guards for maintenance work on the machine itself, the guards must be replaced immediately the work is finished.

03G.05 Two or more men must be employed when carrying long pieces of material such as pipes, hand bars scaffolding, ladders, etc. near switchboard, panels or any live electrical conductor or apparatus so as to eliminate any chance of accidental jarring of relay panels or contact with live Parts. Minimum length requiring these precautions may vary from 1.5 meter to 3 depending on the place of work.

03G.06 Portable lights must be equipped with proper guards and care must be taken to see that guards, lamps plugs and sockets and wires are not defective.

03G.07 Flashlights normally used inside sub-station buildings generating stations must be fully insulated and made of a nonconducting material. In special cases such as line work or outdoor bus inspection a metallic type or higher power portable light may be used.

03G.08 Any electrical apparatus such as small motors, power tools, lamp cords or extension lights which are in an unsafe condition are not to be used.

03G.09 The sides of emery wheels are not to be used unless they are designed for such work and are properly equipped with washers and guards. When changing grinder wheels, the rated r.p.m. of the wheel must correspond with the rated rpm of the tool.

SECTION 03H Switch sticks, Earth sticks and buzz Sticks.

03H.01 Sticks must be of an approved design and inspected before use. Defective sticks must be tagged "Out of order" and reported on a station trouble Report for immediate repairs.

03H.02 Sticks must be stored indoors or in a weatherproof covering outdoors. They must be hung vertically or supported horizontally throughout their entire length. They must have free air space to neighboring walls and must never be left on the floor or ground.

03H.03 Switch sticks, Ground sticks & Buzz sticks should be periodically tested and repaired or replaced if found bad. A duplicate of each type of switch stick must be kept available in the station in case of breakage.

SECTION 03J Wire Ropes/Fibre Ropes

03J.01 Wire rope has almost superseded fiber rope and chains for hoisting and haulage purposes. The type of wire rope to use depends upon the intended use and the degree of flexibility desired.

1. Standard Wire Hosting Rope consists of 6 by 19 wire strands and a fiber core; made of iron, cast steel, mild plow steel, plow steel, or special plow steel. The breaking strength of standard wire hoisting rope, in tons, is shown in the following tabulation. (The breaking strength may be divided by the factor of safety to obtain the safe load). Safety factor is the ratio of ultimate strength of rope to the safe working load.

Diameter in mm (inches)	Weight per meter in KG	Breaking strength (tons) plow steel
6.35(1/4)	0.148	2.5
9.52(3/8)	0.342	5.5
12.70(1/2)	0.595	9.4
15.87(5/8)	0.937	14.4
19-05(3/4)	1.340	20.6
22.22(7/8)	2.380	28.0
25.40 (1)		36.5

2. Extra-Flexible Wire Hosting Rope for use with smaller sheaves and drums such as usually found in hoists and derricks, consists of 8 by 19 wire stands and one fiber core. The breaking strength of this rope is approximately 90 percent of the strength of the standard wire hosting rope given in the preceding tabulation.

3. Special-Flexible Wire Hoisting Rope consists of 6 by 37 wire stands and one fiber core. it is extremely flexible and is specially adapted to high-speed service on cranes or where sheaves are small. The breaking strength is approximately the same as that of standard wire hoisting rope.

Minimum Factors of Safety for Wire rope

Slings	8
Derricks, Cranes	6
Tow Ropes	4

03J.02 Wire ropes are permanently weakened if they are stressed when kinked. To uncoil new wire rope from a reel, the reel should be placed on a spindle and the rope unwound by pulling it out in a straight line.

03J.03 Wire ropes should not be bent around corners when attaching them to a load. Thimbles should always be used when a loop is formed at the end of a wire rope. Lubrication of a wire rope is important.

03J.04 WHEN TO DISCARD WIRE ROPE

6.1 Wire ropes shall be inspected at the time of installation and once each week thereafter, when in use and should be removed from hoisting or load-carrying service when any one of the following conditions exists:

1. When three broken wires are found in one strand of 6 by 7 wire rope.

2. When marked corrosion appears.

3. When wire rope has been idle for 3 months or more and subject to water, moisture, dampness etc. shall be removed from hoisting or load-carrying service.

4. Any wire rope shall be removed from load-carrying service when the number of broken wires found in more than one strand strands amount to more than 4 percent.

03J.05 Fiber ropes are made principally of manila fiber, sisal fiber, and hemp. Constant care and frequent inspection are imperative in the use of rope as the interior fibers may be broken or ground to powder, while the exterior fibers may indicate that the rope is worn but little.

1. Pure manila rope is the strongest and most reliable of the fiber ropes and should be used wherever high tensile strength is required. New manila rope is hard but pliant. It is of yellowish color with a silvery or pearlish luster and has a silky feel when drawn through the hand

2. The breaking strength, working strength. and weight of standard manila rope (3 strand) with safety factor equal to 5 is shown in the following tabulation:

Diameter in mm (inches)	Weight per meter in KG	Strength Breaking KG
6.35(1/4)	0.020	600
12.70(1/2)	0.075	2,650
19.05(3/4)	0.167	5,400
25.04(l.0)	0.270	9,000
31.75(11/4)	0.418	13,500
38.10(11/2)	0.600	18,500
50.80 (2)	1.080	3,100

03J.06 When a table of strength is not available, an approximation of the working strength of rope may be obtained by squaring the numerator of the diameter in eighths and multiplying by 20. This gives strengths somewhat lower than those given in the table.

1. Sisal rope has about 60 to 70 percent of the strength of manila rope. Good grade sisal rope is yellowish-white, sometimes with a greenish tint,

2. Hemp rope is nearly as strong as manila, and is slightly more resistant to atmospheric deterioration. It is of a dark gray colour and is much softer than manila rope.

03J.07 Wet rope deteriorates rapidly unless dried properly. All fiber ropes are easily damaged by acids and care must be exercised to prevent rope coming in contact with acid.

SECTION 03K Signs and Designations.

03K.01 All equipment, electrical or otherwise, involved in the operation of the system, is to be marked with its proper name and/or number for the purpose of identification.

03K.02 The supervisory staff at every location must make sure that adequate signs and designations kits at all control points for disconnecting switches and that these signs and designations are in accordance with station standards. In particular, attention should be given to adequate designation for switches in cubicles or where two or more control handles are operated from the same switching platform. When switches are mounted in cubicles, designation is required both inside and outside of the cubicle. In case of switch cubicles feeder designations should be clearly written in bold letters both in front and back of the cubicles.

03K.03 Each protection and all lines and switches on relay panels, control panels, and in junction boxes etc. are to be properly identified. This includes current and potential circuits.

03K.04 In the case of air, and water suppliers all valves shall be identified and storage tanks shall be marked with the name of their contents as well as the capacity and /or pressure of each.

03K.05 When people are working on any cable or line fed by any cubicle, caution notices like "Do Not Operate", "Men working etc. Please see appendix-"B" are put temporary on such cubicles after drawing out/lowering the switch in the cubicles.

SECTION 03L Accidents and First Aid.

03L.01 All employees must be thoroughly familiar with first aid practices.

031L.02 All employees must be familiar with PGCB approved methods of respiration (Please see MISCELLANEOUS).

03L.03 At each attended station, first aid kits must be kept readily accessible and properly maintained at all times. The first aid kits to be used should be in accordance with established standards.

03L.04 All PGCB vehicles must carry first aid kits in accordance with established standards.

331L.05 When working far from a vehicle or station where first aid suppliers are not available, the men must carry a first aid kit. Supervisor is responsible for seeing that the contents or these first aid kits are complete and in good condition.

03L.06 At each station or circle the Manager/ Deputy Manager/ Assistant Manager will appoint employees who will be responsible for seeing that contents of the first aid kits are complete, and in good condition. No change is to be made in the first aid equipment, medicines or methods without authorization.

03L.07 All injuries, no matter how slight, must be treated as soon as possible. All major burns must be treated by a doctor eventually. All eye injuries must be treated by a doctor.

03L.08 Treatment of injuries must be carried out by methods shown in the authorized first Aid Handbook and as pre-scribed by the PGCB instructors.

03L.09 All accidents, however slight, must be reported and the appropriate forms completed in accordance with Standard Instructions. All accidents should be investigated immediately after the occurrence and the causes by identified and reported to the person/committee responsible for updating these regulations/Codes.

03L.10 A fatal or serious accident must be reported immediately, by telephone if possible, to the station or Manager or his assistant, who in turn will see that the proper persons are notified. Field accidents are required under the law to be reported to Govt. of Bangladesh in their prescribed proforma within certain period (Format in MISCELLANEOUS).

CHAPTER 04

Safe Working Practices-Specific Group

SECTION 04A. Special Regulations Concerning Operators

04A.01 The first consideration of an operator must be the operation of the station or division under his care and it must take precedence over any other duties assigned to him expect those necessary to protect human life.

NO MATTER WHAT WORK IS TO BE PERFORMED,

THE FIRST CONSIDERATION MUST BE THE SAFETY OF THE MEN.

04A.02 Operators must not interchange shifts unless permission has been obtained from the supervisor-in-charge.

04A.03 Operators must not vacate their posts until arrival of their relived unless authorized to do so by the supervisor-in-charge. Any extended delay in relief should be reported to the supervisor-in-charge.

04A.04 Working more than 12 consecutive hours by prearrangement is forbidden. In any case, a relief must be provided as soon as possible after 12 hours of work.

04A.05 Except when special arrangements have been made, an operator must finish his shift, even though his relief comes in early. In the event of station troubles at the time of shift change, the out-going operator will be in charge and will be responsible until the trouble is over or is sufficiently under control to permit handing over to the incoming operator. Records and reports pertaining to such troubles must be completed before the outgoing operator leaves.

04A.06 When changing a shift, incoming and outgoing operators shall sign a daily form recording the time of the transfer of responsibility. Each operator shall sign in the presence of the other, the incoming operator signing last and recording the time on the form. The transfer shall become effective on being signed by the form. The transfer shall become effective on being signed by the incoming operator and before singing, he must be certain that he is familiar with all existing Conditions. The outgoing operator must make certain that the incoming operator is made familiar with all existing conditions.

04A.07 When their are two operators on duty and one wishes to leave the control room, be must advise the other man place or place he intended route through the station and the particular the operators' protection.

04A.08 During times of stress or unusual conditions the operator-in-charge has the right to call upon any employee for help without prior appeal to the man's supervisor. he must however, advise the supervisor at the first opportunity.

04A.09 At night or at any time when supplementary lighting is required operators must carry an approved electric flashlight or lantern when making their rounds of inspection. These flashlights or lanterns must be inspected by the operator at the beginning of the shift and defective ones reported for immediate repair or exchange.

04A.10 The Operator-in-charge, upon taking shift, must make an inspection of the plant and equipment as soon as possible, and make at least one more inspection during the later half of this shift. This is in addition to the usual rounds of inspection by

himself or his subordinates.

04A.11 Any condition of apparatus or equipment which in the opinion of the operator, requires immediate attention or repair is to be reported to the supervisor in charge without delay. If service is likely to be affected, the system operator must also be advised immediately.

04A.12 If, in the opinion of the operator-in-charge, the equipment must be taken out of service immediately to avoid serious damage, the operator is authorized to do so, on his own responsibility.

04A.13 In all cases, the operator-in charge must make out a report covering defective or damaged apparatus or unusual conditions occurring during his shift. When reporting troubles, operators must make a clear distinction between actual fact and personal deductions or conclusions.

SECTION 04B Sale Working Practices Electrical Workers

04B.01 Rubber gloves protected by leather gauntlets are to be used for electrical work only where the possibility or leakage or induction presents a hazard which cannot be eliminated by proper grounding, The use of rubber gloves does not replace the use of proper grounding procedures as laid down in this code.

04B.02 All rubber gloves must be tested by an approved testing station prior to issue and every month thereafter. All gloves considered defective and replacement, accompanied by report as to how the gloves become damaged

04B.03 Employees must never use their fingers to test for live circuits of any voltage. Circuits of less than 250 volts may be tested by lamp or other approved safe testing device. Extreme caution must be taken when testing circuits with portable testing equipment.

04B.04 Men working in or on open transformers must remove all objects from their pockets. All tools must be attached to suitable hand lines so that the tools may be withdrawn if accidentally dropped inside the transformers. Before actually removing manhole covers or bushings from a transformer, all materials and tools must first be removed from the top of the transformer or securely tied. Suitable containers must be provided for the material removed from the transformers, It is the responsibility of the man-in-charge to check that all of these precautions are taken.

04B.05 The use of a blow torch acetylene or any open flame, is absolutely prohibited in or on open transformers, without the approval of the superintendent of the division involved

04B.06 When work must be carried out in switch rooms or confined spaces where exit could be obstructed by fire of other occurrence, adequate fire-fighting apparatus must be kept handy and other employee posted where he can be of assistance in case of an emergency.

04B.07 Only full insulated flashlights or extension lamps are to be used when working behind switchboards, bench boards, relay panels, etc.

04B.08 Particular care must be taken to prevent accidental contact of metallic objects such as key chains, metal pencils, belt buckles, wristwatches, metal zippers, necessary tools, etc. with live wires or terminals.

04B.09 After cutting or disconnecting relay or control circuits, the ends of the wires should be taped or otherwise insulated in order to avoid accidental contact with persons other circuited or ground.

04B.10 When working on current transformer secondary circuits for test or removal of instrument, etc. current transformers must be short circuited between the transformer and the location of any work to be done. In no case, should a live current transformer be allowed to become open circuits on the secondary side.

04B.11 The use of blowtorches and open flames should be avoided behind or under switchboards or relay panels,

04B.12 Two or more men must be employed when carrying long pieces of material such as pipes, hand bars, scaffoldings, ladders, etc. near switchboards, panels or any live electrical conductor or apparatus so as to eliminate any risk of accidental jarring of relay panels or contact with live parts. Minimum lengths requiring these precautions may vary from 1.22 meter to 3.04 meters depending or the place of work.

04B.13 Every precaution must be taken to ensure the identification of electrical circuits before cutting or interfering with them in any way.

04B.14 Before any work is started in the vicinity of relay panels or on apparatus equipped with gas detector relays which could cause tripping of this equipment, a HOLD ORDER must first be obtained from the operator in charge. This applies particularly to drilling in relay panels, drilling or chipping concrete or other work which might cause vibration. Dusting of relay covers is not to be carried out without a HOLD ORDER (Permit to work) from the operator in charge.

04B.15 When removing potential transformer fuses of 6600 volts and above and when it is impossible to clear the circuit, an approved stick must be employed. Employees must keep the maximum possible clearance from the live parts.

04B.16 In stations where it is necessary to handle fuses of several different potentials, the fuse sticks or tongs must be positively identified so that there can be no possibility of error in the choice of appliance. After use, the fuse stick or tongs must be returned to the proper rack.

04B.17 A dangerous charge can be retained by static capacitor after it has been disconnected from the normal power source. Before any work is static capacitors, even if equipped with discharge coils, a short circuit and ground must be applied and maintained for the duration of the work. Where fuse sare employed in capacitor installations and work is to be carried out between the fuses and capacitor, the short circuit and ground must be applied on the capacitor side of such fuses.

SECTION 04C Safe working practices: Linemen

04C.01 When attaching his safety strap, the lineman must see that it is placed in such a way that it connot slop off the pole or tower. The strap snaps must be checked to make sure they are properly in place and the strap tested with the man's weight before releasing his hold with his hands.

04C.02 Two safety straps should never be fastened together to reach around a large pole. An approved extension should be used.

04C.03 When erecting or revolving poles or structures a suitable number of guys and or braces must be attached to the pole or structure in order to prevent uncontrolled movement.

04C.04 All old or weak poles must be guyed or braked before climbing.

04C.05 Linemen must not climb or work on a pole above the bottom of an open ground lead gap if the circuit on the pole is energized. If work is to be carried out above the bottom of the gap them the gap must be bridged metallically by means of an approved grounding jumper. The jumper must be connected to the groundside first and them connected to the upper and of the gap. When disconnecting the jumper, the upper end must be disconnected first.

04C.06 When climbing poles, the linemen must, when possible, climb on the same side as the ground lead, so that neither his hands nor any part of his body will touch the ground lead.

04C.07 When working in elevated positions material or tools must never be thrown-a bucket or hand line must be used.

04C.08 The practice of leaving spare material temporarily on towers or poles is to be discouraged as much as possible. When it becomes necessary to leave spare material in elevated positions, it must be well secured in place.

04C.09 On poles and structures objects such as long bolts, spikes, etc. which may cause accidents should be cut off or removed.

04C.10 Groundman or others must not stand directly under towers or poles when work is proceeding above.

04C.11 Poles, towers or structures are not to be used to secure guy wires from other poles, etc. without the approval of the superintendent or his foreman.

04C.12 Insulted clips on field telephones or test sets must be kept in good condition at all time. When a test set is to be the lineman must climb part way up the pole to insulate himself from ground when doing this he must keep clear of the ground lead on the pole. Or steel tower lines, when using the test set, rubber gloves must be used if no insulated platform has been provided.

04C.13 When stringing conductors in the immediate vicinity of normally energized circuits, such circuits should be cleared and grounded whenever practicable. When it is impractical to ground circuits in the immediate vicinity of conductor stringing, a Permission For live line Work is required on the energized circuits which are nearby.

04C.14 When new wires must be strung or old wires pulled out, near energized lines, the conductors being worked metal pulleys. It is preferable that pulleys be grounded.

04C.15 When bare wire is run directly off the reel, it shall be run over metal snatch blocks which are grounded and arranged so that the wire makes a positive contact at all times.

04C.16 When stringing wire or cable it must be kept under full positive control at all times and permanent ties made as soon as possible.

04C.17 When pulling wire or cable in the vicinity or energized circuits every effort must be made to avoid bodily contact with the bare conductor being pulled. hand lines must be employed for this operation.

04C.18 Carrying of hand tools on the lineman's body belt is to be discouraged. If it is absolutely necessary to carry them, then, such tool or tools must be securely, tied to the body belt so they cannot accidentally fall down.

CHAPTER 05

Fire Protection

SECTION 05A Organization and Responsibility.

05A.01 It is essential that the employees at each station shall be organized in such a way that the fire extinguishing equipment shall be used to the best advantage and that fire fighting activities shall be carried out with a minimum of confusion.

05A.02 It is the duty of every employee to eliminate fire hazards. In event of fire, an employee must render all possible assistance to extinguish it.

05A.03 The Manager/DM/AM of each Division/station shall nominate chief and deputy fire chief for the station or Division, who will be responsible directly to Manager/DM/AM for performance.

05A.04 The fire protection duties of the Chief Fire Officer are as follows:-

1. To be responsible for the training of the station personnel in the application and operation of each type of fire fighting equipments. This must include the operating staff.

2. To make sure that the proper apparatus is available at the place where fire is likely to occur and that all personnel are acquainted with the location of such equipment and its use.

3. To be responsible for fire fighting equipment being in operating condition at all times and that proper fire protection inspections are made monthly and the fire Inspection, forms completed properly and checked by the Manager/DM/AM having jurisdiction before forwarding to the main office Dhaka.

4. To make sure that fire fighting equipment is not obstructed or hidden by any changes which may take place in the station.

5. To point out to the Manager/DM/AM where fire hazards in unprotected locations exist and make recommendations where necessary.

6. To make sure that safe working practices as regards fire hazards are followed .

7. To take change of fire fighting operations in co-operation with the operator-in-charge.

8. To see that "No Smoking" signs are installed in places where there is danger of explosive gases being present, such as battery and oil storage rooms.

9. To set up actual fire fighting practices at least four times a year to assure that all employees are familiar with the use of fire fighting equipment. In addition, at least six test runs per year must be carried out to assure that proper equipment is available and in working order.

10. If for any reason any fixed fire fighting equipment is removed from service under the authority of a Permit-to-Work (HOLD ORDER) then when it has been returned to service the fire chief must inspect and check the system to ensure that all valves and any other associated equipment are in a proper are in a proper operating position and condition.

05A.05 A layout showing the location of fire fighting equipments must be displayed in a suitable place.

05A.06 In the event that nominated fire officer is away, the operator-in-charge will assume the duties of the fire officer.

SECTION 0513 Precautions Against Fire

05B.01 Rages, either clean or dirty, are to be regarded as distinct fire menace and must only be kept in covered cans or receptacles especially provided for that purpose. Combustible material such as packing boxes, excelsior etc. must not be left lying around but should be disposed of immediately.

05B.02 To prevent the possibility of an explosion, gasoline, benzene, paints and other volatile liquids must not be poured in to station drains. Such liquids must be taken outside, dumped into a properly prepared pit and burned under proper control. They must never be poured down drains.

05B.03 Smoking is not permitted nearer storage or in any oil processing rooms. The use of open flames or sparking devices in such areas in prohibited in order to prevent explosions. Electrical wiring in any oil processing room has to be in perfect condition so that no that no spark occurs. It should be periodically checked. Smoking is strictly prohibited in this area.

05B.04 Whenever insulating oil is being filtered or handled, a fire extinguisher of proper type must be in the immediate vicinity.

05B.05 All oil hoses must be of an approved type and properly earthed to reduce the accumulation of static electricity when handling oil or other flammable liquids.

05B.06 In general one should always be aware. If static electricity when using a filter press, and the container in which the oil is to be filtered should be carefully earthed.

05B.07 When working near opening or manholes in the tanks of apparatus containing oil such as transformers, oil circuit breakers, regulators, oil such as transformers, oil circuit breakers, regulators, oil storage tanks etc. open flame lights and sparking devices must not be used because of the possibility of gas formation and consequent explosions. Vapour proof extension lamps with guards in proper conditions are to be used.

05B.08 Volatile and flammable liquids including paint solvents are to be stored in proper containers and in appropriate areas or building provided for such storage. When used, the above liquids must be contained in proper safety cans equipped with a flame arrester screen at the filler and at the spout opening, Dispensing plunger cans must be used when cleaning and sponging with flammable liquids. Paints are to be stored in metal storage cabinets.

05B.09 A fire extinguisher must be readily available where flammable liquids are being used.

05B.10 Fuses must not be plugged or replaced by anything except fuse wire of the proper size and suitable capacity. Should fuses continue to blow when inserted this definitely indicates troubles which must be located, isolated and repaired.

SECTION 05C General Rules

05C.01 At all attended stations there must be a distinctive alarm to indicate a fire. This alarm is to be used only in the case of fire drill.

05C.02 No fixed fire fighting equipment may be modified or taken out of service without the knowledge and authorization of the station or Divisional officer, the operator-in-charge and, if possible the fire chief Any modifications or changes to the fire fighting equipment must be entered in the station log.

Whenever work is to be performed on the fixed fire fighting equipment such as the multi tire or sprinkler systems, fire pumps fire alarms or the controls of any of any of the foregoing, a Permit-to Work (HOLD ORDER) must be obtained.

05C.03 Any new equipment or changed condition of old equipment of different methods of using equipment should be promptly explained in local instructions issued by the station or Divisional Officer.

SECTION 05D Procedure in Case of Fire.

05D.01 Any employee becoming aware of a fire on PGCB property will proceed as follows --

1. Sound the fire alarm where possible.
2. Notify the operator-in-charge.

3. Call for assistance immediately from any employee.

4. Cal the fire service department only if authorized to do so.

5. Use appropriate fire tightening equipment and direct the fire fighting with the personnel available until relieved by the fire chief or deputy fire chief. Procedures and equipment used must be as outlined in the Fire Fighting Manual.

6. To avoid danger to personnel, no attempt should be made to fight a fire on equipment operating at 400 volts or above without first having the equipment properly de-energized. This does not apply to remotely controlled fire extinguishing equipment which can be operated before the electrical apparatus is cleared.

05D.02 Special equipment such as breathing apparatus and fire protective suits should be used only when strictly necessary and then only be authorized, trained personnel accompanied by another person acquainted with fire fighting practices.

05B.02 When the fire alarm is sounded, all available men must report immediately to the location assigned for this purpose.

SECTION 05E Fire Fighting

05E.01 Periodical inspection/test and demonstration must be carried out. The following check list is furnished to remind of more important things to look for if one is called upon to make fire prevention inspection:

1. Electrical Equipment: Switches, Insulation, Fuses, Earthing.

2. Matches or Smoking: Confined to places permitted. Safety matches only used.

3. Heat Hazards: No combustible material in contact with steam pipes, furnaces, flues etc. Ashes in metal containers.

4. Flammable liquids: Stored in approved places, Safety Cans used, Tanks, Drums and Cans in good order. No leak.

5. Oil and paint: Stored in approved places, No leaks, Dripping properly disposed of

6. Combustible Materials: Stored in approved bins or containers.

7. Only Rags and Waste: All in approved metal receptacles.

8. Gas: No leaks, turned off when not in use.

9. Refuse: In approved Containers, Disposed daily.

10. Lockers and Closets: Kept neat. No accumulation of rubbish.

11. STANDPIPE AND FIRE HOSE. All fire hose shall be kept properly connected to the standpipe at all times, nozzle attached and ready for instant use.

12. FIRE TRUCK. The truck should be in perfect condition to start on instant warning and its tank must be full of water.

Pumps, hose, nozzle and other fixtures must be ready for instant use. Periodical checks and demonstration must be made. All personnel shall be alert and ready for any emergency.

05E.02 Fire Fighting equipment: In place easily accessible, in working order, Sprinkler valves open, Sprinkler head unobstructed, alarms in working order, If Fire Truck, Tank full water, Pumps, Hose-nozzle etc. in proper condition, and personnel alert and ready Refill extinguishers as soon as they are:

I) CARBON DIOXIDE AND DRY POWDER shall be kept properly filled according to the MANUFACTURER'S specifications and inspected at least annually. Carbon dioxide extinguishers shall be weighed at regular intervals as reprimanded by the manufacturer.

ii) SODA ACID EXTINGUISHERS shall be inspected periodically and emptied and recharged at least once every 12 months. Each extinguisher shall bear a Card a giving the date of the last recharge. Extinguishers of this type shall be used only on free burning fires and under no circumstances on energized electrical equipments.

!I!) FOAM TYPE EXTINGUSHERS are effective for oil fires. They shall not be used to extinguish electrical fires, foam extinguishers shall be emptied and, recharge at least once every year and have card attached showing date of each recharge.

iv) FOG EXTINGUSHERS. Water Under Pressure, when discharged through special nozzles, produces at for which is very effective in extinguishing all types of fires. As the name implies. the water in fine spray and not a solid stream. It is especially efficient in extinguishing fires involving transformers, oil switches and burning combustibles near electrical equipment. Before directing fog near energized high-voltage conductors, allow air and scale to clear from system and see that fog, not a solid steam, is produced. Keep clearance of over 3 meter from energized high-voltage conductors up to 132 kilo volts.

SECTION 03F Classification of Fires

05F.01 Classification of fires is the systematic arrangement in classes of the various substances that as fuels produce heat by combustion, as follows:

Class A-Ordinary materials such as wood, paper and textiles. Class B -Flammable liquids such as oils and greases.

Class C-Live electrical equipment

05F.02 Class A Fires: Fires coming under the "A" classification are fires with ordinary materials such as wood, paper, textiles, rubber, rubbish etc. These fires are generally handled best with a good solid stream of water to break up and penetrate the burning material. On most ordinary fires any of the common class A extinguisher which use large percentages of water may be used, such as

Class A Extinguisher: Soda- acid extinguishers, antifreeze pump-tank extinguishers, Calcium chloride extinguishers Foam extinguishers, Loaded steam extinguishers Fire pails.

The action of all the above extinguishers is by cooling the burning substance below its ignition temperature and by excluding of these methods. Some types tend to inhabit oxidation by chemical action.

05F.03 Class B Fires: Flammable/inflammable (identical in meaning) liquids do not themselves burn or explode, but as pointed out previously, the gases or vapors formed when they are heated and evaporated explode; that is, the change of state from liquid to gas must first occur. As long as they are in a liquid state with no vapors being given off there is little or no hazard. for the more volatile liquid, such as gasoline, storage in a closed container is a necessity. In order for any vapor to explode it must have the correct vapor-air ratio, just as in the carburetor of a car. When the engine is choked with gas the mixture is too rich, and fails to ignite. The same hold true in gasoline storage.

The danger is when the gas is being poured from one container to another, thus giving the vapors the chance to mix with the correct amount of air to form an explosive mixture. The same circumstances hold true for all flammable oils when enough heat is present to release vapors from the liquid.

Class B Extinguisher: With the above facts in mind, flammable liquid fires may be fought with any of the following.

Class B extinguisher: Water with a fog nozzle Chemical or mechanical foam Carbon dioxide (C02) Dry Chemicals.

Keeping in mind that a flammable liquid is not hazardous as long as it is not hot enough to give off vapors which can mix with the oxygen in air and burn two things can be done: (a) The liquid can be cooled down to the point where no vapors are given off; and 9(b) The supply of oxygen can be blanketed out. Both of these can be accomplished with any one of the Class B extinguisher listed above some flammable liquids off vapors at temperature ordinarily considered cold for example, gasoline vaporizes at -450 F or Lower.

The use of Water with a fog nozzle works very effectively on a flammable liquid, as it completely covers the burning surface with a fine spray which cools the surface, dilutes the flammable vapors, or emulsifies the flammable readily mix with water will form either a foam or an emulsion having proportion of water.

05F.04 Class C fires: In fighting an electrical fire there are two important things to be taken into consideration: namely, damage to the equipment far beyond what the fire could do, and danger to the individuals fighting the fire. To avoid these two possibilities, de-energize the circuit and use only the types of extinguisher recommended for Class C fires, as follows:

Class C Extinguisher: Carbon tetrachoride/Carbondioxide (C02) Dry chemicals water with fog nozzle.

For small electrical fires, such as fires in insulation of cables, windings on motors, etc., any one of the first three class C fire extinguishers may be used before the circuit is de-energized without danger to the operator or to the electrical equipment, due to the fact the extinguishing agent is a non-conductor. De-energize the circuit as soon as possible.

CHAPTER 06

Division of Responsibility

Section 06A Responsibilities of Load Dispatchers and System Operators.

06A.01 The load dispatcher and system operator are responsible for efficiently coordinating the operation of the stations and transmission lines of PGCB high voltage power system (from 132 KV and above) in order to assure continuous and satisfactory service to the customers.

06A.02 the load dispatcher is responsible for allocating loading to all generating stations and for the general safe allocation of load over the interconnected electrical systems. He also responsible for maintaining power interchange over the system, for load frequency control and for general hydraulic and thermal operation in an economic manner.

06A.03 The system operator is responsible for system electrical operation, system voltage and var control, line and equipment loading and the maintenance of service to customers, he has to simultaneously consider continuity, quality and economy while operating the system.

06A.04 The load dispatcher and/or the system operator have jurisdiction over the release of lines or apparatus when such release affects, or might affect, the operation of the system, as outlined in **06A.02.**

06A.05 The load dispatcher and system operator in carrying out their system operating functions are bound by the operating regulations as set forth in this standard operating code.

Section 06B Responsibilities of the operators-in-charge.

06B.01 The shift in charge is responsible to the Manager for the station or division. He must be familiar with these standing instruction or orders which apply to his duties under his supervision.

06B.02 The shift in charge is responsible for the safety of equipment under his supervision and will follow these rules and regulations and must exercise good judgment in case of emergency. When it is apparent that equipment must be taken out of service immediately to avoid serious damage, this should be done without the decay necessary to advice anyone. However, as soon as conditions permit, the supervisor in charge must be notified together with the system operator. In certain instances it may be possible to keep the equipment in service until it can be released with minimum inconvenience to the system service.

06B.03 The Shift in charge is responsible for the enforcement and observance of these Standing Instructions in the station or division under this supervision as far as they affect his duties and the duties of his subordinates. he is also responsible for seeing that any equipment or apparatus is in safe operating condition before it is returned to service.

06B.04 The shift in charge must co-operate with other persons in the application of the rules. Should any conflict or doubt arise as to the division of responsibility outlined in these Regulations the matter must be referred to the operators immediate supervisor.

06B.05 The shift in charge in responsible for safety of people working on feeders to the extent that they should which on or off, earth the feeder on request of foreman in charge of the workers.

Section 06C Responsibilities of the Foremen.

06C.01 Foreman will be held responsible for the general safety of the men under their jurisdiction and must see that all reasonable precautions are taken for their protection.

06C.02 When work is to be done by employees of the Production Organization of equipment located in plants of subsidiary allied or outside companies the Foreman must make himself familiar with the Hold Off system and regulations of these companies and

govern himself accordingly. Understand circumstance the Foreman must see that no work is done under conditions which are contrary to the principles laid down by this standard operating code.

06C.03 Foreman must see that equipment or apparatus released for repair is in a safe condition before returning it to the jurisdiction of the operating staff for service.

06C.04 All foremen are responsible for seeing that all tools safety appliances and equipment used by the men under their supervision are of an approved design and acceptable according to PGCB'S standards where they apply and that they are maintained in good condition at all times. Regular periodic inspections must be made by the foreman of the tools and equipment used and a record of such inspection kept on the forms provided for this purpose.

06C.05 In small stations where there is no Foremen the local supervisor will assume the responsibilities of foreman outlined above.

06C.06 When two more men are working on a job and they are under the immediate direction of a foreman one of the men must be appointed by the supervisor or foreman as "charge hand and the man will then assume the responsibilities of the foreman for that job.

Section 06D Responsibilities of Site-in-charge.

06D.01 When persons are to carry out work where an element of danger may be introduced due to their lack of familiarity with the equipment of working area, a watchman (Site in Charge) will also be employed when work is to be carried out by any group of men where there is an element of danger due to the proximity of live apparatus or other hazards. Manager must issue a list of men authorized to act as watchmen in their station or Division.

06D.02 Under the jurisdiction of the man in charge it is the duty of the watchman to see that.

1. The men under his care do not inadvertently move out of the safe working zone.

2. Dangerous move of men or materials are prevented.

3. All personnel wear appropriate personnel safety equipment. 4. All necessary safeguards are provided and maintained.

5. All hazards are eliminated as far as possible.

6. All hazards which cannot be eliminated are fully explained to the men.

7. Unauthorized personnel do not enter the danger area.

8. He wears an Identification Badge.

06D.03 The Site-in-charge must be on the job before any work is started. If he is called away or has to leave for any reason work must stopped until he has returned or another Site-in-charge is appointed.

06D.04 If the work has been stopped for more than 45 minutes and always after meal periods the watchman must ascertain from the man in charge that he has checked with the operation to see that working conditions have remained uncharged during the interval or that no unusual circumstances have occurred which might render the job more hazardous.

06D.05 When workman has permission to leave his work he must report to the Site-in-charge when leaving and returning.

06D.06 The Site-in-charge must be advised of all changes in location of work and in the number and locations of protective grounds and safeguards.

06D.07 A watchman must not be required to watch more than 10 men at any one time. Under certain circumstances it may be necessary to limit the number to one or two workmen. The number of the men in the gang must not be changed without first notifying

the watchman.

06D.08 The watchman is directly responsible to the Operator in-charge for the safety of the men in so far as all hazards are concerned. The engineer-in-charge must have the work stopped if the watchman considers working conditions too hazardous. Any disagreemention this point must be referred to a higher authority before work is resumed. In the case of immediate of urgent danger the watchman has the authority work instantly.

06D.09 The presence of the watchman dose not relieve the man in charge for the safety of his men from his responsibility

06D.10 When a watchman is required in connection with a HOLD ORDER, the operator and the man in charge are jointly and separately responsible for seeing that a watchman appointed and the operator must give him the same warnings as to restrictions, limitations, and dangerous features as are given to the holder of the HOLD ORDER. He must be supplied with and must wear a Identification badge during his appointment. Manager must issue a list of men authorized to act as watchmen in their station or Division HOLD ORDER will not be issued to men acting as watchmen except in the case where they are the PGCB's representatives on a job being carried out by a contractor, customer of other than Department employees.

Section 06E Responsibilities of Local Supervisors.

06E.01 When word "supervisor" as here used, refers to the ranking man of a station or Division such as station or DM, AM, J.A.M. or other such employee who exercises local executive or administrative duties delegated by the Manager or the Department.

06E.02 The local superintendent is responsible for efficient station operation and the maintenance or all physical assets under his jurisdiction. All other supervisors under his direction are available to assist him in discharging these responsibilities.

06E.03 It is the duty and responsibility of such supervisors to see that all workmen are familiar with the General Regulations and Standard Operating Code of the Department and that workmen use safe working methods, tools and equipment.

In the case of temporary employees, the Local Supervisor must see that they are properly instructed according to the training manual prepared for this purpose and that they are also made familiar with the General Regulations as applied to their duties.

06E.04 Local Supervisor are responsible for keeping each other and all employee under their jurisdiction informed concerning all matters which may affect the safe and efficient function of the station or Division under their supervision.

06E.05 If it becomes necessary for a Local Supervisor to give orders directly to workmen, he immediately assumes the responsibilities or the Foreman or charge hand. the Local Supervisor must advise the Foreman or charge hand concerning such orders at the earliest opportunity.

06E.06 The station or Division Manager or his representative must make every effort instruct his men in accident prevention and the importance of continuity of service.

06E.07 In the various chapters throughout this Code, station or System Manager are made responsible for certain approvals or decisions. In the Manager's absence, DM/AM or "supervisor on duty" will assume these responsibilities.

CHAPTER 07
EARTHING (GROUNDING)

SECTION 07 GENERAL

07A.01 Earthing systems are of great importance for protective purposes. Any failure to carry out effective earthing exposes persons to the risk of shock or burn. All metal work which encloses, supports, or otherwise is associated with electrical conductors and apparatus, unless designed to be energized must be connected with earth.

SECTION 07B PERMANENT EARTHING.

07B.01 Permanent Earthing of Equipments shall be as specified in station and Transmission Line Standards.

07B.02 Temporary installations of electrical equipment must be properly earthed in the same manner as permanent equipment.

07B.03 The secondary circuits of low voltage transformers supplying local lighting or power should be earthed as required by the Electricity Act 1910.

07B.04 The casings of all electrically operated tools, weather portable or stationary, must be properly earthed whenever feasible before employees are permitted to operate them.

SECTION 07C TEMPORARY EARTHING

07C.01 special care should be exercised to avoid bodily contact with normally live electrical circuits unit they have been properly earthed.

07C.02 Temporary earthing of electrical equipment, cleared for work, will safeguard employees from electrical shock or burns in the immediate vicinity of the temporary earths.

07C.03 Temporary earthing is to be carried out by means of portable earths (ground or earth sticks) in substation and generating station work, it is permissible to use earth switches if they are at the location of the work.

07C.04 Portable earths (ground or earth sticks) must conform to the specifications in station and Transmission line standards.

07C.05 As far as practical, no man should work at a point where he is out sight of the earths which protect him. When work is to be carried out on transmission lines/distribution lines, protecting earths must be applied on all phases at the immediate location of the work. If this is not possible, the earths must be applied on ail phases on both sides of the work and as close to the work as possible. This applies whether or not earth switches have been used.

07C.06 When it is necessary to cut a line, bus bar, loop, or to repair a broken conductor or damaged loop, earths must be place on all phases on each side of the work and as close as possible to it.

07.CO7 Should there be any switches between the work and the earth point, earths must be applied on the side of the switch or switches adjacent to the work, unless such switch are securely locked in the closed position and a "Men Working" tag attached to the operation control point or points.

07C.08 There must not be any fuses in the circuit between the protecting earths and the location of the work

07C.09 Permanently installed single or double pole earthing switches do not provide completed earthing of there phases circuits, the other conductor or conductors must be earthed as well.

07C.10 Before any apparatus or circuit is earthed for work, it must first be satisfactorily tested for "no voltage" on all phases using an approved device suitable to the voltage in question.

07C.11 When installing temporary earths on transmission lines/distribution lines and other electrical apparatus, the step-by procedure detailed below must be strictly followed:

1. Test each phase for "No voltage"
2. Attach the earth clamp to the earthing point.
3. Securely attach the safety chain loop around the earthing
4. Place the conductor clamp of the earth stick on the conductor using the insulating stick.

When removing temporary earths, the step-by-step procedure detailed below must be strictly followed:

1. Remove the conductor clamp from the conductor using the insulating stick.

Then:

2. Detach the safety chain.
3. Remove the earth safety chain

Caution: Employees must, take care to avoid contact with the bared during the period when they are actually making or breaking the earth connection with the conductor.

07C.12 Employees who are used in the application of temporary earths must be trained and periodically checked concerning their knowledge of the proper method of application and removal of temporary earths (earth sticks).

07C.13 No work must proceed on or near the electrical conductors of any transmission lines/ distribution lines, bus bar, or other electrical apparatus, operating at a nominal voltage of 400 volts or above, unless all conductors have been properly earthed. This does not apply when PERMISSIONS are issued live station work.

07C.14 Insulated cables and certain other electrical apparatus such as heavy current, low voltage equipment, where earths might be more of a hazard than a safety precautions, and/or in cases where it is not practicable to apply proper earths, they may be exempted from these regulations. The station or Divisional officer must issue a local operating instruction, stating clearly, within limits which apparatus under his jurisdiction is exempt from the general earthing regulations must clearly define the precautions which are to be taken.

07C.1 5 Telecommunication Equipment, Relay and other such circuits which are exposed to induced voltage or accidental contact with power circuits must be earthed for work. The station or divisional officer will issue local operating instructions covering the procedures to be used when work is to be done on such circuits.

SECTION 07D Authority and Responsibility of Temporary Earths

07D.01 Any Temporary earth installed by the operator or ordered installed by the operator for permit-to-work purposes must be considered solely under the control of the operator and no one must interfere in any way with these safeguards.

07D.02 If desirable a maintenance man may install additional temporary earths on equipment covered by his permit-to-work in force. Linemen are obliged to install their own temporary earths.

07D.03 The man in charge is responsible on the completion of the job, for the removal or all temporary earths placed by himself or by his orders. All temporary earths must be counted on their installation and removal in order to check that all have been removed.

07D.04 It is in the right of every employee to be protected and he may request additional temporary earths which in his opinion are required if the man in charge is undecided as to the reasonableness of the employee's request of extra protection, he should grant the request for extra protection or obtain instruction from his supervisor.

07D.05 NO MATTER WHAT WORK IS TO BE PERFORMED, THE FIRST CONSIDERATION MUST BE THE SAFETY OF THE MEN.

SECTION 07E Earthing Equipment for use on High Voltage Apparatus:

07E.01 Approved Portable Earthing leads for use as circuit Main Earths.

1. The portable EARTING leads, that are to be used as CIRCUIT MAIN EARTHING shall be of such a size and design so as to be capable in use of carrying the full rated short circuit earth current if a LIVE circuit, was in error closed on to them at the position where had been applied.

2. The choice of the cross sectional size of such leads will depend on the short circuit levels of the electrical system which they are to be used. However in practical terms the voltage of the electrical system and the rating of the installed switchgear, can generally be used to determine the cross sectional size that will be adequate.

3. The choice of fittings for line, earth end clamps and the length of the leads will depend on the APPARATUS on which the portable EARTHING leads are to be applied.

4. Leads for use in sub-stations with exposed HIGH VOLTAGE conductors shall be of a length suitable to reach from the DEAD conductors to the nearest substation EARTH bar. The line and clamps shall be of a design suitable to enable an effective condition to be made at both ends.

5. Leads for use on wood pole over head lines conductors, shall be of a design suitable for applying a line end clamp to each conductor and effectively terminating at the other end on a junction, from which a lead of sufficient length and size connects to EARTING rods which can be driven into the earth.

6. If portable EARTHING leads are required as CIRCUIT MAIN EARTHS on steel tower overhead lines, then those specified for use in sub-stations with exposed HIGH VOLTAGE conductors can be used providing that the line end clamps are suitable for applying to the overhead conductors and the earth end clamps are suitable for Connecting to steelwork of the tower.

07E.02 Approved Portable Earthing leads for use as Additional Earths

1. An overhead line circuit which has been DEAD, ISOLATED and EARTHED at each end, can have dangerously high voltages induced onto its conductors from adjacent circuit on a double circuit overhead line or by natural phenomena.

2. The effects of this induced voltage can be completely removed when ADDITIONAL EARTHS are correctly fitted at, or near, the point of work on the conductors. If a break is to be made in the conductors of an overhead line circuit, then ADDITIONAL EARTHS shall first be applied, as dangerously high voltage can occur across the break.

3. The portable EARTHING Leads, that are to be used as ADDITIONAL EARTHS, shall be of such a size and design so as to be capable in use of preventing and induced voltage, at the point of work, on a already EARTHED conductor.

4. The choice of the length *of* such leads, their cross sectional size and design features, line and earth end clamps shall depend on whether they are to be used on wood pole or steel tower overhead lines.

5. For wood pole line it may be practicable, and operationally prudent, for the same portable EARTHING leads, as specified for CIRCUIT MAIN EARTHS to be used as ADDITIONAL EARTHS.

6. The portable EARTHING leads for use as ADDITIONAL EARTHS on steel tower overhead lines, may be of a smaller cross sectional size than that required for CIRCUIT MAIN EARTHS duties, but shall be of sufficient length to span from the overhead conductors to be steelwork on the body of the tower. The fine and earth end clamps shall be of a suitable design for this purpose.

CHAPTER 08

Clearing Apparatus for Work

SECTION 08A Regulations concerning the clearing of Apparatus for work

08A.01 Clearing apparatus for issuing HOLD ORDER (Permit to work) requires the almost care to avoid overlooking some source of back feed in the case of electrical equipment. In the case of mechanical equipment, the possibility of some valve gate or safety block not being in the correct position must not be overlooked.

08A.02 When clearing electrical apparatus for work, it must be isolated from all possible sources of potential by an adequate visible air gap.

08A.03 When clearing transformers or regulators for work or when any work is to be carried out on or around such equipment, special precautions must be taken to see that the gas detector relay trip circuits, thermal trip circuits or other such protective devices are properly blocked before starting any work.

08A.04 Equipment such as circuit breakers, concealed blade disconnects etc. which do not provide a clearly visible air gap, must not be employed as a means of isolation. Isolators Incorporated in the mechanism of oil poured or air blast circuit breakers must not be used for this purpose. Some means must be provided to establish an air gap. e.g. open loops removal of bus section, etc.

08A.05 Draw out types of metal clad circuit breakers provides satisfactory isolation when removed.

08A.06 The gaps must be visually inspected to make certain that the circuit is fully open all phases.

08A.07 When a motor or air operated disconnector is used to isolate equipment covered by a HOLD ORDER, the disconnect switch must be blocked positively in the open position where the mechanism is suitable, the disconnection switch must be mechanically disconnected from the motor or air mechanically and blocked and locked in the open position.

All fuses in the control circuit must be removed and/or the source of air supply to the operating mechanism shut off, air in the supply line drained off and the controller tagged. If a disconnect switch can't be blocked positively in the open position, it must not be used to isolate equipment covered by a HOLD ORDER.

08A.08 When clearing electrically remote controlled equipment, all fuses of all control circuits involved must be removed on all legs.

08A.09 In the case if equipment containing stored energy such as compressed spring, compressed air, etc, the energy must be released whenever practicable before a HOLD ORDER is issued.

08A.10 When shutting off pipelines supplying air, oil or water to equipment being cleared, drain valves should be left open.

08A.11 When clearing any apparatus for work, MAN WORKING, tags must be installed on all switch handles, controllers, fuse blocks, valves and all other control gear whose operation affects or might affect the apparatus being cleared for work. Grounding of all cleared electrical apparatus is to be carried out.

08A.12 In all cases when clearing a relay protection for work, reference must be made to the standard and local operating instruction applicable to each location.

08B Protection from HV Back feed.

08B.01 Equipment that is protected by a 'Work Clearance' may be prone to High Voltage back feed. It may occur in a dead bus through LV side of transformer connected to the bus if LV side is connected to a bus fed from other sources also. These things are sometimes overlooked which should be considered seriously for safety of the persons working.

CHAPTER 09

Hold Order System

(Permit To Work) System

SECTON 09A General Description

09A.01 The purposed or the standard HOLD ORDER system is to give protection to employees when working on electrical or other equipment. All types of HOLD ORDER may only be issued by the operator-in-charge.

09A.02 The HOLD ORDER gives authority for definite work to be done on specified apparatus and guarantees that certain conditions with be maintained which this work is being carried out.

09A.03 A HOLD ORDER may be issued in any one of the following forms :

a) Clearance for work

1. Written clearance for work
2. Verbal clearance for work

b) Permission for work:

1. Written work and test permit,
2. Verbal work and test permit,
3. Verbal Permission for work on live lines
4. Verbal permission for work on live station equipment.
5. Verbal Permission for work on relay protections control, metering and communication circuits.

SECTION 09B Regulations concerning the HOLD ORDER system

09B.01 No one is permitted to change, adjust, disturb or in any way interfere with apparatus which is in service or which is being held in reserve and ready for immediate service without the knowledge and permission of the operator-in-charge.

09B.02 Before any work is started on transmission lines, station, equipment or any apparatus including protection, control, metering, communication, fixed fire fighting equipment and pressurized systems, whose shutdown or removal from service affects or might affect the operation of a station or a system, the man in charge must first obtain a HOLD ORDER from the operator-incharge, irrespective of and in addition to any previous arrangements made or order issued by the operator's supervisors or any other person. No HOLD ORDER will be issued to anyone not directly associated with the station or Division unless special arrangement has been made with the Manager/ DM/AM.

09B.03 The applicant for HOLD ORDER must advise the operator as to:

1. The type of HOLD ORDER required.
2. The apparatus to be covered by the HOLD ORDER.
3. The nature of the proposed work.
4. The estimated time of completion.

In addition the applicant must give any other information which is necessary for a complete under standing between himself and the operator.

09B.04 A verbal WORK/TEST PERMIT must not be issued to an operator for subsequent reissue. It must be issued directly to the man in charge of the work.

09B.05 With the exception of a WORK/TEST PERMIT it is permissible for an operator in charge to obtain a verbal HOLD ORDER from the system operator and them to issue subsequent HOLD ORDER to the men in his own station or jurisdiction.

09B.06 Station or Divisional Officer must issue a list of men capable and authorized to receive each type of HOLD ORDER on specified lines and equipment. A copy of this list must be supplied to all operating headquarters having jurisdiction in that area. The operators will issue HOLD ORDER only such authorized persons. The list must be reviewed and if necessary revised every six months.

09B.07 All personnel authorized to take verbal HOLD ORDER by telephone or radio must be supplied with a diagram of the line or apparatus involved, showing the clearance points. When issuing and returning verbal HOLD ORDER they must be repeated back to avoid any misunderstanding.

09B.08 The DM/AM of the station or Manager must see that the operation personnel of Divisions/Stations are made familiar with the PGCB'S regulations, concerning the HOLD ORDER system. These Regulations must be strictly adhered to at all times when HOLD ORDER is being issued on the PGCB's equipment.

09B.09 Only one WORK/TEST PERMIT may be issued on any given place of equipment at one time. Special care must be exercised to ensure that the number of HOLD ORDER issued on any one specific place of apparatus is kept to a minimum. NOT more than four HOLD ORDER are to be issued on a specific place of apparatus at the same time unless special arrangements have been made. All HOLD ORDER issued on the same line or place apparatus are to be grouped and recorded in sequence on the station log. Also, appropriate separate operating diagram pins are to be used for each HOLD ORDER.

0913.10 At attended station, the operator, before issuing any HOLD ORDER, must accompany the applicant to the cleared apparatus pointing out the location of all protecting grounds and warn him of any features which area hazard to personnel or service and which should be guarded against, in the case of remote unattended stations or lines, the same warnings must be given verbally.

09B.11 In the case of a supervisory controlled station, verbal HOLD ORDER are to be use and some of the necessary switching may be required to be done by the applicant under orders of the operator in charge. In these instances, the applicant must be familiar with the equipment concerned, standard and /or local Operating instructions and must adhere strictly to the rules regarding the use of Switching Order Forms. The operator instructions must be followed explicitly.

09B.12 After a HOLD ORDER has been issued, the operating staff must not make use of the specified apparatus until all HOLD ORDER on that apparatus have been properly returned and accepted. For live line and live station work, see Section 09K.

09B.13 Workmen are permitted to transfer from one type of HOLD ORDER to another as often as desired provided the proper procedures, especially the WORK/TEST PERMIT limitations, are always followed and that the limitations and governing conditions of each type of HOLD ORDER are strictly observed.

09B.14 The operator must register in red ink the issuing and return of all HOLD ORDER in the station or office log sheets and log books giving:

1. Time.
2. Name of person to whom the HOLD ORDER was issued.
3. Designation of the apparatus or line and the limiting points between which the HOLD ORDER applies.

In addition, the operator must insert the appropriate pins on his pin diagram indicating the limits of the line or apparatus on which the HOLD ORDER has been given.

09B.15 The operator after issuing a HOLD ORDER may demand its return under urgent or unforeseen circumstances. If the man in charge, to whom the HOLD ORDER was issued, considers the apparatus unsafe for use or his work so advanced that the apparatus cannot be made available for service immediately, then he must refuse to return his HOLD ORDER. The matter must then be referred to the station or Divisional Officer.

09B.16 If, after completion of the work on which a HOLD ORDER has been issued, the holder leaves without returning same to the operator, such holder will be personally responsible for returning the HOLD ORDER properly signed at whatever hour it may be required. If due to accident, sickness or any other reason it is impossible for the holder to return a HOLD ORDER, the apparatus must not be placed in service by the operator, without the approval of the station or Division Officers concerned who will take immediate steps to advise the holder and all other persons concerned.

09B.17 After the work has been completed, the man in charge must notify each of the employees under his charge on that job to remain clear and that he intends to return his HOLD ORDER. The man in charge must see that his own grounds and/or safeguards, if any, are removed but must not interfere with the grounds and/or safeguards, if any installed by the operator or other parties. The HOLD ORDER must then be properly returned to the operator in charge stating the number of temporary grounds installed and removed. No further work must be done unless a new HOLD ORDER is obtained.

09B.18 While a HOLD ORDER is in force the holder of any type of HOLD ORDER must report frequently to headquarters. At least one report should be made every two hours unless other arrangements have been made. While a HOLD ORDER is in force, if the work is discontinued for more than 45 minutes, and always after meal periods, the holder, prior to restarting work, must report to the operator either in person, by telephone or by VHF/Mobile, in order to make certain that no changes have been made in his absence which would make conditions in vicinity of his work more dangerous than before. For live line work HOLD ORDER see Section 09H.

09B.19 With the exception of live line work, a HOLD ORDER must not be issued to allow work to be carried out on an open disconnect or any other type of air break switch has one side alive except when absolutely necessary and then, only with the approval of the station Divisional Officer.

09B.20 If, after all normal precautions have been taken, there still remains an element of danger which requires that the work

be very carefully supervised HOLD ORDER is to be issued except with the approval of the station or district superintendent.

09B.21 When retuning a HOLD ORDER on circuit breakers or disconnecting switches, they must be left in the open position, unless arrangements to the contrary have been made. In returning a HOLD ORDER, the holder must specify the operation of the apparatus involved.

09B.22 When returning any HOLD ORDER the workman must advise the operator of any changes which have been made which might affect the operation of the equipment. Such advice should be made in writing, it possible when necessary with explanatory sketches. Such information must be recorded in the station log and the supervisor in charge advised.

09B.23 When all HOLD ORDER have been properly returned, the operator will remove all ground and safeguards installed by him or the operator on their shifts. He must then see that all tags and danger signs are collected and when possible, make a thorough visual inspection over the area covered by the HOLD ORDER and if desired; take the necessary steps to return the apparatus to normal service.

09B.24 Should the holder's part of a **HOLD ORDER card be lost** or mutilated so that it becomes unreadable, the holder must advise, the operator who will take the corresponding operator's portion and write across it "Workman's stub lost –cancelled Replaced by Card No. .....". The holder must sign the operator's portion to indicate such was the case. The operator will then make out a new card identical to the original except for the new number. The card will then govern the case.

09B.25 When a watchman is required in connection with a HOLD ORDER, The operator and the man in charge are jointly and separately responsible for seeing that the watchman is appointed and the operator must give him the same warnings as to

restrictions limitations, and dangerous features as are given to the holder of the HOLD ORDER he must be supplied with and must wear a identification Badge during his appointment.

Manager (Divisional Officer) must issue a list of men authorized to act as watchmen in their station or division. HOLD ORDER will not be issued to men acting as watchmen except in the case when they are the PGCB'S representatives on a job being carried out by a contractor, customer or other than Department employees.

0913.26 When HOLD ORDER have been issued on line feeding a particular area no HOLD ORDER will be issued on other circuits feeding the same area if there is danger of jeopardizing service.

SECTION 09C Regulation covering a Written Clearance for Work

09C.01 The written CLEARANCE FOR WORK is to be used at attended stations where the apparatus concerned is under the jurisdiction of the station operator, and when the work to be done does not require that the apparatus be operated or energized during the course of the work and when the original safety precautions taken by the operator will be maintained.

09C.02 It gives authority to the holder to work on the specified apparatus. It is also a guarantee that the apparatus has been taken from service, will remain out of service, cleared for work and that the operator-in-charge has taken all precautions for the protection of men, equipment and service as required by this Code. In the case of apparatus at all stations the operator will be responsible for the closing of ground switches and/or having temporary grounds applied where required by this Code, in the case of transmission lines, the operator will have the live terminations grounded where ground switches have been provided and will advice the applicant whether the line is or is not grounded.

It is the duty of the recipient to apply his own temporary grounds at the location fo the work.

09C.03 The type of card to be employed for a written CLEARANCE FOR WORK is shown in Appendix A. It consists of two portions body and stub, with certain printed instructions and space for definite entries by the operator and the applicant for the

CLEARANCE FOR WORK, each of whom keeps his half of the card while the job is in progress. When issued, the body and stub must bear the same date, time and card number.

09C.04 It is permissible to issue more than one written CLEARANCE FOR WORK at the same time on the same apparatus. When two or more foremen are to work independently on the same equipment, a separate CLEARANCE FOR WORK must be obtained by each Foreman. If however, one foreman is appointed to take complete responsibility for the supervision and safety of all parties, then for all practical purposes there is only one foreman and a single CLEARANCE FOR WORK can be employed.

09C.05 When more CLEARANCE FOR WORK are out on the same or related apparatus and it becomes necessary to make a test or a trial, such testing is only to be carried out after all CLEARANCE FOR WORK have been returned to the operator and cancelled.

SECTION 09D Regulations covering a Verbal CLEARANCE FOR WORK

09D.01 A verbal CLEARANCE FOR WORK is to be employed in connection with work on transmission lines or at unattended or semi-attended stations where the operator has not been qualified to issue HOLD ORDER on equipment remote from an attended station where it is impractical for a written CLEARANCE FOR WORK card to be employed. A verbal CLEARACNE FOR WORK will in general be governed the regulation covering the issue of a written CLEARANCE FOR WORK.

09D.02 To avoid overlooking any verbal CLEARANCE FOR WORK, the operator's section of a CLEARACNE FOR WORK card must be filled in and the holder's stub marked to indicate that a verbal CLEARANCE FOR WORK has been issued to a specific employee. This CLEARANCE FOR WORK card must be retained until the verbal CLEARANCE FOR WORK has been returned.

SECTION 09E Application of HOLD ORDER System to Lines and Line Equipment at Attended Stations when a Combination of Written and Verbal HOLD ORDER Is employed.

09E.01 When it is required to work on lines, line disconnecting switches, line entrances or other apparatus on the lines at an attended station, where the station operator has not complete jurisdiction as to the assuring of CLEARACNE FOR WORK on such equipment, the procedure outlined below will be employed.

09E.02 The employee in charge of the work must apply to the station operator for a written CLEARANCE FOR WORK.

09E.03 The station in charge of the work must apply to the station operator or Divisional Officer/Operator, who has jurisdiction as to HOLD ORDER on that line for verbal CLEARANCE FOR WORK.

09E.04 The System Operator, after having the apparatus prepared for the CLEARANCE FOR WORK, will issue a verbal CLEARANCE FOR WORK to the station operator.

09E.05 The station operator will log the receipt or the verbal CLEARACNE FOR WORK. He will then follow in all respects the procedure with reference to the issuing of CLEARANCE FOR WORK, after which he will issue a written CLEARACNE FOR WORK to the applicant. In addition, the operator will write across the face to both sections of the card.

"VERBAL CLEARANCE FOR WORK on .....

received from ..... at .....

09E.06 When the work is finished and CLEARANCE FOR WORK cards have been returned, the station operator will see that all grounds and safeguards, other than those placed under instruction from the system Operator / Divisional Officer, are removed and it is safe to place the line/equipment back in service. The station operator must not interfere with any ground switches closed, or safeguards applied, under instructions from the system operator without their consent.

09E.07 The station operator will then return the verbal CLEARANCE FOR WORK to the operator from whom it was received and log the return of such CLEARANCE FOR WORK.

09E.08 When entering a verbal CLEARAFNCE FOR WORK, the station operator must always advise the system or Divisional Officer/Operator as to the position of all ground switches involved.

SECTION 09F Regulations covering a Written Work Permit

09F.01 The written WORK/TEST PERMIT is to be used at attended stations where the apparatus concerned is under the jurisdiction of the station operator and when the work requires the apparatus to be operated or energized during the course of the work or when the nature of the work is such that the precautions taken by the operator cannot be maintained for the duration of the job.

09F.02 This WORK PERMIT gives authority to the holder to carry out work and tests on specified equipment it guarantees that the holder is the only party working on that equipment and that condition will not be changed by the operator except at the request of the holder.

09F.03 The type of card to be employed for a written WORK PERMIT is shown in Appendix A. It consists or two portion, body and stub, stub, with certain printed instructions and space for definite entries by the operator and the applicant for the

WORK PERMIT each of whom shall keep his half of the card which the job is in progress. When issued, the body and stub must bear the same date, time and card number.

09F.04 A WORK PERMIT must be issued by the system operator or operator in charge directly to the applicant.

09F.05 It is forbidden to issue a WORK PERMIT if the apparatus concerned is already covered by another HOLD ORDER. After a WORK PERMIT has been issued on a place of apparatus, under no circumstances is any other HOLD ORDER to be issued on this same equipment or apparatus.

09F.06 When a WORK/TEST TEST PERMIT is issued, the apparatus must be handed over to the applicant with the same safeguards in place as would apply for a CLEARANCE FOR WORK. The applicant, after he has obtained the WORK/TEST PERMIT grounds and other safeguards as placed by the operator as he considers necessary for the progress of his work in so doing, he automatically relieves the operator of and personally assumes responsibility for any consequences resulting from the removal of such safeguards.

09F.07 In connection with the actual work and tests to be carried out the following limitations will apply:

1. The primary control devices or the apparatus, located in the control room, must be manipulated only by the operator or his delegate.

2. The apparatus worked upon must on no account be allowed to become connected to or in any way involved with other apparatus not covered by the WORK/TEST PERMIT, without the consent of the operator.

3. Request by the holder for changed conditions must be entered on the operator's portion of the WORK/TEST PERMIT.

4. At the request of the holder and at he operator's discretion, the latter will remove the ground and safeguards provide, if that interfere with the work. If the operator refuses the request the matter must be referred to the local superintendent.

SECTION 09G Regulations covering a Verbal WORK/ TEST PERMIT

09G.01 A verbal WORK/TEST PERMIT is to be employed in connection with work on transmission lines or at unattended, or semi-attended substations where the operator has not been qualified to issue HOLD ORDER, on equipment remote from an attended station where it is impractical for a written WORK/TEST PERMIT card to be employed. A verbal WORK/TEST PERMIT will in general be WORK/TEST PERMIT.

09G.02 To avoid overlooking any verbal WORK/TEST PERMIT, the operator's section of a WORK/TEST PERMIT card must be filled in and the holder's stub marked to indicate that a verbal WORK/TEST PERMIT has been issued to a specific employee. This WORK/TEST PERMIT card must be retained until the verbal WORK/TEST PERMIT has been returned.

SECTION 09H. Regulations covering a Verbal Permission for work on or Near Live Lines

09H.01 These regulations are drawn up to cover live line work on lines energized at 66 KV and above. Their express objective is to protect personnel which carrying out this work. If communication is lost with operating personnel during such work, a prolonged outage of an important circuit could easily result. All personnel involved in live line work must realize the importance of continuity of service.

It is imperative that while this work is being performed a channel of direct communication must be set up between the workman in charge and operating headquarters and this communication channel must be maintained throughout the duration of the work if at all possible. If it is impossible to maintain communication with headquarters then special arrangements must be made and the live line must be buzzed at intervals as requested by the operating staff. If a line being buzzed is found dead, an immediate report is to be

made to the operator in charge so as not to delay the restoration of service.

09H.02 Live line work is defined as follows:

1. Hot stick work such as changing insulators.
2. Pole top mirror inspection.
3. Buzzing insulators.
4. Live insulator washing.
5. Resetting poles with the line energized.
6. Inspection of tower tops.
7. Painting tower tops.
8. 1 R drop testing of conductor joints.
9. Work on overhead ground wires.

In brief, live line work includes all work of any kind on energized lines above a point one meter below the bottom cross arm in the case of structures with pin type insulators, or work on any kind above the elevation of the bottom conductor in the case of structures with suspension type insulators. This does not apply to special structures such as river crossings where work may be permitted above the conductors at the discretion of the officer concerned.

09H.03 A verbal PERMISSION FOR LIVE WORK is to be employed when it is desired to on or near an energized line.

09H.04 A verbal PERMISSION FOR LIVE LINE WORK Gives Authorization for specific work on a given line. When verbal PERMISSION FOR LIVE LINE WORK is issued for work on a double circuit tower, a PERMISSION FOR LIVE LINE WORK is issued for work on a double circuit tower, a PERMISSION FOR LIVE LINE WORK must be taken not only on the line being worked on but also on the adjacent line. When a HOLD ORDER has been taken to work on one circuit of a double circuit line, PERMISSION FOR LIVE LINE WORK must also be taken on the adjacent line.

09H.05 For live line maintenance work involving the use of hot line sticks, only one PERMISSION FOR LIVE LINE WORK per line will be granted. Up to four PERMISSION FOR LIVE LINE WORK on the same line may be granted for buzzing and mirror inspections and the other types of live line work.

09H.06 Specific conditions for live line work are:

1. Automatic reclosing features must be blocked on a line which a verbal PERMISSION FOR LIVE LINE WORK is in force.
2. Relay protective features and device must be in service on a line which a verbal PERMISSION FOR LIVE LINE WORK is in force.
3. Live Line Permit for Work tags must be attached to all circuit breaker controllers of the line before a verbal PERMISSION FOR LIVE LINE WORK is issued.
4. Large green pins must be placed on the station and system operating pin diagrams.

   Note: The operator issuing the verbal PERMISSION FOR LIVE LINE WORK will notify all other operators concerned that until further notice, the designated line is not to be tested,
5. While live line work is in progress every effort should be made to prevent an automatic outage of the line concerned. For this reason, which such work is in progress, permission should not be granted for work on the line relay protection, the line breaker automatic ground switch or other features or devices associated with the line protection.
6. In the case of an automatic outage of a line on which a verbal PERMISSION FOR LIVE LINE WORK has been issued, the operator must not reclose the line until

the man in charge of the live line work has been contacted and warned to have his men stand clear.

7. During the progress of the work, should there be any evidence to indicate the loss or possible loss of normal potential on the lines or equipment concerned, the foreman or man-incharge must report to the system operator or operator in charge as quickly as possible. This applies whether or not anything has occurred at the site of the work which might have caused an interruption on the equipment. such delays in the restoration of normal service.
8. When work is to be discontinued for any length of time, the verbal PERMISSION FOR LIVE LINE WORK must be returned and a new verbal PERMISSION FOR LIVE LINE WORK must be obtained before work is resumed. If the job site is left in an abnormal condition, special arrangements must be made to keep in contact with the operator.
9. The holder of a verbal PERMISSION FOR LIVE LINE WORK or his messenger will keep in frequent contact with operator-incharge. In case where the linemen are out of contact with headquarters, the line must be buzzed at least once every hour and an immediate report made to headquarters if a line is found dead.

09I-09J Refer to the LIVE LINE WORK MANUAL for special precautions covering live line work.

SECTION 09K Regulations covering a verbal Permission for work on or Near Live Station Equipment.

09K.01 These regulations are drawn up to cover work on or near live station apparatus energized from its normal source and connected to the system net work. Live station work is defined as follows:

1. Mirror inspection with hot sticks.
2. Testing live bushings.
3. Washing live bushings and insulators.
4. Phasing checks.
5. Testing for voltage indication, exclusive of voltage testing prior to grounding.

In brief, live station work includes al cases where work is to be done on or near live apparatus operating at 600 volts or above.

09K.02 A verbal PERMISSION FOR LIVE STATION WORK must be obtained when it is desired to work on or near live station apparatus.

09K.03 A verbal PERMISSIN FOR LIVE STATION WORK gives authorization for specific work on a given place of equipment when a verbal PERMISSION FOR LIVE STATION WORK is issued, and there is the possibility of hazard from adjacent apparatus a PERMISSION must also be taken on the adjacent apparatus.

09K.04 When high voltage testing is to be carried out, the area or locality of the test must be properly fenced or roped off and tagged and if in an area of ordinary thoroughfare guards should be stationed to direct traffic and prevent unauthorized persons from passing through the danger area.

09K.05 Temporary high voltage test leads must be distinctly marked with "Danger" signs or other distinctive markers which are clearly visible.

SECTION 09L Regulation covering a verbal permission for Work on Relay Protection, Controls, Metering and Communication Circuits.

09L.01 The above PERMISSION FOR RELAY WORK cover all features of the station wiring including associated circuits external to the station which in any way might affect the operation of the system and are tested as follows:

1. A verbal PERMISSION FOR RELAY WORK, for work on relay protections and associated wiring.

2. A verbal PERMISSION FOR CONTROL WORK, for work on equipment control devices and wiring.
3. A verbal PERMISSION FOR METERING WORK, for work on metering equipment and associated wiring.
4. A verbal PERMISSION FOR COMMUNICATION WORK FOR work on communication and carrier circuits, which are in any way connected to relay protection, control or metering circuits.

09L.02 Before any work is performed on the above mentioned apparatus except the routine changing of meter charts, a verbal PERMISSION FOR RELAY WORK must be obtained from the operator in charge. When such PERMISSIONS are issued it shall be the duty of the operator in charge to notify the system operator and other interested parties.

09L.03 Before issuing a verbal PERMISSION FOR WORK on the above mentioned equipment it is the responsibility of the operator in charge to see that the equipment has been properly blocked so that no unauthorized tripping will take place. It is his further responsibility to see that proper procedure as detailed in Standard and Local Operation Instructions.

09L.04 Before a verbal PERMISSION FOR RELAY WORK is issued for work on a specific protection, the front and back of adjacent relay panels must be covered to prevent accidental tripping by workmen. When relay panels are arranged back to back, the panel opposite one to be worked on must also be covered.

09L.05 When it is necessary to work in relay rooms or adjacent to relay protection panels where no verbal PERMISSION FOR WORK is required, this work may be done only with the authorization or one of the supervisory staff, after the operator in charge has been notified.

Irrespective of the above, before any work is started in the vicinity of relay panels or on apparatus equipped with gas detector relays which could cause tripping of this equipment, a HOLD ORDER must first be obtained from the operator in charge. This applies particularly to drilling metering panels, drilling or chipping concrete or other work which might cause vibration. Dust clearing of relay covers must not to be carried out without a HOLD ORDER from the operator in charge.

09L.06 No work on the above mentioned equipment is to be undertaken without the prior approval of a member of the supervisory staff of the station(s) or division concerned.

09L.07 In the case of a PERMISSION FOR COMMUNICATION WORK on a communication or carrier circuit which is in any way connected to relay protected, control or metering circuits involving two or more station. it is the duty of the operator the PERMISSION to advise the other station or stations concerned and the system operator.

SECTION 09M Men Working Tags

09M.01 These are red colored tags as shown in Part Caution Notices/Tags. These tags are to be installed at all controlling points of apparatus on which a CLEARANCE FOR WORK or a WORK/ TEST PERMIT is being issued and are only to be installed and removed by the operator-in-charge or on his order. If desirable a miniature tag may be used on the bench board controller.

09M.02 Each tag must be initiated and dated by the person installing it.

09M.03 These tags are never to be used as a substitute for the "Live permit for Work", "Danger" "Out of Order", or "Abnormal Conditions" tag.

SECTION 09N Line Permit for Work Tags

09N.01 These are green colored tags as shown in Part Caution Notices/Tags. These tags are to be installed on all circuit breaker controllers of apparatus on which a PERMISSION FOR LIVE LINE WORK or a PERMISSION FOR LIVE STATION WORK is being issued and are only to be installed or removed are by operator in charge or on his

order. If desirable a miniature tag may be used.

09N.02 Each tag must contain installation date & the initial of the person installing it.

09N.03 These tags are to be installed only when a PERMISSION FOR LIVE LINE WORK is being issued and are not to be removed until the PERMISSION has been returned.

SECTION 09P "Danger" signs/Tags

09P.01 These black and red signs shown in Part Caution Notices/Tags. must be used to indicate danger in the immediate vicinity of the point marked. They may be installed by the operator or the work as required. They are to be used only in areas where actual danger exists.

09P.02 Each sign must be initialed and dated by the man installing it.

SECTION 09Q Abnormal Conditions Tags

09Q.01 These blue colored tags as tags as shown in Part Caution Notices/Tags, to be attached to apparatus which do not operate in its normal manner. Such a tag do not prohibit the use of the apparatus marked, it indicates that special caution should be exercised and that the equipment should not be used unless its limitations are understood. If desirable a miniature tag may be used.

09Q.02 This tag may be used by both operators and maintenance men, but must not be placed on any apparatus under the jurisdiction of the operator-in-charge without his consent.

09Q.03 Each tag must be initialed and dated by man installing it.

09Q.04 This tag must not be revived until the abnormal conditions have been corrected and all interested parties notified.

SECTION 09R "Out of Order" Tags

09R.01 These are yellow colored tags as shown in Part Caution Notices/Tags. These are to be used to indicate faulty apparatus, building accessories, or any equipment which must kept out of service because of some defect.

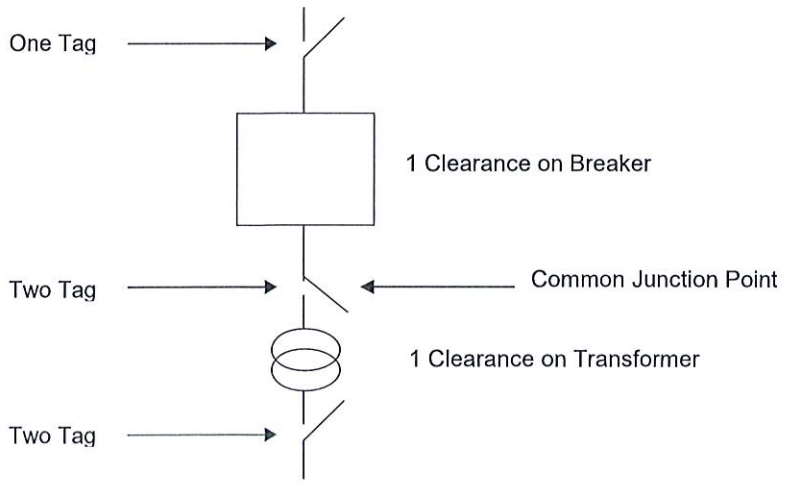
09R.02 This tag may be used by both operators and maintenance men but must not be placed on any apparatus under the jurisdiction of the operator-in-charge without his consent.

09R.03 Each tag must be dated and initiated by the man installing it.

09R.04 This tag must not be removed until the "Out of Order" conditions has been corrected and all interested parties notified.

SECTION 09S Do Not Operate Tags

Each Disconnecting Switch will have individual tags. The tagging of isolating devices that are common junction point between multiple clearances is shown:



SECTION 09T Miniature Tags

09T.01 In the case of bench board and supervisory controls, miniature tags of the type previously outline may be used in a holder of approved design and when using this type of tag, each tag must be initiated and dated by the person installing it.

SECTION 09U Operating Pin Diagrams

09U.01 Operating diagram pins are of different colors and shapes. They are to be used in conjunction with operating pin diagrams at ail locations to give operators an indication of the status of the equipment under their jurisdiction.

SECTION 09V PERMITS-TO-WORK/TEST AND MINIMUM ACCESS DISTANCE (MAD)

09V.01 Authority for issue

1. Permit to WORK/ TEST shall only be issued with the sanction of the control engineer. Who shall retain in his custody a written record of the issue of each Permit-to-WORK/ TEST and its cancellation.
2. A Permit to WORK/ TEST shall be issued by the Senior Authorized person under whose supervision the work is initiated before any work is carried out on any apparatus after it has once been connected to and remains part of a high voltage system.
3. A MAD shall be issued by a Senior Authorized Person or an Authorized Person specially authorized to do so. A MAD shall be issued when verbal instructions are not considered sufficient.
4. Excavation Permit A for declaration endorsed by all relevant departments of PGCB issued prior to work permit to the person in charge of the proposed excavations to ensure that all underground services and power cables are identified and safe methods of excavation are followed.

09V.02 Procedure for Issue and Receipt

1) A WORK / TEST permit or MAD shall be issued to the person in charge of the work, who after reading its contents shall sign on its receipt and it's duplicate shall be retained to the person issuing the Permit to WORK / TEST or MAD.
2. The person to whom a Permit to WORK/TEST or MAD is issued shall be a Competent Person who shall retain the Permit to WORK/TEST or MAD in his possession at all times whilst work is being carried out.
3. The person in charge to whom a Sanction-of -Test is issued shall be an Authorized Person who shall retain the Sanction for Test in his possession at all times whilst tests are being made.
4. Where more than one working Party is concerned a Permit-to-Work or MAD shall be issued to the Competent Person in charge of each Working Party.

09V.03 Precautions during Progress of Work

1. The apparatus isolated and earthed for work under the terms of a Permit-to-Work shall remain so until the Permit-to-Work has been cleared, returned to a Authorized Person, and cancelled.
2. The apparatus isolated and earthed for testing under the terms of a Sanction-for-Test must not be connected to the system without the sanction of the Control Engineer. The recipient of the Sanction-for-Test will be responsible for co-ordinating all testing operations on the isolated equipment and for ensuring safety during the tests. He may without further reference to the Control Engineer remove and replace earths as necessary and carry out tests including making live the apparatus concerned from a testing supply. This does not mean that the recipient of the Sanction-for-Test must make the tests personally.

9V.04 Procedure for Clearance and Cancellation

1. When work on apparatus for which a Permit to WORK/TEST has been issued is suspended or completed the recipient shall sign the clearance and return the Permit to WORKITEST to Senior Authorized Person who shall cancel it and inform the Control Engineer.

02. Where more than one Permit to WORK/TEST has been issued for work on High Voltage Apparatus associates with the same Circuit Main Earths the Control Engineer shall ensure that all such Permit to WORK/TEST have been cancelled before the Circuit Main Earths are removed.

03. When work for which a MAD has been issued is suspended or completed the recipient shall sign the clearance and return the MAD for clearance and return the MAD for cancellation to a Senior Authorized Person specially authorized to do so.

CHAPTER10
PLACING APPARATUS IN SERVICE

SECTION 10A Returning Apparatus to Service.

10A.01 Before returning any apparatus to service the operator must be informed of any change which has been made of the equipment and be guided accordingly.

10A.02 In the case of major restrictions the station or division incharge and the system operator must be advised. If necessary, written instructions regarding procedures to be followed will be issued.

10A.03 Generators, Transformers, lines or other Electrical apparatus whose correct operation depends upon Definitely fixed connections, and whose connections may possibly have been altered during the work, must not be placed in service until the necessary phasing, polarity, ratio and continuity checks have been made. When such alterations can affect the paralleling of two individual circuits, this paralleling must be physically proved before the equipments is paralleled in normal operation.

10A.04 When synchroscopes, synchronizing connections or their associated potential transformers have been disturbed or their connections altered, a positive test for "in phase" indication and rotation must be made before they are returned to service.

10A.05 In returning relays to service the procedures as given in standard and local operating Instructions must be followed.

10A.06 Before starting any apparatus after repairs have been carried out, the operator must inspect the equipment to assure himself that all loose material or obstructions between stationery and moving parts have been removed.

10A.07 After being returned to service, all repaired apparatus must be carefully watched for signs of trouble which may be indicated by instruments odor, noise, vibration, overheating or other unusual conditions.

SECTION 10B Placing New Apparatus in Service.

10B.01 New lines or station apparatus must not be placed in service until a thorough inspection and proper tests have been made by the station or testing & commissioning department. Such new apparatus must not be placed in service without the knowledge and approval of the station or testing & commissioning authority concerned the operation-in-charge and the system operator. The time and date of placing new apparatus in service must be accurately recorded.

10B.02 When placing new major power equipment in service for the first time, in attended or unattended stations, it must be kept under close continual observation to ensure that it is operating satisfactorily. This period of observation must be a minimum of 48 hours. Circumstances may dictate a much longer period.

CHAPTER11
SWITCHING

SECTION 11 A Preparation of a switching programme form.

11A.01 The approved switching order form used in connection with the manual operation of disconnecting switches is as shown in appendix. This form is to be used at a location whenever manual switching is performed.

11A.02 In all stations where two or more operators are on shift together, the operator in charge, makes out the order, which is checked by the assistant operator, using the operating pin diagram. After checking the form, he must initial it, as witness to its correctness.

11A.03 In smaller stations that have only one station attendant on shift or at normally unattended stations having a man sent to do the switching, the order shall be made out from instructions received by telephone or radio. It shall be read back to the person dictating it to ensure its correctness and the man who has completed the switching programme form must perform the switching operation.

11A.04 The switching order form shall list in the proper sequence of operation, each individual maneuver which requires the installation or removal of temporary grounds, the manual operation of disconnecting switches, circuit breakers, potential transformer, switches or relay protection switches which comprise a sequence of operation.

11A.05 When a circuit breaker or motor-operated disconnector is to be operated from a controller, it is not required that a switching order form be completed. However, when a circuit breaker or motor operated disconnector operation forms parts of a sequence of operations particularly when manual operations are involved, then it must be included in the switching orders entered on the switching programme form.

11A.06 Before any manual operation of disconnecting switches, the operator incharge must make out a standard switching order form, with the switches listed in proper operation sequence in conformity with the applicable operating instructions. He must state clearly either "Open" or "Close" and give the official designation of each switch.

11A.07 A good number of switching operations may be listed on one form, where large number of operations are required, Additional forms must be made out and numbered in proper sequence.

11A.08 After the switching programme form or forms have been made out, they must be checked by assistant operator where this position exists. Switching orders received by telephone or radio must be entered in the switching order forms and then repeated back to the person giving the order.

SECTION I IB Switching Procedure.

11B.01 While carrying out the switching operation, the switching programme must be carried out in the standard switching order form by the man doing the Switching so that each operation can be checked and the proper sequence followed.

11B.02 The operation will then go to the first switching on the switching form and if possible check the position of the associated circuit breakers by visual inspection and by local indicating lamps.

11B.03 Being assured that any associated circuit breakers are in the correct position, the operator must then check the official designation and position (open or close) of the disconnector to be operated against his switching order form.

Note: If it is found that any circuit breaker or disconnector is not in the correct position according to his switching order form the operator will cease switching and cancel the switching order form. When the cause of the abnormal condition has been discovered and corrected, switching may proceed with switching programme form.

11B.04 Operator must then perform the switching operation as called for on the switching order form. When the operation has been completed, the operator must check that the disconnector is fully open or close on all phases as called for in the switching order form. Each operation must be off on the switching order form as completed and before proceeding with the next operation.

11B.05 The exact procedure of checking before and after each individual switching operation on the Switching Order Form must be strictly adhered to.

11B.06 Summary of procedure to be followed by the employee carrying out manual operation of disconnecting switches.

1. Make out switching order form.
2. Together with assistant or by telephone or radio check accuracy and sequence orders.
3. Check associated breakers.
4. Note switch designation and position, check with the switch order form.
5. Read first order, perform operation called for.
6. Check position of all phases and the condition of the switch after operation.
7. Mark off completed operation on the switch order form. Read the next order and proceed as above.

SECTION 11 C Precautions Regarding the Operation of Disconnecting Switches.

11C.01 If a disconnecting switch has been closed in error, the switch must be left in the closed position and due to the danger of an arc or system disturbance, no further switching is to be performed until a corrected switching order form has been prepared.

11C.02 If a disconnecting switch has been operated in error, it should be left in the open position and no further switching is to be performed until a corrected switching order form has been prepared. However, if it is obvious that the switch is being operated in error and the arc is not yet broken, it should be re-closed immediately.

11C.03 Circuit breaker signal lights generally give a true indication of the position of the breaker. But sometimes an improper indication does occur. It the accordingly necessary to make a visual inspection of the breaker whenever practical and check associated meters for load and voltage before operating associated disconnecting switches

11C.04 Where the mechanisms of disconnecting switches are accessible to the public, such switches must be kept locked.

11C.05 When closing a stick operated single pole disconnecting switch, the blade should be lined up and then closed deliberately and without hesitation. It should be closed firmly but not slammed.

11C.06 When opening a stick operated single pole disconnecting switch, the blade should be opened slowly until it is determined that no abnormal arcing will result then it should be opened to its full travel in one quick movement.

11C.07 After a stick operated single pole wedge and screw type disconnecting switch has been closed, the wedge should be screwed up firmly but not excessively. Excessive tightening will damage the switch.

11C.08 Do not attempt to interrupt load current on a disconnecting switch or other air break switch, as they are not designed for that purpose, This, of course, does not apply to separating parallel circuits where the current has and alternative path to take and the voltage difference across the gap after the switch has been opened will be relatively small.

11C.09 Tests have shown that at 50 cycles, 400 volts difference of potential will maintain an arc (one foot) 30.58 cm long. Extreme care must be exercised and extra precautions taken, while opening heavy duty disconnecting switches, even where a parallel path is known to exist, since if only a relatively small difference of potential exists across the

gap, when the switch is opening, a serious arc may result. Should any doubt exist in the mind of the operator as to such a switching operator, he must not hesitate to refer the matter to his supervisor, for a decision as to the proper procedure.

11C.10 When it is necessary to open outdoor disconnecting switches to de-energize line of transformer banks during high wind conditions, it must be recognized that a possibility of arcing over between phases exists. If such circumstances, the supervisory staff should be consulted.

11C.11 When operating disconnecting switches indoors, operators should see that switch room doors are left open and clear of obstructions so as to allow the exit in case of trouble, and should not allow themselves or any other person to get in such a position that an electric arc or other trouble would cut off the only means of escape.

11C.12 Rubber gloves protected by leather gauntlets must be worn whenever operating manually operated disconnecting switches and ground switches.

11D Identification of circuits.

11D.01 Proper Marking of the Breakers and Disconnections (Isolators) on the panel boards as well on the equipment is most important in view of accurate operation of the system. When installed new, there is a no. from the manufacturer / constructor (Project) of sub-station in line with that exists on the drawings. It should be co-coordinated with the general numbering given by LDC for central coordination of system operations.

11D.02 Marking on the transmission line help in identifying the lines and circuits during the line maintenance works. Line markings should be easily understandable so that line staff and supervisors can identify easily on which tower or in which span maintenance is to be done.

CHAPTER12
WORK ON CIRCUIT BREAKERS

SECTION 12A General Precautions

12A.01 Before entering a circuit breaker compartment, all persons must obtain the consent of the operator in charge and be accompanied by the operator, if possible or by a responsible person designated by local instructions.

12A.02 If necessary, measuring, cleaning or other work may be done around a live circuit breaker only with the approval of the incharge, if there is any danger what so ever of contact being made with any live parts to inadvertently operating the breaker. A PERMISSION FOR LIVE STATION WORK must be obtained and a watchman must be appointed.

12A.03 The operator must take the following special precautions before issuing a HOLD ORDER of any type of circuit breaker:

1. If possible, breaker should be open.
2. Remove the D. C. control supply fuses at the controller or the interposing relay panel.
3. Remove the A.C. supply to tank or control cabinet heaters.

12A.04 The following precautions must be taken by the workman in charge after receiving a HOLD ORDER on a circuit breaker.

1. Satisfy himself that the conditions of the HOLD ORDER have been fulfilled.
2. Install mechanical blocking where required, to prevent unauthorized movement of the mechanism.
3. In the case of pneumatically operated breakers shut off the air supply and exhaust the tanks, leaving the exhaust valve open.
4. If possible, operate the trip and close circuits at the breaker itself.
5. Check that the A. C. supply to control cabinet heaters has been removed.

12A.05 The holder of a HOLD ORDER may operate a circuit breaker by hand under the authority of a CLEARANCE FOR WORK but a WORK / TEST PERMIT must be taken out before energizing any circuits or operating the breaker either electrically or pneumatically.

12A.06 Where it is necessary to work in a circuit breaker in a bus chamber. or room which contains two more such breakers, suitable barriers must be taken that material to be used in the work does not block any exit.

12A.07 When work has been completed on a circuit breaker and before returning the HOLD ORDER to the operator in charge, the man in charge of the work must assure himself that all his safeguards such as mechanical blocking and barriers have been removed. He must also make sure that any valves or electric circuits which have been operated in the course of the work are restored to the position in which they were originally received, unless other arrangements have been made.

SECTION 12B Work Inside Oil Circuit Breaker Tanks.

12B.01 When work necessitates going inside an oil circuit breaker, another man must be detailed to stay in the immediate vicinity of the manhole to render any aid that may be required. This outside man must see that no safeguards are removed or changed without the consent of the man inside the tank.

12B.02 The mechanism must not be moved, except on definite instructions from the man in the tank and this man must be warned before any movement is made.

12B.03 Matches, oil or gas lanterns, sparking devices or other open lights must not be used near manholes or inside tanks, because of possible explosion due to the presence of explosive gases. Smoking is strictly prohibited inside a tank.

12B.04 under normal conditions the breaker tank should be vented for at least 15 minutes before the workman enters the tanks. Under abnormal conditions (excessive fault operation, hot oil, etc.) tanks are to be vented by forced air.

SECTION 12C Special Precautions Relating to Minimum-Oil Type Circuit Breaker.

12C.01 An isolating switch incorporated in the Minimum-oil circuit breaker is not acceptable for the purpose of clearing the breaker for work.

12C.02 As the operating springs are under tension in both the open and closed positions of the breaker, extreme care must be taken when adjusting the operating mechanism to avoid accidental operation which may cause physical injury

12C.03 When working on the contacts of these breakers, the stored spring tension should be released by closing and tripping the breaker mechanically, after the control circuit has been opened at the breaker.

12C.04 When it is necessary to dismantle the operating mechanism in the control cabinet the main spring tension should be completely released by means of the ratchet gear.

SFCTION 12D Special Precautions Relating to Air Blast circuit Breaker.

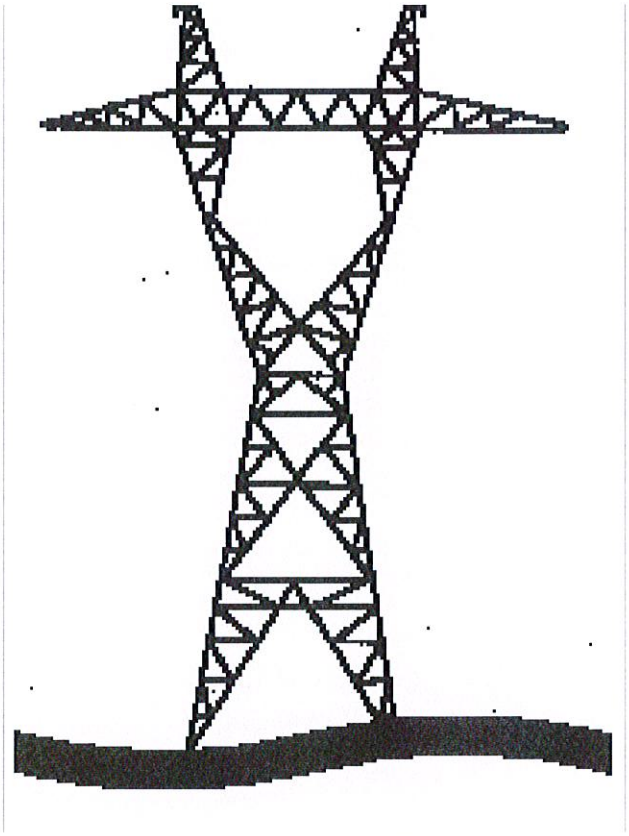
12D.01 All parts of an air blast circuit breaker must be considered as live, with exception of the control cabinet. Exposed live metal parts to these breakers must be painted a brilliant red as a warning. Where it is desirable to indicator voltages, only the extreme top of the breaker is to be painted. Also the word DANGER should be painted in white in same conspicuous place.

12D.02 When it is required to operate an air blast circuit breaker for test, all personnel, in the vicinity should be warned and men working on the breaker ordered to stand clear. Where employees are exposed to the air blasts from the breaker, goggles must be worn.

12D.03 An isolating switch incorporated in the air blast circuit breaker is NOT acceptable for the purpose of clearing the breaker for work.

12D.04 When working on an air blast circuit breaker where an electrical disagreement feature exists, the control switch and disagreement switch must be opened in each phase control cabinet at breaker.

12D.05 Air blast circuit breaker, which has pneumatically operated mechanism, must never be blocked mechanically while pressure remains in the breaker storage tank or tanks. Mechanical blocking may result in personal injury or damage to the breaker.



It's NOT Dead
If It's NOT Grounded

Part-II

SAFETY PRACTICES

01 General safety precautions

01.01 Work on High Voltage Apparatus

No person shall carry out work in any description on any part of High Voltage Apparatus unless the parts of the apparatus on which he works are

- **a.** Dead
- **b.** Isolated and all practicable steps taken to lock off from live conductors.
- **c.** Efficiently connected to earth:
  - i) At all points of disconnection of supply to such apparatus, or
  - ii) Between such points and the points(s) of work:
- **d.** Screened where necessary to prevent Danger and Caution and Danger Notices fixed.
- **e.** Released for work by the issue of an Electrical Permit-to-Work or sanction-for-Test.
- **f.** No person shall carry out work of any description on any part of High Voltage Apparatus unless the person is fully conversant with the nature and the extent of the work to be done.

It is the duty of the person issuing the Electrical Permit-to- Work or Sanction-for-Test to ensure that the provisions listed above are complied with. If the senior authorized person is not at the location of the work then the confirmation, that the safety precautions are completed, shall be obtained by the senior authorized person by telephone or radio contact with the responsible Control Engineer. Provided that if the clearances specified in Rule 8.6.1 are maintained, adjustments, cleaning and painting of earthed metal enclosures, and of structures may be carried out from ground level under a Limitation-of-Access. Similar work carried out from above ground level shall be done under and Permit-to-Work. Making live or dead by signal or pre-arranged understanding after agreed interval of time is FORBIDDEN.

01.02 Interference with Conductors/Parts

No person shall touch the insulation which covers or supports a high voltage conductor unless the conductor is dead and earthed.

01.03 Fixing of Notices and Screens

Work shall not be carried out on any High Voltage Apparatus which has been made dead and earthed until Caution Notices have been attached at all points where such apparatus can be made live. Danger Notices shall also be attached to the live apparatus.

Caution Notice, Danger Notice, barriers and screens shall be fixed or moved only under the supervision of and authorized person.

01.04 Safety locks

Safety locks shall be used to lock off all switches at points where the circuit on which work is to be carried out could be energized.

01.05 Safety Keys

Key safes fitted with locks shall be provided at suitable positions for keys which secure switches, barriers, spout shutters, lock-out equipment and other similar devices provided for the protection of men working under an Electrical Permit-to-Work only by a key in the possession of a Senior Authorized Person. The other locks shall be of a type operated by non-interchangeable Keys. Holders of all safe keys are personally responsible for their safe custody. Written receipts must be given by means of an entry made in the station key ledger each time the custody of a key is transferred.

01.06 Work on Towers, Poles and high structures.

All persons working on towers, poles and high structures shall wear and make proper use of a suitable safety belt or harness.

No man shall work alone at any tower or high structure. Before any wood pole is climbed it shall be sound and if the condition of it is doubtful shall be climbed only with the permission of the Competent Person in charge. All old weak poles must be guyed or branched before climbing.

01.07 Work on Apparatus which can be made live from More than One control system.

a. Before any switching or earthing is carried out or before an Electrical Permit-to-Work or Sanction-for-Test issued for work on apparatus which can be made live from more than one control system the Control Engineer responsible shall communicate with the control Engineer(s) of the other system(s) concerned and the switching and earthing shall be agreed between them.

b. The conditions of Rule 8.1 shall apply. Key safes shall be provided and the safety keys places therein.

c. The switching, earthing, deposit of safety keys in key safes and details of any Electrical Permit-to-Work or Sanction-for-Test issued shall be recorded at all centres concerned.

02 Minimum Access Distance (MAD)

02.01 No part of a work's body or any conductive object held by a work shall be closer to energized high voltage parts than the applicable Minimum Access Distance unless an approved barrier is in place. When work is to be performed within the Minimum Access Distance Including the installation and removal of barriers, one of the following must be employed:

1. Adequate barriers.
2. Use of live line tools.
3. Clearance.

02.02 Conductive objects such as insulator support hardware which extend into Mimimum Access Distance may be contacted outside the applicable Minimum Access Distance.

However, such objects must have been installed in accordance with approved design standards and be fixed or limited in movement so that the designed Clearances cannot be reduced.

Power equipment or loads shall not be moved closer than 4.6 meters (15 Feet) to energized circuits unless directed by a Safety Watcher. Approach within the Minimum Access Distance can occur only when the circuit is de-energized, properly tagged and grounded, or approved barriers have been installed.

02.03 The following Table provides Minimum Access Distance, in meters (inches), for phase-to-phase Voltage commonly used on other system. MAD is based upon maximum transient voltages that can be generated during switching.

Minimum Access Distance (MAD)			
Nominal Voltage Phase to Phase	Impulse Voltage	Meters	Inches(Feet)
33 KV	170 KV	0.72	28 (2½)
132 KV	550 KV	1.25	49 (4)
230 KV	930 KV	1.83	72 (6)
500 KV/400 KV	1425 KV	3.21	126 (10½)

02.04 Enclosures Containing High Voltage Apparatus.

Enclosures, chambers, cubicles or cells containing live High Voltage Apparatus shall normally be kept locked and the keys shall be kept locked in a box or cupboard. They shall be removed only by an Authorize Person, except Authorized Person or person acting under his immediate supervision, shall have access to any enclosure, chamber, cubicle or cell in which a live conductor is exposed.

02.05 Towers and Gantries.

Gates and devices to prevent climbing of towers and gantries shall always be kept locked except when they are opened under the instructions of an Authorized Person.

03 Switching

03.01 Operation of Circuit Breakers and Isolators.

No high voltage switching shall be carried out without the sanction of the appropriate Control

Engineer, except for cases of emergency For Switching of grid substations, sanction of load despatcher shall be obtained.

03.02 When a control Engineer requires high voltage switching to be carried out he shall first communicate with the Authorized Person concerned. If the switching is to be carried out by another person not under immediate supervision of the Authorized Person, then the Authorized Person shall instruct the person who is to switch to communicate with the control Engineer to receive direct instructions.

03.03 Before any switching is carried out on a locally controlled system which may affect other system the Control Engineer authorized the switching shall communicate with the Control Engineer (s) of the other system (s) concerned and the switching shall be recorded at all centres concerned.

03.04 Switching to the Control Engineer's instructions, or with his consent shall be carried out without undue delay. All switching, whether to a Control Engineer's instructions or in case of emergency, shall be reported to the Control Engineer as soon as possible after each operation.

03.05 When a switchgear shows any sign of malfunction or distress after operating, its condition shall be reported to the

Control Engineer and it shall be examined before further operation.

03.06 When any Person receives instructions to work on High Voltage. Apparatus but objects to the instructions, he shall report his objections to the Control Engineer who shall then have the matter investigated.

03.07 Telephone or Radio Messages

Every telephone or radio message relating to the operation of the high voltage system shall be written down. Every message shall be repeated in full back to the sender to ensure that the message had been accurately received.

03.08 Recording of Switching.

A record of high voltage switching shall be made in the station logs. The Control Engineer shall record in his log the time and details of all high voltage switching.

03.09 Switching for Test Purposes.

When a section of equipment has been isolated from the main supply system for testing, the Control Engineer may on the form for the Sanction-for-Test give a general sanction for the operation of switches, isolators, earthing switches and earth connections within the isolated, section. And for the application of testing supplies, the person in charge of the testing will then become wholly responsible for complying with these Safety Rules within the isolated section. No switch or isolator connecting the isolated section to the main supply system shall be operated without the direct section of the Control Engineer except those for the agreed testing supplies.

04 Grounding (Earthing)

04.01 Circuit Main Earths.

No high voltage earthing switch shall be operated except to the instructions of the Control Engineer. Only an Authorized Person or competent Person acting under the immediate supervision of Control Engineer shall carry out these operations. Each operation shall be reported to the Control Engineer as soon as possible after completion. Where applicable the location of each connection to earth shall be recorded on the Electrical Permit-to-work or Sanction-for-Test.

04.02 Additional Earths

Additional Earth connections may be attached and moved by Competent Person under Electrical Permit-to-Work

04.03 Equipment for Earthing.

High Voltage apparatus is to be discharged and earthed by the use of earthing switches or special apparatus where provided, or by other approved means.

04.04 Earthing leads for use at generating stations and substations shall have a cross section

of not less than (0.1sq.in) 65mm^2 copper equivalents. Earthing leads for use on overhead lines shall have a cross section of not less than (0.04sq.in) 25.8mm^2 copper equivalents. The clamps shall be of an approved type and adequate capacity.

04.05 Earthing leads shall be examined at least every three months and always immediately prior to use.

04.06 Procedure for the use of Earthing Leads

The procedure to be followed when using portable earthing leads shall be as follows:

a. Check that the circuit is not live and where practicable test by means of a voltage indicator of approved type, THE INDICATOR ITSELF BEING TESTED IMMEDIATELY BEFORE AND AFTER VERIFICAITON.

b. Earthing leads shall be connected to the earth system before being connected to the phases. They must be connected to the phases by means of a pole or other approved apparatus and care must be taken to ensure that good contact is made.

c. All phases shall be earthed, even if work is to be carried out on one phase only

d. Earthing leads shall not be applied in any cell or compartment in which there is any exposed metal live at high voltage.

e. When removing earthing leads at any point, they shall all be disconnected from the phase end before being disconnected from the system.

04.07 Earthing of Metal-Clad Switchgear

For the purpose of earthing metal-clad switchgear approved appliances only be used. THE INSERTION OF THE HAND OR ANY TOOL IN CONTACT SPOUTS FOR THIS PURPOES IS FORBIDDEN.

Before work is carried out on the withdrawable portion of truck type or metal-clad switchgear, the provisions of Rules 8.1 (a) and (b) shall be first complied with. The apparatus shall then be:

a. Checked by means of an approved voltage indicator, THE INDICATOR ITSELF BEING TESTED IMMEDIATELY BEFORE AND AFTER THE VERIFICATION.

b. Discharged to earth (such earth to remain connected unless the apparatus is bodily removed from its normal live position and is disconnected from all possible sources of supply)

04.08 Recording of Earthing

The control Engineer shall record in his log the location and time of application of all circuit main earth connections, and the time of their removal.

05 Permits-to-work and sanctions-for-test.

05.01 Arrangements for issue.

Permits-to-work or sanctions-for-test shall only be issued with the consent of the Control Engineer, who shall retain a copy of each permit and sanction issued, until a senior authorized person has cancelled it.

Work shall not be carried out by person on any high voltage apparatus where technical knowledge or experience is required to avoid danger until an electrical permit-to-work or sanction-for test has been signed and the card copy handed by a senior authorized person to the person in charge of the work. The person in charge of the work shall then read about its contents to the senior authorized person issuing the permit or sanction, and also sign the card copy, and it's duplicate.

If the apparatus is not situated on the premises of PGCB, the senior authorized person shall hand over a pink copy of the electrical permit-to-work to the official responsible for those premises, and obtain his signature on it.

The person in charge to whom an electrical permit-to-work is issued shall be a competent person and the work shall be carried out under his immediate supervision. If work is to be carried out under the immediate supervision of the senior authorized person himself, he shall issue the permit and hold it as the person in charge. It is not permissible for a senior authorized person to issue an electrical permit-to-work to himself and then leaving the site.

An electrical permit or sanction shall be issued to the person in charge of each working party, unless the superintending engineer has authorized an alternative procedure in writing.

The person in charge to whom a Sanction-for-Test is issued shall be a Senior Authorized Person or an authorized Person who has been appointed in writing to receive Sanction-for-Test

05.02 Precautions during Progress of Work

The apparatus isolated and earthed for work under the terms of an Electrical Permit-to-Work shall remain isolated and earthed until the permit has been cleared, returned to a Senior Authorized person, and cancelled.

The apparatus isolated and earthed for testing under the terms of a Sanction-for-Test comes under the temporary control of the man who receives the Sanction. He may operate it in accordance with these rules. He is responsible for co-ordination all such operation in the isolated equipment and for ensuring safety during the tests.

05.03 Procedure for Clearance and Cancellation

After work, for which a permit or sanction has been issued, has been completed or stopped by an Authorized Person, the person in charge the work shall sign the clearance. He shall then immediately return the card to the Authorized Person who shall then obtain the permission of the Control Engineer for cancellation.

06 Work in Sub-stations and Switching stations.

06.01 Safety Clearance to Live Conductors

When work is to be carried out in a sub-station in which there are exposed live high voltage conductors then unless the whole equipment is dead, the section which is made dead for the work to be carried out shall be defined as far as possible by the use of barriers or roping. These shall be arranged so that the minimum clearance from the nearest exposed conductor ground level or platform or access way shall be maintained as stated below

Rated Voltage	Minimum Clearance	
	Metes	Feet
33KV	2.75	9.00
132KV	3.43	11.50
230KV	4.22	14.00
400KV	5.49	18.00

06.02 If the work is such that these clearances are not sufficient to avoid Danger, other suitable arrangements shall be made to provide the degree of safety required.

06.03 At ground or floor level the section shall be distinguished by red flags fixed on separate supports 0.6m (2) to 0.9 apart. The boundary mark shall not be supported by any, structure carrying electrical apparatus or conductors, and shall not carry notice. Danger Notices shall be placed to indicate adjoining High Voltage Apparatus or section clearly.

06.04 Use of Cranes, Ladder and Longer Objects

a. Ladders shall be of an approved type and not longer than that needed for the work.

b. Ladders and other long objects shall not be used without the permission of an Authorized Person. The movement and erection of such ladders and objects shall be carried out only under the direct supervision of an Authorized Person. When moved at ground levels they shall be carried only in a horizontal position and as near the ground as practicable.

c. Portable ladders provided for giving access to fixed ladders shall be locked in position by an Authorized Person while work is being carried out on the structures.

d. When not in use, all portable ladders within substations or switching stations shall be securely locked to a suitable anchorage.

e. When not in use, all portable ladders within substations the route to be followed shall be agreed and defined on site by a Senior Authorized person. The equipment shall be connected to the substation earthing system immediately if it is practicable to do.

f. When cranes or other equipment are taken into or out of a substation, the route to be followed shall be agreed and defined on site by an Authorized Person to an Authorized Person and the equipment shall be erected or moved only within these limits under the supervision of the Authorized Person.

07 Work on High Voltage Apparatus

07.01 No person shall carry out any work on any high voltage Apparatus, unless the following operations are carried out in strict sequence:

a. The apparatus shall be

i) Switched out at all points of supply.

il) Isolated from all points of supply, including voltage and auxiliary transformers and common apparatus may become live.

b. The carrying out of these operations shall be reported to the control Engineer and further permission received for the carrying out of the subsequent operations.

c. The apparatus shall then be

i) Checked by means of an approved voltage indicator to verify that the circuit is not live. THE INDICATOR ITSELEF BEING TESTED BEFORE AND AFTER THE VERIFICATION:

ii) Discharged to earth.

iii) Efficiently connected to earth at all points of isolation from the supply, including points of isolation from common neutral earthing equipment.

d. Caution Notices shall be attached at all points where such apparatus can be made live.

e. Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for purpose which then be locked in the appropriate key safe.

f. A Permit-to-work shall then be issued.

g. Unless the circuit main earths through which the apparatus is connected to earth are close to and visible from the point of works the apparatus shall be efficiently connected to earth by means of Additional Earths at the points of work. When apparatus has been disconnected from all supplies and bodily removed from its normal live position, its conductors shall be discharged to earth. No fixed earths are necessary.

h. If operations (a) to (e) are carried out at more than one location, the Authorized Person at each location shall lock the safe and retain the key in his possession until he receives instructions from the control Engineer to restore the equipment ready for service. At the location where the Permit-to-work is issued, the senior Authorized Person shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the permit and returns it with the key to Authorized Person. Operations (a) and (b) shall be carried out by an Authorized Person. Operations (c),(d) and (e) shall be carried out by an Authorized Person or a Competent Person acting under his immediate supervision.

07.02 Work on Switchboard/Outdoor Station.

The whole switchboard or outdoor station shall be dead. The section in which work is being carried out should be separated by permanent or removable divisions or screens from adjoining section and distinguished by red flags fixed on separate supports 0.6m (2') to 0.9m (3') inside the safe boundary and not more than 6m (20') apart. The permanent or removable divisions or screens shall remain fixed in position during course of the work. Danger Notices shall be placed to indicate adjoining High Voltage Apparatus or sections clearly.

07.03 Work on Static Capacitors

Work on high voltage static capacitors shall be carried out in accordance with requirements of Rule 07.01 and the following earthing operations shall be carried out under the direct supervision of an Authorized Person in the following sequence:

a. (i) Apply approved Earth to the capacitor frames.

(ii) Apply approved post or Rack Earths to the common connections of each group of capacitors.

b. A Permit to Work / Test shall then be issued for the group or groups upon which work or testing is to be carried out. Approved additional earths shall then be applied to the capacitor units at the point of work these earths may be applied or remove only under the direct supervision of an Authorized Person.

c. Capacitor units shall be short circuited and remain short circuited on removal from the circuit or in cases where earthing is impracticable.

07.04 Remotely/Automatically Controlled Equipment.

Before work is carried out on remotely or automatically controlled equipment such as circuit breakers isolators, tap changing gear, or air compressors, the automatic or remote control features shall first be rendered in-operative. No work shall be carried out on the controlling equipment, wiring or relays except by an Authorized Person or a competent Person acting under the direct instruction of an Authorized Person.

07.05 Optical Fibers

When working with Fiber Optics, the use of personal protective equipment is required to prevent injury. Eye protection shall be worn when splicing glass fiber. Care should be taken during the cleaving process to protect the eyes and the body from broken glass pieces. Looking into the end of an optical fiber may damage eye as there may be laser light present which is invisible before touching or coming within the Minimum Access Distance (MAD) of an optical fiber ground wire (OPGW), it must be grounded at that location by either a portable ground or a permanent ground connection.

08 Work on Metal-Clad Switching Spouts.

08.01 Bus bar spouts of Multi-panel switchboards when work to be carried out on bus bar spouts the following operations shall be carried out in strict sequence:

(a) The section of the bus bars on which work is to be carried out shall be isolated from all points of supply from which it can be made live.

(b) The isolating arrangements shall be locked so that they cannot be operated and shutters of live spouts locked shut.

(c) When practicable, the bus bars shall be checked by means of an voltage indicator itself being tested immediately before and after the indicator shall be done on the panel to be earthed with circuit main earths.

(d) Circuit Main Earths of approved type shall be applied at a panel other than that at which work is to be done, on the isolated section of bus bars. The insertion of the hand or any tool into contact spouts for this purpose is forbidden.

(e) Caution Notices shall be attached at all points where the bus bars can be made live.

(f) Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for the purpose which shall than be locked in the appropriate key safe.

(g) If operations (a) to (e) are carried out at more than one location the Authorized Person at each location shall lock the safe and retain the key in his possession until he receives instructions from the Control Engineer to restore the equipment ready for service. At the location where the Permit-to-Work is issued the Authorized Person shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the Permit and returns it with the key to an Authorized Person.

(h) Danger Notices shall be attached (where applicable) on or adjacent to the live apparatus at the limits of the zone in which work may be carried out.

(i) A Permit-to-Work shall be issued.

(j) Work on the spouts shall then be done under the personal supervision of Authorized Person who shall prove each spout dead by means of an approved voltage indicator before it is worked on, the indicator itself being tested before and after the verification.

08.02 Feeder Spouts, Voltage Transformer Spouts and Single Panel Bus Bar Spouts.

When work is to be carried out on feeder and voltage transformer spouts or on the spouts of a single and separate panel, the following operations shall be carried out in strict sequence:

(a) The spouts on which work is to be carried out shall be isolated from all points of supply from which they can be made live.

(b) The isolating arrangements shall be locked so that they cannot be operated and the shutters of live spouts shall be locked shut.

(c) Where practicable the spout contacts shall be checked by means of an approved voltage indicator to verify that they are not live, the indicator itself being tested before and after the verification.

(d) The circuit shall be earthed with approved earthing equipment at the point of work and where practicable at all points of isolation from the supply. For the purposes of earthing metal-clad switchgear approved appliances only shall be used. The insertion of the hand or any tool into contact spouts for this purpose is forbidden.

(e) Caution Notices shall be attached at all points where the circuit can be made live.

(f) Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for the purpose which shall then be locked in the appropriate key safe.

(g) If operations (a) to (e) are carried out at more than one location the Authorized Person at each location shall lock the safe and retain the key in his possession until he receives instructions from the Control Engineer to restore the equipment ready for service. At the location where the Permit-to-Work is issued, the Authorized Person shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the Permit and returns it with the key to a Authorized Person.

(h) A Permit-to-Work shall be issued.

(i) Work on the spouts shall then be done under the Personal supervision of an Authorized Person, who shall remove the earths at the point of work and prove each spout dead by means of an approved voltage indicator, before it is worked on the indicator itself being tested before and after the verification. If the only earths that can be applied to the circuit are those applied in the spouts on which work is to be done and are Circuit Main Earths, then while this work is in progress no other work shall be carried out on the circuit connected to those spouts. In all other cases the requirements of Rule 07.01 shall apply.

(j) Where the spouts are connected to an overhead circuit on which there is any likelihood of back feed from other sources or dangerous induced voltage, the back feeding source must be switched off and additional earths shall be efficiently connected at the nearest point to the point of work.

09 Work on High Voltage Cables and Conduits

09.01 High Voltage Cables and Conduits.

(a) No person after receiving a Permit-to-work shall work on any high voltage cable or conduit containing a high voltage cable, unless personally instructed at the point of work by the Authorized Person.

(b) When any high voltage cable is to be cut the Authorized person, after satisfying himself that the cable has been made dead and identified, shall spike the cable in and

approved manner at the point where the cut is to be made.

(c) When any high voltage joint or chamber is to opened in circumstances where it is not desirable to spike the cable entering the joint or chamber, the Authorized person shall prove by use of the appropriate cable route records, supplemented if necessary by an approved cable electrical testing set, that the joint or chamber is associated with the particular cable which has been made dead, and on which it is safe to work. The tests shall be carried out in the presence of the person receiving the Permit to work and shall be witnessed by him.

(e) When work is to be carried out on cable circuits in proximity to other live circuits and on cable circuits with fully insulated metallic sheaths, special precautions should be taken to avoid danger from induced voltages.

09.02 Single or Multiple Circuit Overhead Lines with all Conductors Dead.

Before any person is allowed to carry out any work on any single or multiple circuit overhead line with all conductors dead, the following operations shall be carried out in strict sequence:

(a) The line or lines shall be:

(i) Switched out at all points of supply including consumers end;

(ii) Isolated from all points of supply, including voltage and auxiliary transformers and common neutral earthing equipment from which the apparatus may become live.

(b) The carrying out of the above-mentioned operations shall be reported to the control Engineer and further permission received for the carrying out of the subsequent operations.

(c) The conductors shall then be:

(i) Discharged to earth.

(ii) Efficiently connected to earth at all points of isolation from the supply excluding low and medium voltage connections but including points of isolation from common neutral earthing equipment where applicable, or between such points and the points of work.

(iii) Operation (a) and (b) shall be carried out by any Authorized person. Operation (c), (d) and (e) shall be carried out by an Authorized person or a Competent person acting under his immediate supervision.

09.03 Double Circuit Overhead Lines with one Circuit Live

Where work similar to that covered by General Rules has to be carried out on double circuit overhead lines with one of the circuits live the provisions of General Rules shall apply, and the following additional precautions shall be taken.

(a) The Earthing party under the supervision of the competent person at the point of work shall climb the tower on the dead side and shall efficiently connect to earth each individual conductor on that side. They shall then affix red pennants to the cross arms supporting the live conductor at the junction of these cross arms with the tower body The conductors shall remain in position, throughout the progress of the work and the earth shall be removed by the Earthing party only after all other members of the working party have descended the tower on completion of the work. While affixing or removing the earths and red pennants, the Earthing party shall be under observation by another person at ground level.

(b) Work on a tee-off tower shall only be carried out in the presence of an Authorized person and special care shall be taken at terminal and large angle towers.

09.04 Triple Circuit Lines or Towers with one or more other Circuits Live.

Work on any one circuit of triple circuit lines or towers shall not be carried out with either or both the remaining circuits live except under the following conditions:

(a) The work shall be carried out as provided by Rules 09.02 and 09.06 except that where crossarms support two circuits separated by screens or barriers, red pennants shall be affixed so as to denote the live circuit or circuits.

(b) Separate means of access shall be provided to each individual circuit.

(c) Either the conductors on each circuit shall be adequately screened from the two other circuits or the clearances from the nearest point of work to the remaining live circuits shall be not less than those specified in Rule 09.06

(d) Caution notices shall be attached at all points where such line or lines can be made live.

(e) Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for the purpose which shall then be locked in the appropriate key safe.

(f) Unless the Permit-to-work is to be issued and cancelled at a particular station, then at each station, an Authorized person shall personally check the circuit colours at the point of isolation and report to the Control Engineer. He shall also lock the key safe at that station and retain the key in his possession until he receive instructions from the Control Engineer to restore the equipment ready for service. An Authorized person may then issue the Permit-to-work. In this case no key shall be issued to the recipient of the Permit-to-work When the Permit-to-Work is to be issued and cancelled at a particular station, then at that station, the Authorized Person shall personally check the circuit colours and shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the permit and returns it with the key to the Authorized Person.

(g) The conductors shall be efficiently connected to earth by the Earthing party at the point (E) of work or at the adjacent tower on each side of the point(s) of work but in no case shall the earths be more than two spans apart. In addition, if conductors are to be broken they shall be connected to earth at each side of and on the same tower, as the point of work, where the break is to be made. These earths shall be applied before the break is made and shall remain in position until the conductors are reconnected or until work is complete.

(h) When work is to be carried out on lines of all insulated construction and an earthing point is not provided at the point of work. Additional Earths shall be connected at the point of work to an efficient portable earth back driven into the ground. The line shall also be earthed at the nearest line earthing point on either side of the point of work.

09.05 Quadruple circuit Lines with one or more other Circuits Live

Work shall not be carried out on the circuits on one side of a tower unless both these circuits have been switched out, isolated and earthed, as provide by Rules 09.02 and 09.03.

09.06 Towers Carrying Live Conductors

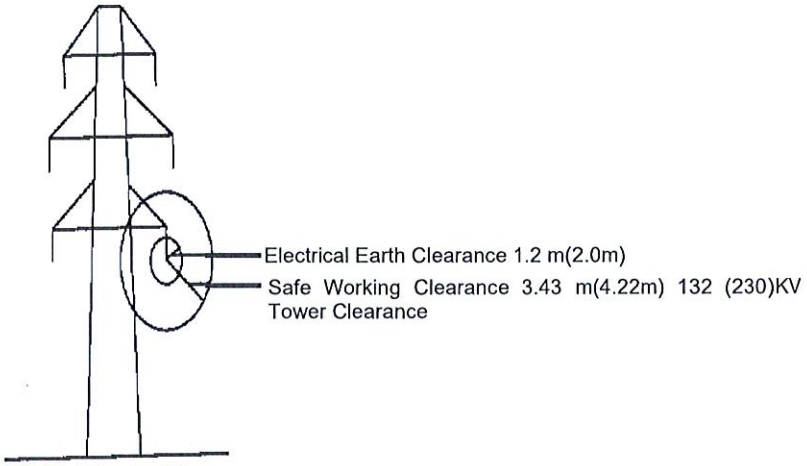
Painting and other work above the anti-climbing devices on the lower portions of towers carrying live conductors shall only be permitted under the following conditions:

(i) The work shall be carried out under the terms of a Permit to Work.

(ii) Before anyone is allowed to start work the person in charge at each tower shall define the area to be worked in by removable barriers, roping, red flags or pennants arranged to prevent any person working on the tower nearer than the following distances from any live conductors:-

Rated Voltage	Minimum Clearance	
	Metes	Feet
33KV	2.75	9.00
132KV	3.43	11.00
230KV	4.22	14.00
400KV	5.49	18.00

While doing so the person in-charge shall be under observation by another person at ground level.



132 (230) KV Tower Clearance

(III) No man shall work in such a manner that his arms or any to extend beyond the limitation fixed under subparagraph (ii) of this Rule.

09.07 Adverse Weather Conditions

(a) In the event of the near approach of lightning storm all work on overhead lines shall cease immediately, and the Control Engineer be informed.

(b) If overhead lines are to be patrolled during the hours of darkness, suitable lighting equipment should be provided.

10 Testing of High voltage Apparatus.

10.01 When any High Voltage Apparatus is to be subjected to voltage before being connected to the high voltage system the Authorized person responsible for applying the test voltage shall ensure that such apparatus is adequately guarded to prevent Danger and that Danger Notices are attached to in conspicuous positions during the period the apparatus may be subjected to voltage. All cables shall be discharged before and after the application of test voltage

10.02 Temporary conductors used for testing purposes shall be of an adequate size and easily visible.

10.03 Test connections shall not be applied in a cell compartment in which there is any exposed metal live at high voltage. (This rule does not exclude the use of approved voltage. indicators or approved devices for phasing out circuits)

11 Insulators on Live Lines-Testing/Washing

11.01 Testing of Insulators on live lines shall only be permitted under the following conditions:

(a) Special care shall be taken at tension, double circuit transposition, tee off and terminal towers in view of the close proximity of live cross-over connections.

(b) The work shall be carried out under a Sanction-for Test and under suitable weather conditions. Testing shall not be carried out where the humidity is above 70% and shall be discontinued it a thunderstorm approaches.

(c) All men carrying out such work shall have the Managers written authority and be directly supervised at each tower by an Authorized Person.

(d) Not more than three men shall climb the tower. One of others shall be responsible for seeing that the others maintain the necessary clearance from live conductors. The second man shall apply the testing apparatus. The third man shall take observations either at conductor level or ground level.

(e) No tool other than approved testing apparatus shall be taken up the tower.

(f) The person in charge shall inform the Control Engineer when commencing and finishing the actual work. A line which trips out while such work is known to be in progress shall not be reclosed until the control Engineer has been in communication with the person-in-charge.

(g) If any circuit breaker controlling the line is fitted for auto reclosing equipment, such equipment shall be rendered inoperative before the Sanction for Test is issued and the fact that this has been done shall be recorded on the Sanction.

(h) If during the progress of the work the line is found to be dead the person in charge shall immediately communicate with the control Engineer.

11.02 Where special apparatus is provided, washing of live insulators may be carried out provided that the following requirements are complied with:

(a) The work shall be carried out under the supervision of an Authorized person who shall have the General Manager's written authority.

(b) The water used shall normally have a specific resistance of not less than 2,000 ohms/cm. cube on 132 KV and 5,000 ohms/cm. cube for 275 KV system. Where the washing system is common to both voltages, water of the higher specific resistance shall be used.

(c) The jets used shall be such that the water breaks into a spray before reaching the insulator.

(d) The nozzle of the hose shall be connected to earth by an earthing lead not less than 0.1 sq. in. (65mm^2) copper equivalents in cross section and the operator shall wear rubber gloves.

(e) The operator shall be not less than 6m (20 ft.) away from the insulator being washed and care shall be taken in observing this to see that no other live insulator or live conductor at a lesser distance inadvertently sprayed.

(f) Water washing shall be discontinued in the event of a local lightning risk.

11.03 The inspection of equipment of live lines shall only be permitted under the following conditions:

(a) The inspection shall be carried out under a Permit to Work and from within the body of the tower.

(b) No tool shall be taken up the tower.

12 Preparation for Work on High Voltage Apparatus Containing /Operated by Compressed Air

12.01 In addition to the general requirements of Rule 08.01 the following special precautions shall be taken before any work other than operating adjustments, on High Voltage Apparatus operated by or containing compressed air may be carried out:

(a) The valves controlling the supply of air to the equipment shall be closed and the air released from the associated receivers and pipe work which shall be left open to atmosphere.

(b) The valves shall be locked in position by safety locks and the keys shall be placed in the appropriate key safe.

(c) Caution Notices shall be attached to the valves.

(d) A Mechanical Permit to work shall be issued to the person to whom the Electrical Permit to work has previously been issued.

12.02 Operating adjustments or inspection of High Voltage Apparatus which do not involve dismantling of any part of the compressed air system may be carried out without a Mechanical Permit to work provided that the requirements of 07.01 are complied with. All such operating adjustments shall be carried out under direct supervision of the Competent Person to whom Permit-to-Work has been issued.

13 Work In High Voltage Equipment Containing Sulfur Hexafluoride (SF6) Gas

(a) For any equipment containing sulfur hexafluoride (SF_6) gas the PGCB code of practice must be available at the point of work stating the method of dealing with the gas and associated compounds. The apparatus shall bear an approved notice stating that it contains sulfur hexafluoride.

(b) In addition to the requirements of Additional Rules the following special precautions shall be taken when any work involves access to any part of the equipment which is or has been in contact with the gas or associated compounds:

(i) The apparatus shall be isolated from all sources of the supply of gas, purged in accordance with the PGCB code of practice and the associated receiver(s) and pipework jet open to atmosphere.

(ii) The valves shall be locked by safety locks and the keys shall be placed in the appropriate key safe.

(iii) Caution Notices shall be attached to the valves.

(c) Approved protective clothing, respirators, eye shields and sate handling equipment shall be provided and used where danger may arise from the gas or associated compounds in accordance with the PGCB code practice.

14 Safety Rules for Work on Medium and Low Voltage Apparatus, Conductors and Equipment

14.01 General Precautions

The consequences of shock or serious burn from short circuit associated with Medium or Low Voltage systems may be serious, or in some circumstances, fatal. Wherever practicable, therefore, work on Medium and Low Voltage Apparatus, conductors and equipment shall be done while they are dead. When verbal instructions are not considered sufficient a Minimum Access Distance (MAD) shall be issued.

14.02 Work on Dead Apparatus, Conductors and Equipment When work is to be done on dead Medium Voltage Apparatus, conductors or equipment controlled by circuit breaker or switch, the circuit breaker or switch shall be locked off, where practicable and a Caution Notice affixed. The keys shall be kept in a safe place, preferable in the possession of the person in charge of the work and the circuit shall be proved dead by an approved indicator before work is commenced.

14.03 When work is to be done on dead Medium Voltage Apparatus, conductors or equipment, supplied from fuses in a fuse distribution board, the fuses shall be removed and a Caution Notice affixed to the distribution board with a notice specifying the circuit upon which work is in progress. The fuses shall be kept in a safe place, preferable in the possession of the person in charge or the work and the circuit shall be proved dead by an approved indicator before work is commenced.

14.04 Before work is commenced on bare low or medium voltage overhead lines which have been made dead, the lines, including he neutral line, shall be short circuited and where practicable earthed

14.05 Line Crossings

Any overhead line over which another line is to be run shall be made dead or an adequate temporary cradle guard provided during the running out and binding in or conductors on the new work

14.06 Work on Live Apparatus, conductors and Equipment

Work on live Medium or Low Voltage Apparatus, conductors or equipment shall be undertaken only by a competent person.

14.07 Work on Overhead lines

Before any wood pole is climbed it shall be sounded and no pole, the condition of which is doubtful, shall be climbed without the permission of the Competent Person in charge. No person shall climb any pole or tower unless he is wearing and makes proper use of an efficient safety belt and is under observation by a second person who is in attendance, preferable at the

base of the Pole on which work is being done.

15 Safety Rules for Live Line Working

15.01 Live line work shall be under the direct and continuous supervision of an Authorized Person who has received specialized training in the work to be undertaken and is appointed in writing to be responsible for such work.

15.02 Live line work shall be undertaken only by persons who have received appropriate training and are appointed, in writing, to be authorized persons for live line work.

15.03 Live line work shall not be undertaken until the method of working has been planned and written down step by step and explained to all persons to be engaged on the work.

15.04 Live line work shall only be permitted on circuits which have been approved as suitable for this type of work.

15.05 All tools and equipment used for live line work shall be approved, and shall be maintained and used in approved manner.

15.06 The Authorized Person in charge of live line work shall satisfy himself, before work commences, that each member of the team who is to carry out live line work is properly authorized and fully understands the method to be used and the nature and extent of the work to be carried out.

15.07 Before the live line work, commences, the Senior Authorized Person in charge of live line work shall satisfy himself that atmospheric conditions are such that the work can be performed safely.

15.08 The Authorized Person holding the Live Working Certificate shall examine the conditions of all tools and equipment prior to use. He shall ensure that such tools and equipment are marked to indicate the appropriate limit of the safe handling position. If any defect is found or suspected in a live line tools or pieced of equipment it shall not be used.

15.09 Auto-reclose equipment or circuit breakers controlling the circuit concerned shall be rendered, and shall remain inoperative while the HV Live Line Working Certificate is in force. Caution Notices shall be affixed to the auto reclose equipment. The Control Engineer shall not reclose the circuit, in the event of it tripping until he has obtained toe agreement of the Authorized Person in charge of the live line work.

15.10 A channel of communication shall be established between the live line working team and the appropriate Control Engineer before the commencement shall be maintained throughout the period during which live line work is being carried out.

15.11 Before work commences, the Authorized Person who holds an authorization for live line work shall with the consent of the Control Engineer, issue to himself, or the another Authorized Person similarly appointed, an HV Live Line Working Certificate.

15.12 The Authorized Person in charged shall ensure that all persons while engaged in the live line work wear and made proper use of approved protective clothing, safety belts or harnesses and any other necessary safety equipment.

15.13 An approved leakage detector shall be used throughout the duration of the live line work. Live line work shall cease if the approved leakage detector gives and alarm. Work shall not be resumed until conditions giving rise to the alarm have been cleared.

15.14 When displacing live conductors, or near circuits on which live line work is to be carried out precautions shall be taken to avoid danger arising from deduced clearances.

15.15 Where mechanical loading conditions are to be varied during the course of live line work conductors, insulators, fittings and steelwork affected shall be inspected before work commences.

15.16 No vehicle or equipment or any person shall be followed in the near vicinity while work in progress without the sanction of the Authorized person in charge of the live line work.

15.17 No high voltage conductor or connection shall be broken during the course of live line work unless a parallel path of equivalent current carrying capacity has been safely and efficiently connected.

15.18 Where the work for which the HV live line working certificate was issued has not been completed on the day of issue of the certificate, all men shall be withdrawn, and then the certificate shall be cancelled with the consent of the Control Engineer.

15.19 If live line work has to be suspended, due to adverse atmospheric conditions or for any other reason, the Authorized Person holding the HV live line Working Certificate shall immediately inform the control Engineer and shall agree with him whether the HV live line working certificate is to be cancelled.

15.20 If live line work has been suspended for any reason, then before work is recommenced the Authorized person holding the HV line working certificate shall inform the Control Engineer and shall satisfy himself that atmospheric conditions area such that the work can be performed safely and that all tools and equipment are in a safe condition.

15.21 On completion of live line work covered by the live line working Certificate, all men shall be withdrawn and then the certificate cancelled with the consent of the Control Engineer.

16 Fire Protection Equipment and its Auto Control

16.01 General

(a) Contact with some chemicals used in fire protection equipment may be dangerous and in such cases notices to that effect shall be displayed adjacent to the equipment

(b) Portable fire fighting equipment shall not be used on electrical apparatus unless such apparatus has been disconnected from the supply.

(c) Portable CO_2 and any chemical extinguishers may be used in the vicinity of live electrical apparatus provided that in the handling of the extinguishers, safety clearances are maintained. After the discharge of portable CO_2 extinguishers in a confined space, the operator shall leave the space until the precautions set out in (d) have been taken.

(d) After any fire or after the discharge Of CO_2 extinguishers in an enclosed space, the space shall be thoroughly ventilated before entry or suitable breathing apparatus shall be worn if entry is necessary before the gases have been cleared.

16.02 Automatic Control

(a) Before work or inspections are carried out in any enclosure protected by automatic C02 or other chemical extinguishing equipment the automatic control shall be rendered inoperative and the equipment left on hand control and a notice to this effect shall be attached.

(b) The automatic controls shall be restored immediately after the persons engaged on the work or inspections have from the protected enclosure.

(c) Precautions taken to render the automatic control inoperative shall be noted on any Permit-to-Work issued work in the protected enclosure.

Part-III

MISCELLANEOUS

A. Safety Committee

A01 Safety Meeting Structure & Protocol Scope

The intent of this document is to identify the minimum requirement and responsibilities for a safety meeting structure and Protocol that meets the needs of Transmission Field Service.

A02 Structure

MD will appoint central Safety Committee in collaboration with Director (Finance/Technical)

A03 Meeting agenda

The meeting must be held Monthly/Quarterly on a Regular Recurring Schedule.
All members must attend.
Members will bring safety manual to meeting.

Mandatory items-

- All Accident, Incidents & Injuries will be reviewed.
- Items referred to Safety Committee will be discussed & acted Upon.
- Optional items.

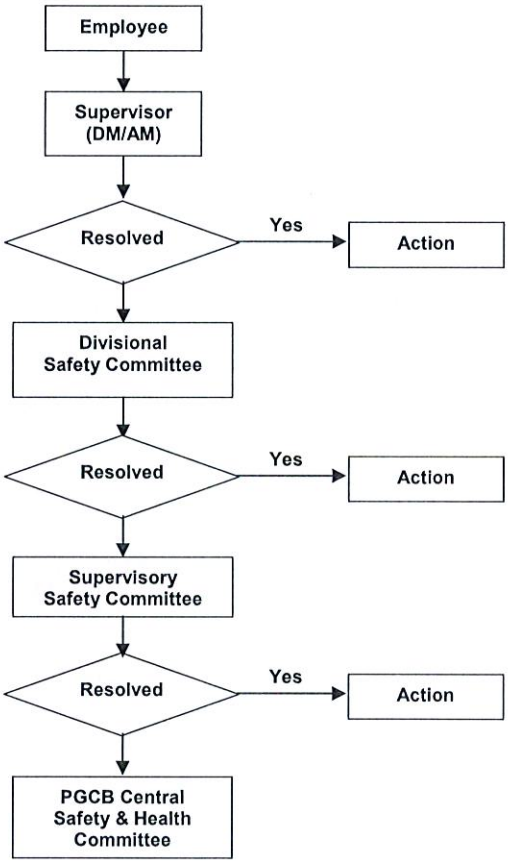
A04 Minimum Meeting Requirements

Committee	Frequency
Central Safety & health Committee	Monthly
Supervisory Committed	Bi-Monthly
Divisional Safety Meeting	Quarterly

A05 Safety Engineer.

A post of 'Safety Engineer' in the rank of DGM will be created to work under the Safety Committee. One engineer in the rank of Deputy Manager of each Grid Division will be trained on Operating Codes and Safety Practices who will follow the instructions of Safety Engineer. He/She would remain responsible for all works and assignments under the respective Division.

A06 Safety Programme Hierarchy



Work with CARE
Life has no SPARE

B. Treatment for Electric Shock

B TREATMENT FOR ELECTRIC SHOCK

The intent of this document is to identify the minimum requirement and responsibilities for a safety meeting structure and Protocol that meets the needs of Transmission Field Service.

B01 The following methods should be learnt from a qualified Instructor and practiced regularly.

Immediate and Speedy Action is necessary Free from Contact

Switch off current immediately or send someone to do so. Do not attempt to remove a person from contact with high voltage unless suitable articles insulated for the system voltage are used for this purpose. When attempting to free a person form contact with low voltage use rubber gloves, boots, or mat, or insulated stick, but if these are not available use a loop of rope, cap or coat to drag the person free. Whatever is used should be dry and non-conducting.

After Release

Do not waste time moving him. Lay the patient down on something dry, if possible, and if no sign of breathing can be observed. IMMEDIATELY proceed to promote artificial respiration and someone else for a doctor and ambulance. Do not give up efforts to restore natural breathing until told to do so by a doctor.

Artificial Respiration: Mouth-to-Mouth Method

1) Remove any foreign material- false teeth, vomit, etc. which may cause blockage of the air passages. (See-Figure-1)

Ii) To open the air passage tilt the patient's head backwards as far as possible. Use one hand to push the patient's head backwards and the other to pull the jaw forwards. At the same time slightly opening the patient's mouths

!I!) Take a deep breath, place your mouth over the patient's mouth and blow, Seal the patient's nose either by passing your cheek against it or by grasping it with the fingers. (See Figure-3)

iv) Give 6 to 8 quick blows and then continue to inflate the Chest about 10 times per minute. Watch the chest during inflation. It should rise. No movement indicates a blocked airway. If so, check mouth and throat are clear and tilt the head further backwards.

Artificial Respiration: Holger Nielsen Method

I) Lay the patient face down, the arms above the head, the elbows flexed so that one hand rests on the other. Turn the patient's head to one side so that the cheek rests on his uppermost hand. If the hands are injured rest the cheek on a firm pad (See Figure-3)

I!) See that the air passages are clear of foreign matter.

iii) Kneel on one knee at the patient's head with the other foot near his elbow. (See Figure-3)

iv) Place your hands on the patient's shoulder blades and rock forward with your elbows straight until your arms are vertical, pressing downwards but not too heavily. This movement should take two seconds. (See Figure-3)

v) Grasp the patient arms just above the elbows and rock your self backwards lifting the elbows above the patient's head (two seconds (See Figure 4)

vi) Lower arms and transfer your hands to his shoulder blades (See Figure-3)

vii) Repeat total movement at the rate of ten times per minute.

Artificial Respiration: Silvester's Method

i) Remove any foreign matter blocking the airway.

ii) Place casualty on his back with a pad of some kind under his shoulder so that the head falls back fully extended. (See Figure-5)

iii) Kneel at his head-grasp the patient's arms at the wrist - cross them over the lower chest and press to squeeze the air out of the chest (two second) (See Figure-5)

iv) Pull arms upwards and outwards to above the head, stretching the chest (three seconds) (See Figure 6)

v) Repeat the whole movement approximately ten times per minute.

B02 Other injuries

After breathing, priority should be given to controlling bleeding. This is achieved by firm pressure on the wound.

1) Cover with a clean dressing and bandage firmly in place.

11) If bleeding continues and further dressings on top of the first and increase the pressure by bandaging firmly in place.

Burns should be covered with a clean, sterile dressing to exclude air. This dressing should have the bandaged lightly in position. Unless it is dangerous to leave the casualty at the site of the accident expert assistance should be sought before other injuries are treated. if it is necessary to move the casualty, do so with the utmost gentleness carefully supporting any injured parts.

B03 First aid appliances

The first aid appliances provided shall be used only for the purpose intended. A person shall be appointed to be responsible for ensuring that supplies are always available.

B04 SHOCK

Shock is state of collapse or prostration that interferes with normal action or the heart, respiration and circulation. This condition is probably due to derangement or lack or proper balance within the sympathetic nervous system that controls these vital functions. Shock is a serious condition and requires immediate action on the part of the first aider. Shock follows an injuries or emotional disturbances. Symptoms may develop immediately, or in some cases considerable time may elapse before they are noted. The more serious the injury or emotional disturbance, the more severe is the shock.

a) Symptoms. The symptoms of shock are:

1. The face is pale.

2. The skin is cool and clammy with perspiration around the nose, mouth, and forehead.

3. The pulse will be fast and weak.

4. The eyes will lack luster and the pupils may be dilated.

5. Breathing may be shallow and irregular.

6. Dizziness, nausea and vomiting may develop.

b) Dangers or Shock.

1. Shock may cause death.

2. Shock pre-disposes the body to infection, such as pneumonia or wound infection.

3. Shock may lead to amputation of parts of the body due to lack of circulation in the extremities.

c. Prevention and Treatment. First aid attention is the same for the prevention and treatment of shock.

1. Keep the patient lying down flat until you have determined whether or not a head injury is present. If no head injury is present and no fractures of lower extremities exist, elevate the feet or lower the head, whichever is more convenient. If a serious head injury is suspected, keep the patient laying flat

2. Keep the patient warm; conserve body temperature. This can be accomplished by placing a blanket underneath the patient and covering him, according to weather conditions, to maintain normal body heat. Do not cause the patient to be over heated. In cold weather it may be necessary to use artificial heat.

d) Factors which Contributor to Shock. Anything's which causes pain, such as rough handling, improper transportation, continuation of bleeding, exposure to cold or excessive heat, or fatigue, contributors to shock and should be avoided.

REMEMBER

IN ARTIFICIAL RESPIATION TIME IS OF UTMOST IMPORTANCE

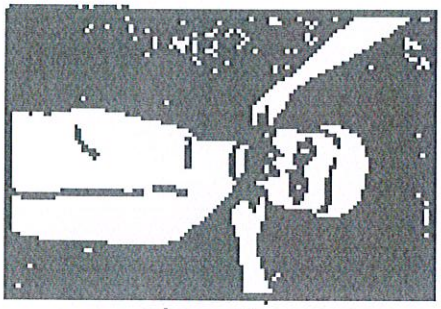


Figure-1

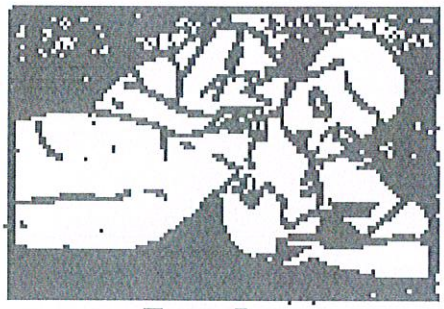


Figure-2

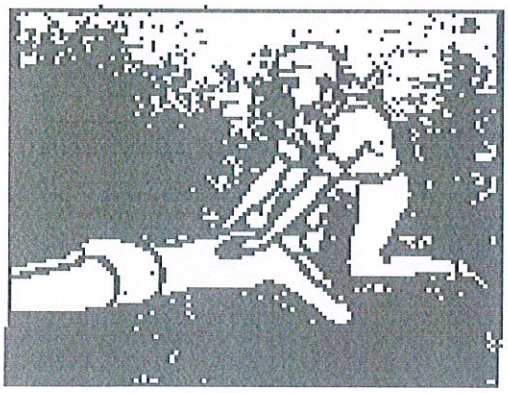


Figure-3







C. REPORTING OF ACCIDENTS

C. REPORTING OF ACCIDENTS:

(Rule 84 of Factories rules 1979)

C01 1. When in any factory there occurs an accident to any person which results in death or such injury that there is no reasonable prospect that he will be able to resume his employment in the factory within 20 days, such accidents shall may be called in all communication as "Fatal" or "Serious", as the case may be, and the Manager of the Factory shall give notice of the occurrence forthwith by telephone, telegram or special messenger to

a) The Chief Inspector

b) The Deputy commissioner, c) Inspector,

d) The Commissioner for Women's Compensation appointed under section 20 or the Workmen's Compensation act, 1923:

e) In the case of fatal accident only the Officer-in-charge of the police station within the local limits of which the factory is located.

2. Reports by special messenger shall be in Form No. QF-GMD- (Form 18) and those sent by telephone or telegram shall be confirmed within 24 hours by a written report in that Form.

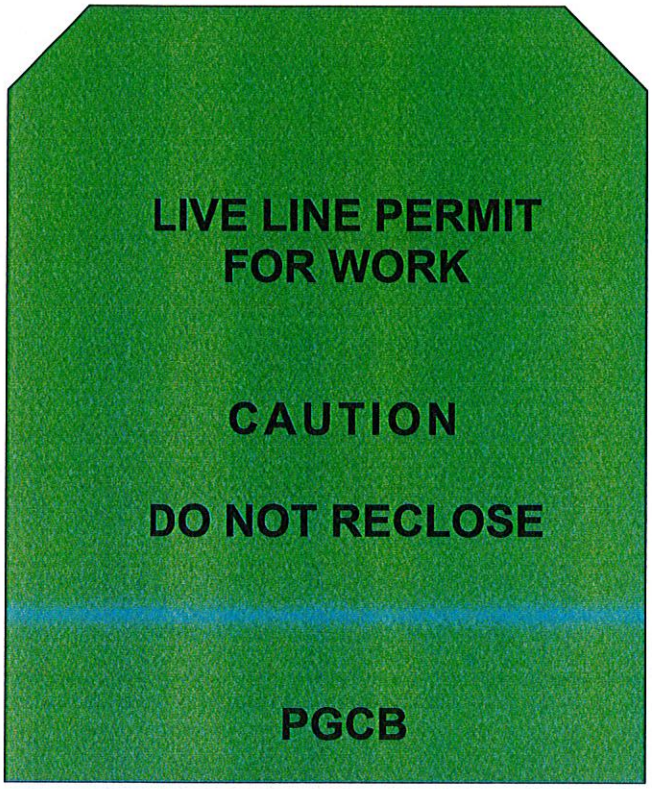
C02 Supplementary Reports or Accidents. (Rule 84 of Factories rules 1979)

1. When an accident which has been reported to the Factory Inspector as either "Serious" or "Minor" afterwards proves to be "Fatal", The Manager shall make the necessary correction in a supplementary report which shall be sent forthwith to the authorities mentioned in clauses (a), (b), (c) and (d) of rule 84.(2) When an accident which has been reported to the chief inspector and Inspector as "Minor" afterwards proves to be "Serious", or when one reported as "Serious" afterwards proves to be "Minor", the manager of the factory shall make the necessary correction in a supplemented in clauses (a), (b), (c) and (d) of rule 84.

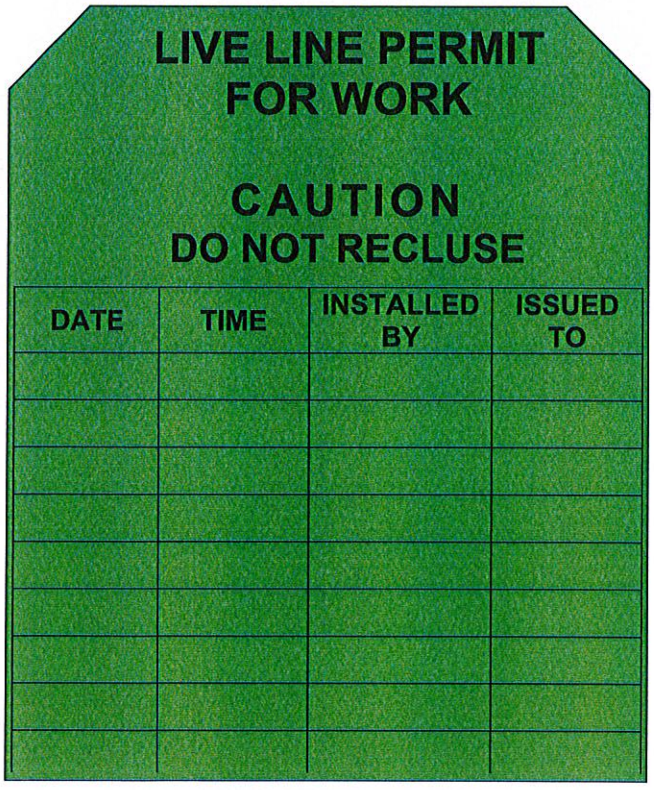
2. A final accident report shall be sent by the Manager to the Chief Inspector and Inspector, in Form No. QF-GMD- (Form 18A) within one month from the date of occurrence of the accident.

Part-IV

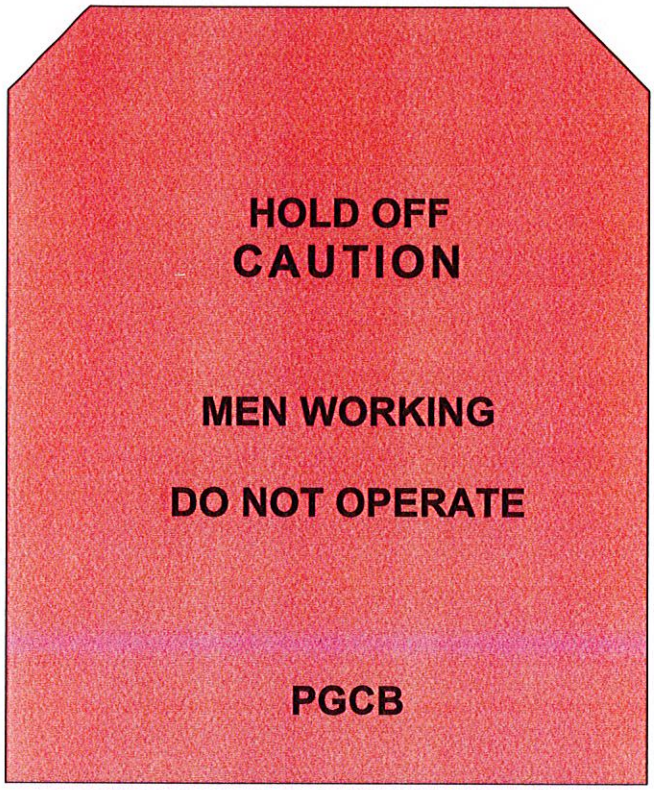
CAUTION NOTICES/TAGS



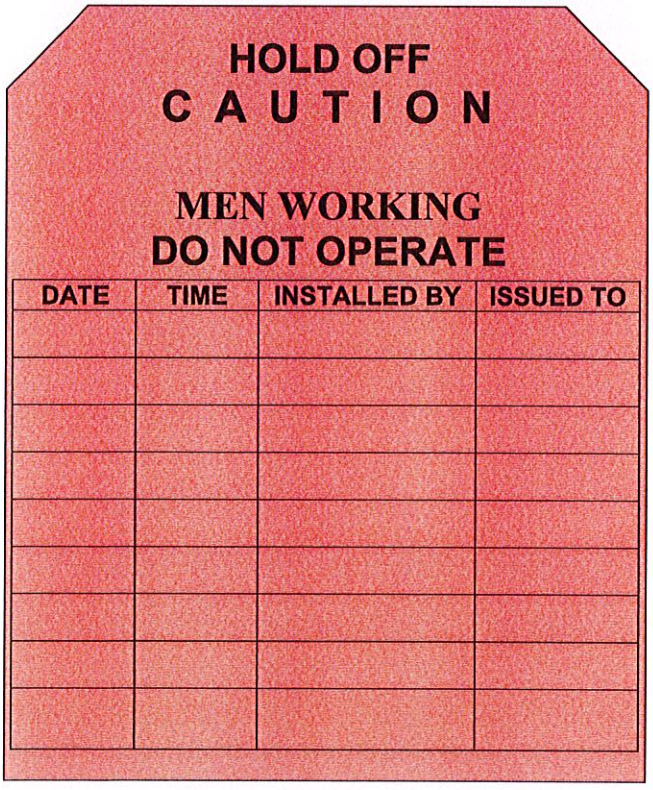
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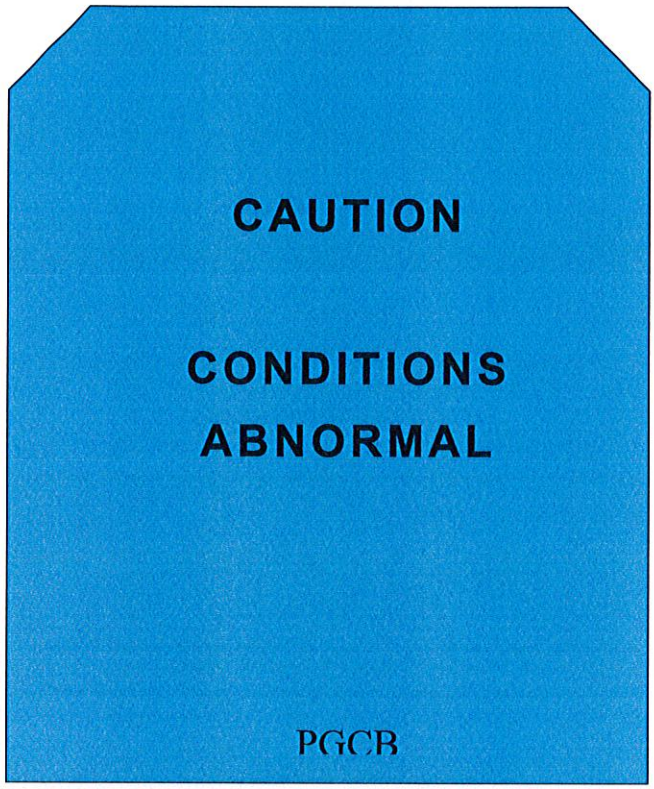
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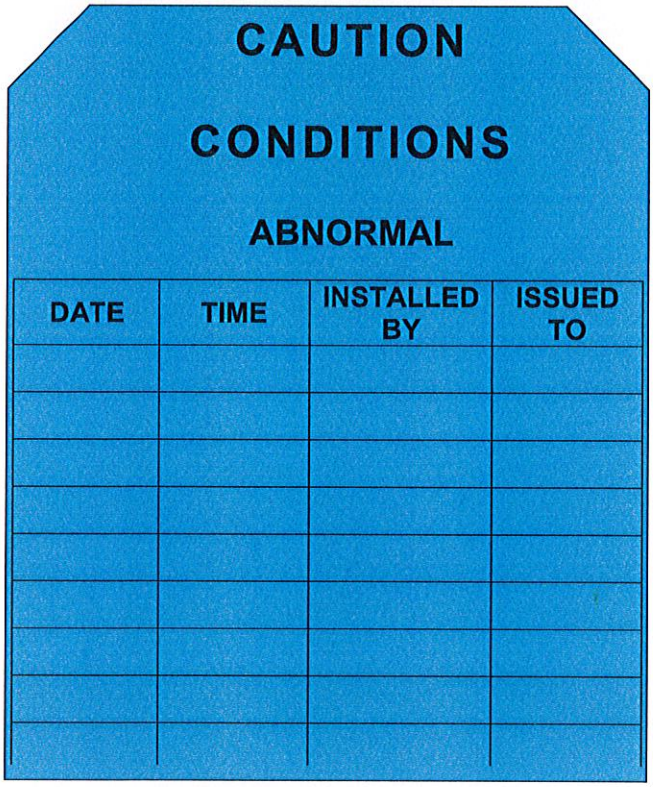
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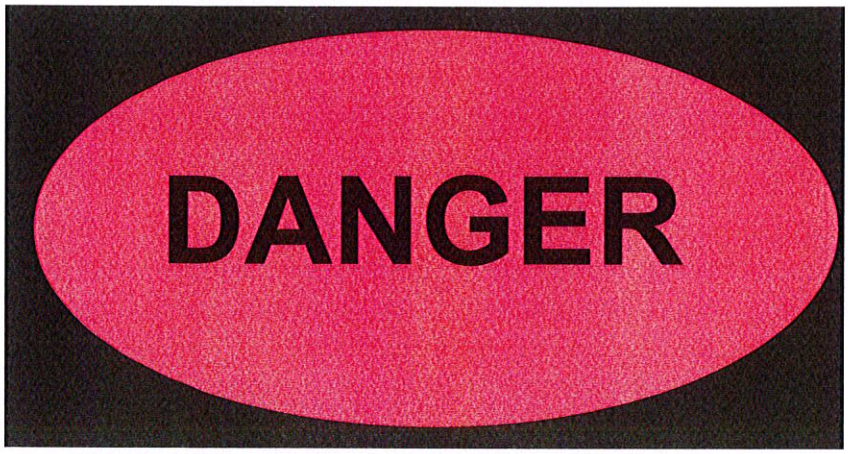
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GLOSSARY OF SPECIAL TERMS

Control Engineer	Engineer-in charge of a Shift at Load Dispatch Centre in case of Transmission. Shift-in-charge of System Control Centre will act as Control Engineer in case of 33kV System.
Authorized Person	A competent person adequately trained and possessing technical knowledge and appointed in writing by PGCB to carry out specific operations and/or work on their systems or on apparatus. The certificate of appointment shall state the class of operation and/or work the person in which it applies.
High Voltage Apparatus	Any apparatus, equipment or conductors which are normally operated at a voltage exceeding 400V
Circuit Main Earth	An earth applied on the instruction of the Control Engineer before a Work/Test Permit.
Isolation Memo	A form detailing the circuits to be isolated, which may be used where the apparatus to be controlled by another organization.
Minimum Access	A form issued and cancelled by a Distance (MAD) Authorized Person specially authorized to do so, defining the limits and nature of work which may be carried out in the vicinity of live apparatus. A MAD may be issued where a Work/Test Permit is not applicable and where verbal instructions are not considered sufficient.
Work Test Permit (WTP)	A form of declaration signed and given by an Authorized Person in charge of work to be carried out on any earthed HV apparatus for the purpose of making known to such person exactly what apparatus is dead, isolated from all earth and on which it is safe to work.
HV Live Line Working	A form declaration signed and given by Certificate an Authorized Person, who has been appointed in writing to be responsible for live line work and issued either to himself or to another Authorized person, Similarly Appointed to be in work upon, nature and extent of the Live Line work and method thereby it is to be carried out.
Switching Order	Step-by-step plan to perform switching operations in a specific sequence.
Clearance for Work	Assurance given to a worker by an Authorized Person that (1) specified power system equipment or a transmission line is isolated from the power system, and (2) it will not be ordered energized until that worker report that the equipment or line is ready for service.

Hold order (Hold off)	Permit to work for definite work to be done on specified apparatus and guarantees protection of employees when working on electrical or other equipment, it may be issued in any one of the following way a. Clearance for work-written or verbal b. Permission for work -Written/Verbal Work/Test Permit -Verbal permission for work on live line/station equipment.
Safety Engineer	Deputy General Manager, Load Despatch Circle will act as Safety Engineer of PGCB. He will act as Member-Secretary to the Managing Director, PGCB.
Divisional Engineer/Officer	Manager-in-charge of Division Viz-, Manager, GMD, Dhaka (East)
Staiton-in- Charge	Deputy Manager/Asstt. Manager of a Grid Sub-station.

Appendix L

Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS Substation at Kaliganj on turnkey basis (Package-5)

[Contract No.: PGCB/ADB/L3853/AIIB/L8374/DWZTGEP/GIS/P5]

Site Specific Labours Management Plan

January 2023

Appendix L

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Appendix L

1.0 Introduction

ADB works with borrowers to put policy principles and requirements into practice through project review and supervision, and capacity development support. The SPS also provides a platform for participation by affected people and other stakeholders in project design and implementation. Site specific labor management plan provide an overview of the applicable Bangladesh legislative and Bangladesh labour act 2013 and Bangladesh Labour Rules 2015 provisions and how the risks and issues related to labor in the sub-component component project of Power Grid Company of Bangladesh under Dhaka and Western Zone Transmission Grid Expansion Project (**DWZTGEP**) project to ensure reliable and quality supply of electricity to the rural and urban consumers in Bangladesh through improvements in technical efficiency of the distribution system. Labours will be managed during the implementation of the SS project. The site specific Labor Management Plans for the individual components will in due course be prepared by **China Electric Power Equipment and Technology Co., Ltd** and will be reviewed and cleared by the Supervision consultant of ADB and PMU, PGCB as appropriate.

SN	Name of the Substation	GPS	Land area
1	Kaligonj 400/230 kV indoor GIS substation.	23.967419 90.551346	18.05 acres

2.0 Overview of Labours use on the substation project

The Site Specific Labor Management Plan (SSLMP) has been developed to manage labor risks during the implementation of the substation project. The SSLMP is in line with national requirements as well as the objectives of the Bangladesh labour rules 2015, contractor will give health protection including

- To wash it or make free from germs with chemicals, solution depending on the situation.
- As per the section 52(2), the temperature of each working room of the firm should be kept in a tolerable limit and there will be windows of sufficient numbers in each room for the proper ventilation of pure air.
- As per the section 54, the arrangements of removing the wastes and liquids should be in accordance with the existing law and direction of the country and the clearance issued by the environment and health authorities concerned on the measures taken should be submitted to the inspector.

Labor Act 2006 (including Amendments of 2013 and 2018), and National Child Labor Elimination Policy 2010 etc have been thoroughly studied and cited to meet their requirement and obligations. Major points of consideration that include Conditions of Employment, OHS, Child/Forced Labor etc have also been referred as guidelines.

Various types of workers (Direct, Contracted, and Primary Supply workers), their estimated numbers, characteristics etc. have been set out in this LMP. Key potential environmental and

social risks—such as unscrupulous labor practices, OHS, community risks, waste generation, risk of GBV, exploitation of child and forced labor have been identified. Given the size of the project, the potential Environmental and Social (ES) risks and impacts, the capacity of the implementing agency to manage and mitigate the ES risks and the context, under which the project is being implemented, the ES assessment has set the project risk classification as high.
Grievance Redress Mechanism (GRM) for labor has been worked out so that any potential dissatisfaction, concerns, notice can be raised by anyone employed by the **China Electric Power Equipment and Technology Co., Ltd**. For the PMU, PGCB, Contractor Management guideline has also been appended so that selection, retention, monitoring and guiding the contractor in its meeting of the ES requirement can be done in accordance with the national laws/acts. This LMP will form a part of the General Specification of Contract of the bidding documents.
The transmission line project has four components as follows: Component A – civil work including piping work and pile cap ; Component B- erection of substation with definite height; and Component C – straining of metallic wire component D- management unit of the total substation project.

The substation project activities involve three types of employment, these include: (i) direct workers- the staff, such as PIU staff and who will be directly engaged by **China Electric Power Equipment and Technology Co., Ltd**, (ii) contracted workers through third parties, such as sub-contractors and substation construction companies under trade license, who will employ consultants and contracted workers related to the construction of the 5-substation project, and (iii) primary supply workers – who will be engaged by the substation construction companies' primary suppliers. There will not be any community workers involved in the project. The sections below provide detailed description of the type and number to be engaged throughout the project life for 24 months. Site Specific Labor Management Plans will be prepared by **China Electric Power Equipment and Technology Co., Ltd** as part of SSESMP based on the provisions of these Labor Management plans and the details of labor to be used in those contracts. These plans will be reviewed and cleared by Supervision consultants of ADB.

3.0 Project Management Unit (PMU) and Project Implementation Unit (PIU) for DWZTGE

The project director and others will make a project management unit (PMU) of Dhaka and Western Zone Transmission Grid Expansion Project (**DWZTGEP**). The PIU of **China Electric Power Equipment and Technology Co., Ltd** will be formed with project manager,. substation Civil Engineers, Project coordinators, Site Managers/In-charge, Transmission Line Electrical Engineers, Environmental and Social Manager, Site Engineers, H&S Officers, Social Officers, Store Keepers and surveyors. The labour management plan is based on the PIU of **China Electric Power Equipment and Technology Co., Ltd**. All labours of the substation project will be maintained the code of conduct of project implementation unit (PIU)

4.0 Project Approach to Labor and Working Conditions Management Plan

Transmission Line construction project will involve the mobilization and recruitment of a large number of labours during a limited period of time. Assuring good labour and working conditions for all persons whom will be engaged during the construction of transmission line project implementation of high priority for Power Grid Company of Bangladesh Ltd. The majority of labours will belong to the sub-contractor. The accommodation will be the responsibility of the **China Electric Power Equipment and Technology Co., Ltd**, which will have to draft their own plan in this regard, in compliance to the Bangladesh Labour act and BLR legislation and norms, but also to the current Labor Management Plan.

The SSLMP represents an instrument that guides the **China Electric Power Equipment and Technology Co., Ltd**, regarding their compliance with biding documentations, in order to:

- ✓ Respect labour and working conditions for all their employees and the employees of their sub-contractors;
- ✓ Respect social and environmental conditions on sites of substations;
- ✓ Promote workers' conditions and rules for health, safety and security;
- ✓ Promote workers positive behaviour on the substation settlements; and
- ✓ Reduce negative impact of the substation project.

In particular, the provision of this Plan shall meet national legislation and international good practice in relation, but not restricted, to the following:

- ✓ Provision of all rights for all workers as envisaged in the national legislation (BLL 2006)
- ✓ All workers belonging to contractors and/or sub-contractors (and all other third parties) should be legally registered;
- ✓ Development of a worker registration system that enables **China Electric Power Equipment and Technology Co., Ltd** to keep track of all workers on each site and to identify the person (organization) for whom they are directly working;
- ✓ China Electric Power Equipment and Technology Co., Ltd will develop a register for all their workers. This register should contain data such as: name, age, sex, hours worked, wages, payments (including overtime payments) made, and any deductions made from their wages. The register will be in line with national requirements on registration of workers;
- ✓ Establishing a coherent and integrated grievance mechanism for all workers engaged in the substation project

Development of a workers' accommodation plan that should consider aspects such as:

- ✓ the provision of minimum amounts of space, heating, ventilation for each worker;
- ✓ provision of sanitary, laundry and cooking facilities and potable water;
- ✓ the location of accommodation in relation to the workplace;

- ✓ any health, fire safety or other hazards or disturbances and local facilities;
- ✓ the provision of first aid and medical facilities;

There are several stages to the process of addressing issues raised by workers' accommodation. These are:

- Assessing whether housing is needed for the project and if so, what sort;
- Assessing impacts on local communities and planning mitigation of potential negative impacts;
- Awareness of the national and local regulatory framework;
- Determining the standards to apply to the location of facilities, the construction of housing and provision of facilities; and
- Managing accommodation.

Purpose

This Labour Force Management Plan (LMFP) has been prepared by to comply with the minimum Government of Bangladesh and International Labour Standards, which include:

- ➢ Freedom of association and collective bargaining;
- ➢ Non-discrimination and equality of opportunity;
- ➢ Freedom from child labour;
- ➢ Freedom from forced labour;
- ➢ Retrenchment of which the core requirement of which is to have a retrenchment plan based on consultation and non-discrimination;
- ➢ Working relations which should include documentation and communication of conditions;
- ➢ Working conditions which should comply with collective bargains or, where these are not in place, national law minimums on matters such as pay, hours, etc.;
- ➢ Grievance mechanisms whereby an appropriate procedure must be in place for workers; and,
- ➢ Human resource policy whereby the Contractor is expected to have a human resource policy in place.

PGCB will ensure that the management of all labours working on the substation project including those who are indirectly employed:

- ✓ Complies with Bangladesh Labour law (2006) and meets the requirements of the International Finance Corporation (IFC) Performance Standards;
- ✓ Optimises the benefits associated with construction employment; and,
- ✓ Mitigates where possible any negative impacts that might occur as a result of construction employment or subsequent retrenchment.

This SSLMP seeks to achieve the above objectives through clear and manageable plans and procedures, underpinned by the explicit guiding principles detailed below. This SSLMP is

applicable across 5 substation project by direct and indirectly-labour force at all skill levels working on the substation project development and implementation.

5.0 Brief overview of Labour Legislation;

5.1 Terms & Conditions

Terms and Conditions of employment are guided by The Bangladesh Labor Act, 2006 and Amendment 2013 that illustrate the basic conditions of employment which are materially consistent with ESS 2. The Act makes it mandatory for employers to furnish employees with written particulars of employment stating, hours of work, wages, leave entitlements, job description, grievance procedure, benefits if any etc. This
Act also contains:

- Contracts of employment
- Leave entitlements, i.e. annual leave, sick leave, maternity leave and compassionate leave
- The protection of wages (prohibition against unlawful deductions)
- Retrenchment procedures
- Fair and unfair reasons for termination of employment
- Grievance mechanism

5.2 Occupational health & safety

Chapter 6 of The Bangladesh Labor Act 2006 (**Safety**) specifically details the safety and working condition of the assigned workers. The salient aspects that this chapter illustrates are: Safety of building and machinery. It details the inspection requirement of these installations and actions to be taken if these are found unsafe for workers.

- **Precautions as to fire**. Illustrates fire safety requirement, equipment needed as well as actions to be taken in case of fire
- **Fencing of machinery, machinery in motion, automatic machines**. Details the fencing and safety requirement to be set around dangerous machinery.
- **Floors, Stairs and Passages**. Sets out the construction and setup requirement for safe access and ease of use.
- **Excessive weights**. Illustrates that no excessive weights to be lifted by any labours.
- **Dangerous fumes and explosive and flammable gas**. Details courses of action in case dangerous and explosive gases and fumes are in work area.
- **Personal protective equipment (PPE)**. Makes it mandatory to supply workers with PPE.

5.3 Special Provision Relating to Health, Hygiene, and Safety

Chapter 7 of the Bangladesh Labor Act 2006 details:

- **Dangerous operations.** All potential dangerous operations to be declared and women and children to be barred from such operations.
- **Notice on accident.** Makes it mandatory to report any accident in workplace.

- **Notice on diseases.** If any worker is infected with any disease listed in the Second Schedule of the Act, it is mandatory to notify and the employer is obligated to treat the worker.
- **Restriction to Employ Women Worker.** Lists specific assignments where women may not be employed.
-

5.4 ADB Safeguards Standards

They include:

- ✓ **As per ADB, protective measures consisting of the use of specific technical means,** called safeguards (guards, protective-devices), to protect workers from hazards that cannot be reasonably removed or sufficiently limited by design.
- ✓ Safeguarding is the practice of **ensuring that vulnerable people have their health, wellbeing and rights protected in society**. If there are children or vulnerable adults in your workplace, everyone has a responsibility to be vigilant of potential signs of abuse and neglect.
- ✓ Safeguard measures can take various forms, including **increased duties, quantitative restrictions, and others** (e.g., tariff-rate quotas (TRQs), price-based measures or special levies).
- ✓ **IFC Performance Standard 2:** Recognizes that, the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamentall rights of labours or workers.

6.0 Responsible staffs and Procedure

Various aspects of the responsibility with respect to worker management have been described in details in the SSESMP. The summary of responsibility is appended below:

Overall Management. The PMU has the overall responsibility to oversee all aspects of the implementation of the LMP, in particular to ensure contractor compliance. PMU will address all LMP aspects as part of procurement for works as well as during contractor induction. China Electric Power Equipment and Technology Co., Ltd is subsequently responsible for management in accordance with contract specific

Labor Management Plans, implementation of which will be supervised by the PMU. China Electric Power Equipment and Technology Co., Ltd will be required to write, adopt, and implement a written Site Specific Labour Management Plan as part of the bidding document and contract before employing any labor in the work.

Occupational Health and Safety (OHS). Contractors must engage a minimum of one safety representative/ officer. He/she will ensure the day-to-day compliance with specified safety measures and records of any incidents. Minor incidents are reported to PMU on a monthly basis, serious incidents are reported immediately.

Labor and Working Conditions. Contractors will keep records in accordance with specifications set out in this LMP. PMU, PGCB may at any time require records to ensure that labor conditions are met. PMU will review records against actuals at a minimum on a monthly basis and can require immediate remedial actions if warranted. A summary of issues and remedial actions will be included in quarterly reports to the WB.

Worker Grievances. A Grievance Redress Mechanism (GRM) has been detailed with this LMP including the setup of a Grievance Redress Committee (GRC). Contractors will be required to abide by the provisions of the GRM. The Social Specialist/ Consultant will review records on a monthly basis. PMU will keep abreast of resolutions and reflect in quarterly reports to the ADB. Given the anticipated number of the project workers the labor GRM will be a separate document apart from the Project level

GRM, though personnel in the committees (GRC) on both the GRMs may have overlapping functions. Reporting Channels for the GRMs may also be same.

GBV, Waste management, communicable diseases; China Electric Power Equipment and Technology Co., Ltd will be fully responsible to ensure that their workers know and are trained on their obligations with respect to avoidance of any form of GBV, safe disposal of wastes and reporting of communicable diseases if they contract any. Continuous motivation, monitoring and reporting on the same is the responsibility of the Contractor. The PMU, PGCB will have a monitoring team to ensure the same.

Additional Training; China Electric Power Equipment and Technology Co., Ltd will be required to ensure that the assigned workers are adequately trained and briefed with overall safety arrangement, use of equipment, GRM procedure, working conditions of the project. Training on GBV and preparation and obtaining signed code of conduct are also Contractor's responsibility.

6.1 Site-specific management for labor camps or rental house

As per terms and conditions of labours is guided by Bangladesh Labor Act, 2006 and Amendment 2013 that illustrate the basic conditions of employment which are materially consistent with BLR 2015.

The BL Act makes it mandatory for employers to furnish employees with written particulars of employment stating, hours of work, wages, leave entitlements, job description, grievance procedure, benefits if any etc.

Various types of workers (Direct, Contracted, and Primary Supply workers), their estimated numbers, characteristics etc. will be set out in this site specific LMP. Key potential environmental and social risks—such as unscrupulous labor practices, OHS, community risks, waste generation, risk of GBV, exploitation of child and forced labor. For the accommodation of labours, there are two accommodated direct, contract and primary supply workers. The substation project activities involve three types of employment, these include: (i) direct workers-the staff, such as PIU staff and who will be directly engaged by China Electric Power Equipment

and Technology Co., Ltd, (ii) contracted workers through third parties, such as sub-contractors and substation construction companies under trade license, who will employ consultants and contracted workers related to the construction of the substation project, and (iii) primary supply workers – who will be engaged by the substation construction companies' primary suppliers. For the direct substation project labours will be adopted by China Electric Power Equipment and Technology Co., Ltd and contract labour will be adopted by subcontractor of the substation project under supervision of China Electric Power Equipment and Technology Co., Ltd. The primary supply labours will be local labours at the transmission project.

One of the positive impacts is local labours of any construction project. But the project will have to need skilled and contract labours from outside of the project area. But more negative impacts will be found for the foreign or outside labours. Outside labours must be needed for the implementation of substation project work. The rental house and temporary labours shad will be necessary at the substation project area. The accommodation of labours, supply of drinking water, sanitation facilities, hygienic food will be provided to the labours for the outside (outside district). Substation project is moving type work; rental house is not always fixed along the substation right of way. China Electric Power Equipment and Technology Co., Ltd has taken a plan to rent a house near the substation project site, so those rental houses have good sanitation facilities, supply drinking, shower water for bathroom and security guard etc. The rental house will also have facilities of cooking hygienic foods for labours and substation project site will be very near to the rental house, for this reason, no need extra transportation for carrying labours from rental house to project site. China Electric Power Equipment and Technology Co., Ltd will also make labours shad in the substation project area where will have toilet, drinking water facilities and seat for taking lunch.

7.0 Policies and Procedure

This section outlines main policies and procedures to be followed during the implementation of the project and will be updated and amended as needed, after contracts have been awarded. Bangladesh has in place the Bangladesh Labor Act 2006 and Amendment 2013, National Occupational Health and Safety Policy 2013 that illustrates rights and responsibilities of employers and workers, conditions of employment, child and force labor issues, OHS requirements etc. In line with this LMP and National Labors Acts, the Contractor will prepare Labor Management Plan. The principles and procedures presented below represent minimum requirements, but are not an exhaustive list of requirements. As specified in the Labor Act and ADB safeguard statement, the employment of project workers will be based on the principles of non-discrimination and equal opportunity. There will be no discrimination with respect to any aspects of the employment relationship, such as recruitment, compensation, working conditions and terms of employment, access to training, promotion or termination of employment. The following measures will be developed by the China Electric Power Equipment and Technology Co., Ltd and monitored by PMU to ensure fair treatment of all employees:

- As per Labor Code requirements, recruitment procedures will be transparent, public and nondiscriminatory with respect to ethnicity, religion, sexual orientation, disability, gender, and other grounds included in the Labor Code
- Applications for employment will be considered in accordance with the application procedures established by the Contractor.
- Clear job descriptions will be provided in advance of recruitment and will explain the skills required for each post
- All workers will have written contracts describing terms and conditions of work and will have the contents explained to them. Workers will sign the employment contract. Terms and conditions of employment will be available at work sites
- Unskilled labor will be preferentially recruited from the affected communities and local areas
- Employees will be informed at least two months before their expected release date of the coming termination. If more than 50 workers will be terminated within any three month period, the Contractor will prepare a retrenchment plan for review and approval by the PMU
- The contracted workers will not pay any hiring fees. If any hiring fees are to be incurred, these will be paid by the Contractor
- The labor contracts will be developed in *Bangla* so as to be understandable by all workers
- In addition to written documentation, an oral explanation of conditions and terms of employment will be provided to workers who may have difficulties with understanding the documentation
- While communicating with women workers, it is to be ensured that they understand their rights and process of raising issues and grievances related to their employment
- PMU will include in contracts that all labors must be of the age of 18 years or more and that no forced or child labor would be allowed

The health and safety procedure illustrated in the Labor Acts, and BLR 2015, PMU is expected to carry out field visits and inspections of the construction from time to time. PMU will include into the bidding documents specific OHS standard requirements that all contractors will meet under this project. The standards will be consistent with local regulations, The following OHS standard requirements should as a minimum be included in the OHS Plan to be prepared by the China Electric Power Equipment and Technology Co., Ltd:

- ✓ Risk Assessment Procedure for substation project;
- ✓ Work permitting for hazardous work (working at heights, work on energized substation , work within confined spaces);
- ✓ Rules for life threatening works;
- ✓ Emergency response procedure;
- ✓ Fall prevention and working at heights;

- ✓ Excavations safety, Ladders and scaffolding safety; welding and cutting safety; Cranes, Derricks, and forklifts safety; power and hand tools safety;
- ✓ Respiratory prevention to chemical and airborne hazards (including dust, silica and asbestos);
- ✓ Electrical safety (hazardous energies control, safe distance work, wiring and design protection, grounding, circuit protection, arc fault protection, Electrical safety, PPE and dielectric tools); hazards communication; Noise and vibration safety; Steel erection safety; fire safety; material handling safety; concrete and masonry safety;
- ✓ Substation construction PPE;
- ✓ OHS training for substation project

In addition, OHS plans also include OHS accountability matrix for all staffs including substation Project manager, contract manager, OHS staff, foremen, and all labours with clear roles and OHS responsibilities. China Electric Power Equipment and Technology Co., Ltd must have its own OHS staff that will be responsible for the implementation and supervision of the OHS program. **China Electric Power Equipment and Technology Co., Ltd** will also provide a safe workplace, therefore a risk assessment will be completed before the commencement of substation construction activities, and safety measures will be implemented in accordance with applicable safety standards. PPEs and other preventive measures will be provided at no cost for labours. All e labours will strictly follow rules for life threatening works (OHS rules that cannot be broken in any circumstances), which will be enforced under contractual matrix of consequences. Monthly OHS meetings will be conducted to discuss preventive measures, deviations and non-compliances, accidents and corrective actions. **China Electric Power Equipment and Technology Co., Ltd** will conduct internal OHS surveys and audits to verify compliance of OHS practices. Non-compliances will be documented and reported internally. A time frame for a corrective action will be set and followed up. Daily OHS briefings will be conducted before the commencement of the works highlighting the hazards and preventive measures from each job. Contractors will document and report to PIU all accidents and illness with a day lost or more, fatalities or serious injuries that may happen at work site. There must be on site resources for first aid and for more serious injuries there must be a pre-approved health facility for medical treatment, as well as appropriate transportation of injured workers. China Electric Power Equipment and Technology Co., Ltd will control the access to the construction site only to authorized people and verify if workers are meeting training and capacity requirements to carry out their jobs. All workers must complete at minimum an OHS induction to have access to the substation construction site.

If accommodations are provided for workers, China Electric Power Equipment and Technology Co., Ltd will ensure that they are provided in good hygiene standards, with fresh drinking water, clean beds, restrooms and showers, clean bedrooms, good illumination, lockers, proper ventilation, safe electrical installation, fire and lightening protection, separate cooking and eating

areas. PMU will conduct periodic supervision of China Electric Power Equipment and Technology Co., Ltd's OHS performance, including site visits, at least monthly. These supervisions will cover compliance with above mentioned standards, accidents, violations of rules, recommendations, and progress of ongoing corrective actions. PMU, PGCB will include in the contract(s) as requirement for China Electric Power Equipment and Technology Co., Ltd's to report on issues such as number of accidents rates, severity rates, number of recurring non-compliances, violations of rules, fatalities and serious injuries; and penalties for non-completion.

PMU will review and approve China Electric Power Equipment and Technology Co., Ltd safety plans and procedures.

PMU, PGCB will inform WB promptly about any incident or accident related to the project which has, or is likely to have a significant adverse effect on the environment, the affected communities, the public or workers (labor, health and safety, or security incident, accident or circumstance) as soon as reasonably practicable. Such events can include strikes or other labor protests, serious worker injuries or fatalities, project-caused injuries to community members or property damage. PMU will prepare a report on the event and the corrective action and submit to WB within 30 calendar days of the event.

China Electric Power Equipment and Technology Co., Ltd will develop and implement Code of Conduct (CoC). The CoC will reflect the China Electric Power Equipment and Technology Co., Ltd core values and overall working culture. This will include provisions relating to GBV, waste management and disease prevention and work ethics. CoC will have to be understood and signed by all workers. The content of the CoC will be included in the Standard Bidding Documents (SBD).

China Electric Power Equipment and Technology Co., Ltd will be required to provide the periodic information on the performance in terms of labor, OHS issues. The information will be included in the China Electric Power Equipment and Technology Co., Ltd's monthly report and will be reviewed by PMU.

8.0 Age of Employment

Chapter III of Bangladesh Labor Act 2006 describes provisions related to Employment of Adolescent Worker. It details the restrictions of using child labor, where adolescent labors (age between 14 and 18, under Definition number 8, Chapter I, Labor Act 2006) can be used, fitness requirements, verification of age, reference to list of hazardous work not to be performed by adolescent workers, daily and weekly working hour restrictions, time of work, need for medical certificate etc. National Child Labor Elimination Policy 2010 also details the age of child (under 14 years) and adolescent (age 14-18), adolescent employment principles, their health and safety issues etc. Contractors and the monitoring PMU, PGCB officials is obliged to abide by the requirements of Chapter III of the Labor Act 2006. As per the Labor Act 2018, no one below the age of 14 (minimum age) will be employed as a labor. A child over the minimum age (14) and

under the age of 18 may be employed or engaged in connection with the project only if the work is not likely to be hazardous or interfere with the child's education or be harmful to the child's health or physical, mental, spiritual, moral or social development; an appropriate risk assessment is conducted prior to the work commencing; and the Borrower conducts regular monitoring of health, working conditions, hours of work and the other requirement of ESS5.

If a child under the minimum age is discovered working on the project, measures will be taken to immediately terminate the employment or engagement of the child in a responsible manner, taking into account the best interest of the child.

9.0 Terms and Conditions

The terms and conditions of employment in Bangladesh are governed by the provisions of Bangladesh Labor Act 2006, Labor Law (Amendment) 2013, Bangladesh Child Labor Elimination Policy 2010. Chapter II of the Labor Act 2006 (Conditions of Employment and Service) makes it mandatory to provide workers with Appointment Letter, Identity Card, and a Service Book (Act 5 and 6). A registers of workers including details of all workers engaged also is mandatory to be maintained by the employer (Act 9). Leave Procedures are illustrated in Act 10. Termination of employment is described in Act 26 for both permanent and temporary workers.

Chapter IX details the working hours (maximum 8 hours a day ordinarily, except exceptional cases and 48 hours a week), rest hour (1 hour for more than 6 hours of work), overtime work (more than 8 hours a day with twice the rate of normal working hour), working hour for women (no work between 10 PM to 6 AM without her consent) and leave entitlement.

Chapter X of the Labor Act details wages and its calculation. Act 123 describes the time for wage payment (the wages of a worker shall be paid before the expiry of the seventh working day following the last day of the wage period in respect of which the wages is payable). Act 125 defines the cases where deductions may be made from wages.

Chapter XI of the Act (Act 148) makes it binding on the contractors (employers) to abide by the minimum wages rate. Contractors will also be required to comply with the most current decision of Wages Board assigned by the government. The Wage Board Order and the Labor Act specify the minimum wages, hours of work, overtime pay, leave entitlements, travelling and subsistence allowances and the issue of protective clothing.

Chapter XIII of the Act (**Trade Unions and Industrial Relations**) stipulates the right workers shall, without distinction whatsoever, have the right to form trade union primarily for the purpose of regulating the relations between workers and employers, or between workers and workers and, subject to the constitution of the union concerned, to join trade union of their own choice.

Upon receiving a public contract, the Contractor shall certify in writing that the wages, hour and conditions of work or persons to be employed by him on the contract are not less favorable than those contained in the most current wages regulation issued by the government recommended by

the Wages Board Chairman. The employer shall maintain worker's register which will be available for inspection during working hours for the Inspector appointed by PMU. In ensuring full compliance with the law in this regard, the Contractor will be required to furnish PMU with copies of the Service Book or copies of contract of its entire workforce. Contractors will not be allowed to deploy any employee to work in the project if such copy of employment of that employee has not been handed to PMU. The Contractor also is obliged by the law to allow workers to form trade unions subject to the provision of Labor Act 2006. As a monitoring mechanism, a contractor shall not be entitled to any payment unless he has filed, together with his claim for payment, a certificate: - a) stating whether any wages due to employees are in arrears; b) stating that all employment conditions of the contract are being complied with. It will be a material term of the contract to allow PMU to withhold payment from contractor should the contractor not fulfill their payment obligation to their workers.

10.0 Grievance Redress Mechanism (GRM)

The Labor Act 2006 Section 33 provides for the Formal Grievance Procedure in case a worker who has been laid-off, retrenched, discharged, dismissed, removed, or otherwise terminated from employment. Section 202 (Subsection 24) describes the responsibilities of a Collective Bargaining Agent (CBA) especially bargain with the employer in matters of the conditions of work or environment of work of the workers and conduct cases on behalf of any individual worker or a group of workers under this Act. However, the PMU will require the Contractor to develop and implement a Grievance Redress Mechanism (GRM) for their own workforce prior to the start of design stage. The Contractor will prepare their Labor Management Plan before the start of civil works, which will also include detailed description of the workers GRM. The GRM must be well circulated and written in a language understood by all. The workers GRM will include:

- ✓ A channel to receive grievances such as comment/complaint form, suggestion boxes, email, a telephone hotline that might also be anonymous;
- ✓ Stipulated timeframes to respond to grievances;
- ✓ A register to record and track the timely resolution of grievances;
- ✓ A responsible section/wing/committee to receive record and track resolution of grievances.

The GRM will be described in workers induction trainings, which will be provided to all project workers.

The mechanism will be based on the following principles:

- ➢ The process will be transparent and allow workers to express their concerns and file grievances.
- ➢ There will be no discrimination against those who express grievances and any grievances will be treated confidentially.
- ➢ Anonymous grievances will be treated equally as other grievances, whose origin is known.

- Management will treat grievances seriously and take timely and appropriate action in response. Information about the existence of the grievance mechanism will be readily available to all project workers (direct and contracted) through notice boards, the presence of "suggestion/complaint boxes", and other means as needed.
- The Project workers' grievance mechanism will not prevent workers to use conciliation procedure provided in the Labor Act 2006.

A PMU representative will monitor the Contractors' recording and resolution of grievances, and report these to PMU in their monthly progress reports. The process will be monitored by the GRM Focal Point of PMU (preferably the Social Consultant).

11.0 China Electric Power Equipment and Technology Co., Ltd Management

As part of the process to select construction Contractor who will employ contracted workers, the PMU will review the following information:

- Information in public records, for example, corporate registers and public documents relating to violations of applicable labor law, including reports from labor inspectorates and other enforcement bodies;
- Business licenses, registrations, permits, and approvals;
- Documents relating to a labor management system, including OHS issues, for example, labor management procedures;
- Identification of labor management, safety, and health personnel, their qualifications, and certifications;
- Workers' certifications/permits/training to perform required work;
- Records of safety and health violations, and responses; recordable incidents and corresponding Root Cause Analysis (lost time incidents, medical treatment cases), first aid cases, high potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training, and so forth);
- Accident and fatality records and notifications to authorities;
- Records of legally required worker benefits and proof of workers' enrollment in the related programs;
- Worker payroll records, including hours worked and pay received;
- Identification of safety committee members and records of meetings; and
- Copies of previous contracts with contractors and suppliers, showing inclusion of provisions and terms reflecting/ materially consistent with ESS2.

The contracts with selected Contractor will include provisions related to labor and occupational health and safety, as provided in the ADB safe guard statement and Bangladesh Labor Act 2006. The bid document will make it mandatory for the contractors to a Contractor's ESMP (CESMP)

which will include work program, Code of Conduct, Traffic Management Plan, Labor Influx Management Plans, among others.

The PMU will manage and monitor the performance of the Contractor in relation to contracted workers, focusing on compliance by contractors with their contractual agreements (obligations, representations, and warranties). This may include periodic audits, inspections, and/or spot checks of project locations or work sites and/or of labor management records and reports compiled by contractors. Contractors' labor management records and reports may include: (a) a representative sample of employment contracts or arrangements between third parties and contracted workers; (b) records relating to grievances received and their resolution; (c) reports relating to safety inspections, including fatalities and incidents and implementation of corrective actions; (d) records relating to incidents of non-compliance with national law; and (e) records of training provided for contracted workers to explain labor and working conditions and OHS for the project.

12. Community Workers

The project is unlikely to engage any Community Workers.

13. Primary Supply workers

The primary suppliers for the project will mainly be construction material (brick, cement, rods etc) suppliers, Electrical and Sanitary Equipment suppliers, HVAC equipment (AC, Ventilation etc), IT and communication Equipment suppliers etc. Manufacturers of Electrical, Mechanical and Plumbing (MEP), HVAC and IT / Communication equipment industries are not known to involve significant risks of child labor and forced labor. It is expected, that these primary suppliers will be large scale international companies. In case of construction material suppliers, Contractors shall be required to carry out due diligence procedure to identify if there are significant risks that the suppliers are exploiting child or forced labor or exposing worker to serious safety issues. In instances where foreign suppliers are likely to be contracted, the Contractor will be required to inquire during his/her procurement process whether the supplier has been accused or sanctioned for any of these issues and also their corporate requirements related to child labor, forced labor, and safety. If there are any risks related to child and forced labor, and safety identified, the Contractor will notify PMU and will address these risks and may avoid such suppliers, where possible.

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China Electric Power Equipment and Technology Co., Ltd

Appendix M

Code of Conduct (COC

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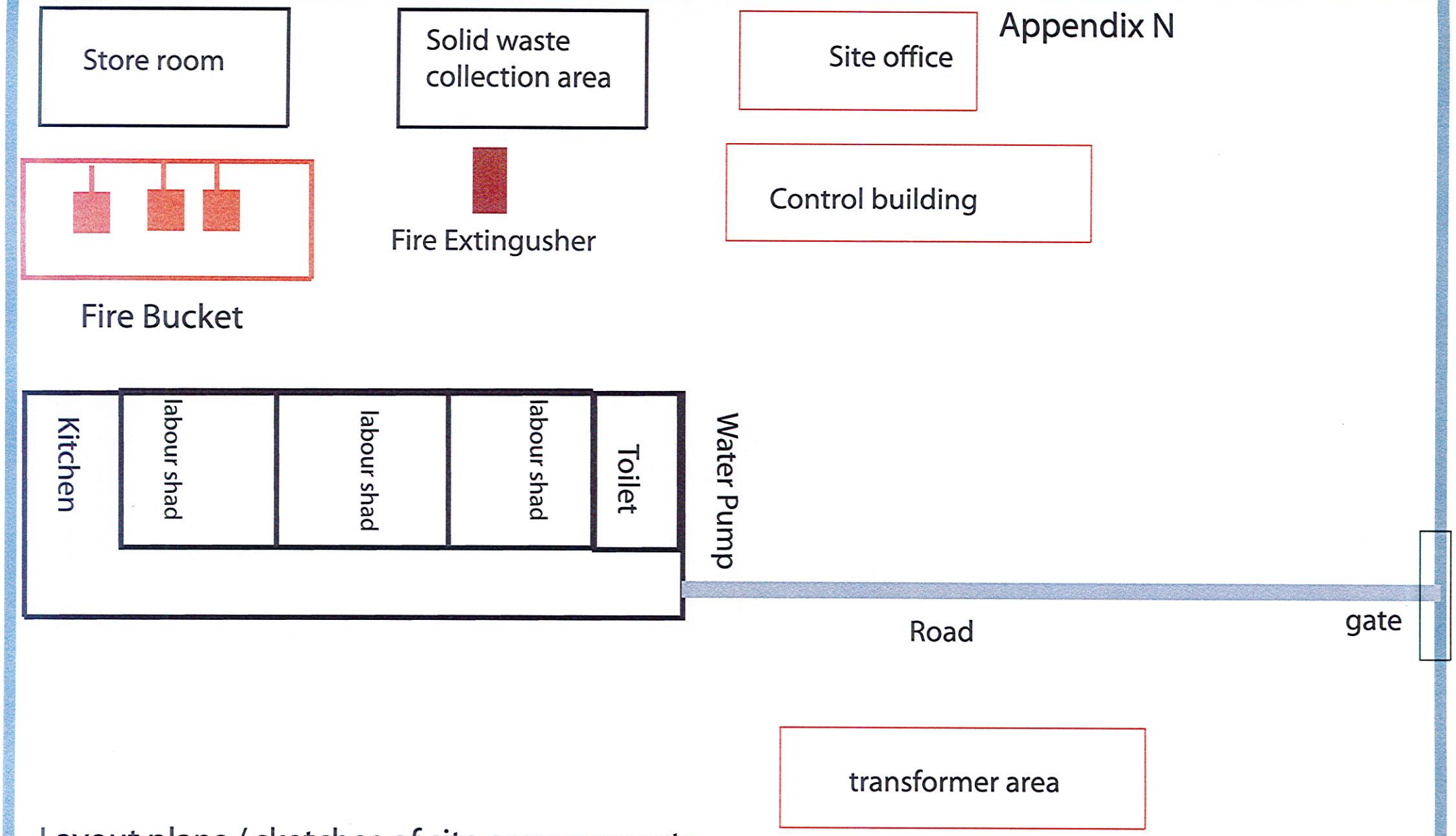
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Appendix N



Layout plans / sketches of site arrangements

Design, Supply, Installation, Testing and Commissioning of 400/230 kV GIS Substation at Kaliganj on turnkey basis (Package-5)

China Electric Power Equipment and Technology Co., Ltd

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中国电力技术装备有限公司 CHINA ELECTRIC POWER EQUIPMENT AND TECHNOLOGY CO., LTD

Appendix O



Awarness poster for COVID 19 protection

ISO 9001:2015 CERTIFIED
Power Grid Company of Bangladesh Ltd

Appendix O





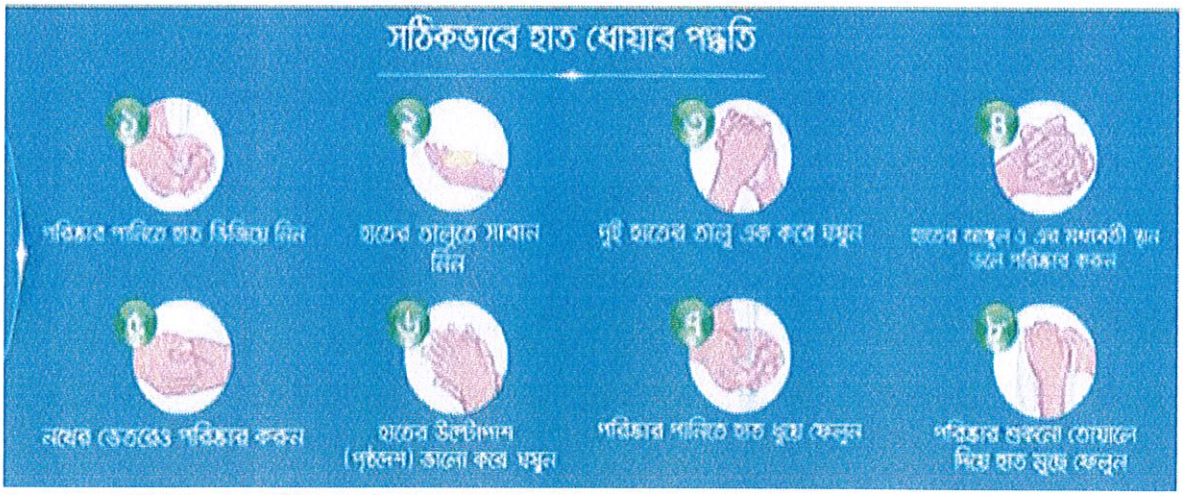












Courtesy: BRAC and different internet sources

Awarness poster for cumminity protection for COVID 19

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Appendix P: Suspected and Protection of Suspected COVID-19

Infection Prevention and control measures from COVID19, it is very important for the safety of labours and stakeholders at the worksite of substation project. To protect the healthcare workers from different infections and reduce the transmission of infections among general population. Isolation will be needed for following symptoms

- signs or symptoms included : fever, cough, general weakness/fatigue, headache, myalgia, sore throat, coryza, dyspnea
- Isolation duration will be 14 days from initial day of signs or symptoms of covid19
- Person who will be attacked severe acute respiratory illness, it is very urgent to require hospitalization
- A person with recent onset of loss of smell or loss of taste in the absence of any other identified cause; it will be the suspected case of COVID-19.

Standard Precautions for COVID 19

Standard Precautions are the infection prevention practices that to applied for patient care and personal safety. 7 Elements for Standard Precaution for COVID19 as per WHO and Bangladesh that will be followed by China Electrical Power Equipment and Technology Co., Ltd;

1. Hand hygiene (soap-water/ alcohol based (70% alcohol) handrub)
2. Respiratory hygiene and cough etiquette (cover cough-sneeze)
3. Personal protective equipment (PPE) use (gloves, mask, gown, eye protection as needed)
4. Safe injection practices, sharps management and injury prevention
5. Safe handling, cleaning and disinfection of patient care equipment
1. (including sample, patient care area)
6. Decontaminate environmental surfaces (patient care area, work surfaces, table, room etc.) and safe handling and cleaning of soiled linen
7. Waste management

Practice need to protect COVID 19

The rapidly changing coronavirus disease 2019 (COVID-19) pandemic and wrestling with its impact. The following practice will be needed for protect and spread of COVID 19. Substation project will be given training for general practice to protect COVID 19

- Hand washing with soap- water for 20-60 seconds
- Hand hygiene: Rub hand with alcohol-based formulation
- Wear surgical mask in public place specially when coughing/sneezing
- Dispose used tissues and masks in yellow waste bin
- Perform hand hygiene after contact with respiratory secretions
- In case of sudden episode, use upper arm during coughing and sneezing
- Turn your head away from people/patients or food while sneezing or coughing

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- Always maintaining the distance 1-2 meter from one from others
- PPE used in healthcare settings
  - Gloves-protect hands
  - Gowns/aprons-protect skin and/or clothing
  - Masks-protect mouth/nose:
  - Respirators-protect respiratory tract
  - Goggles-protect eyes
  - Face shield- protect face, mouth, nose and eyes

Community-based health care includes services delivered by a broadly defined community health workforce, according to their training and capacity, encompassing a range of health workers, lay and professional, formal and informal, paid and unpaid, as well as facility-based personnel who support and supervise them and provide outreach services and campaigns. Where applicable, specific occupational groups and their roles. In every community, there are local actors, relationships and processes that intersect with the health sector and are central to delivering high-quality, people-centred health care and to building health system resilience. Relevant actors include local authorities, faith leaders and nongovernmental organizations (NGOs) and community groups, such as women's, scouting and youth groups. As trusted members of the community, the community health workforce usually has strong ties with these groups.

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11. Safe injection practices, sharps management and injury prevention
12. Safe handling, cleaning and disinfection of patient care equipment
2. (including sample, patient care area)
13. Decontaminate environmental surfaces (patient care area, work surfaces, table, room etc.) and safe handling and cleaning of soiled linen
14. Waste management

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Bangladesh Government Instruction for COVID-19 Protection

If the worker or enterprise experiences or found cases related to COVID-19, immediately report to the National COVID-19 hotline 333 or 16263 or to the local authority hotline number provided. Department of Labour Hotline related to COVID-19: 02-8391324 (World Health Organization https://www.who.int/.) Head office Directorate General of Health Services (DGHS)-01797011919 Dhaka- 01714266843, 01972138530, 01711240390 Gazipur-01847129493 Narayanganj-01722909122, 01787386361

Appendix P



Backhoe Loader



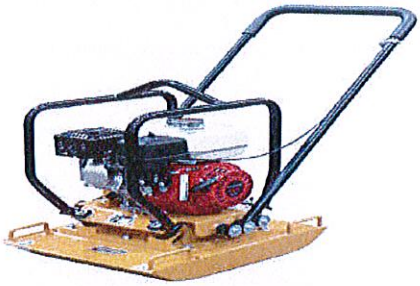
Bulldozer



Excavator



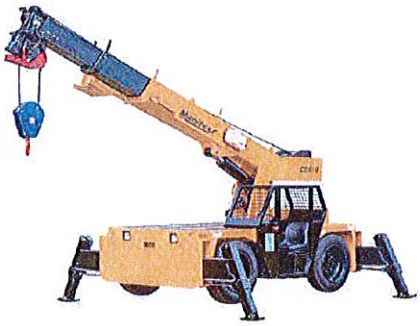
Articulated Hauler



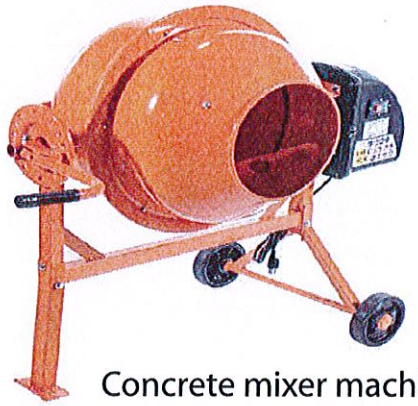
Compactor



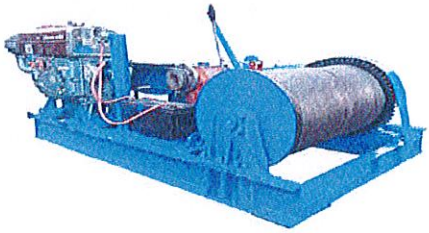
Drum Roller



Carry Deck Crane



Concrete mixer machine



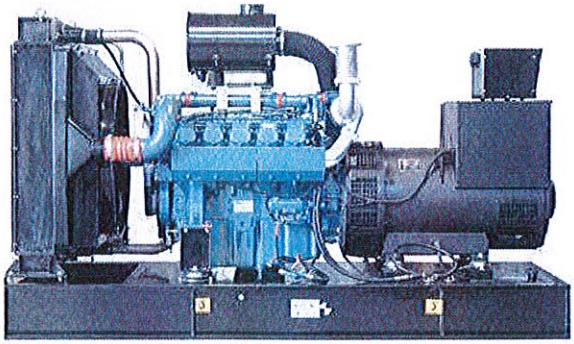
Winch machine



Front Loader



Crane with pully



Diesel Engine with generator

Fig: SS project machineries and vehicles

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Appendix Q

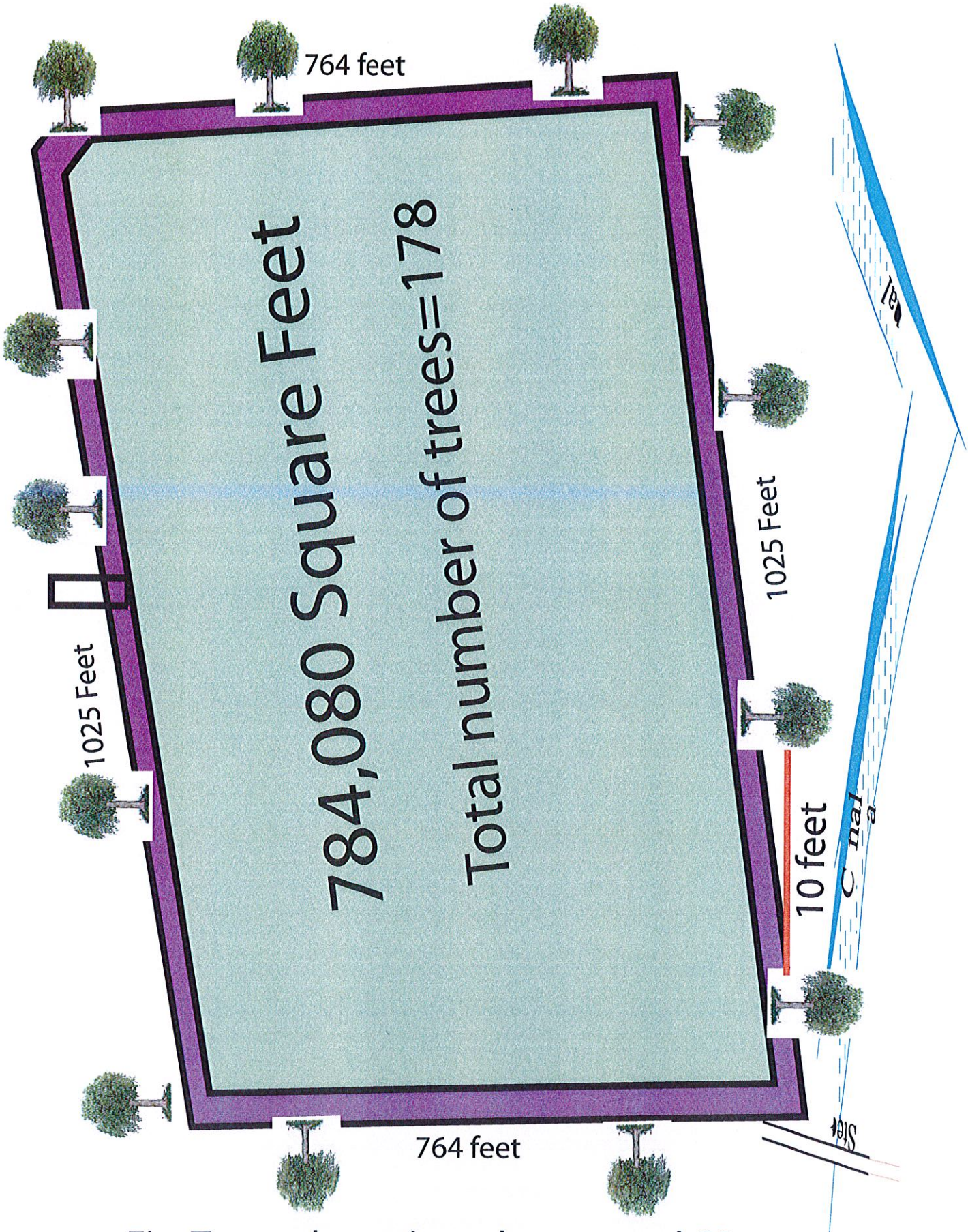


Fig: Trees plantation plan around SS area

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Appendix R

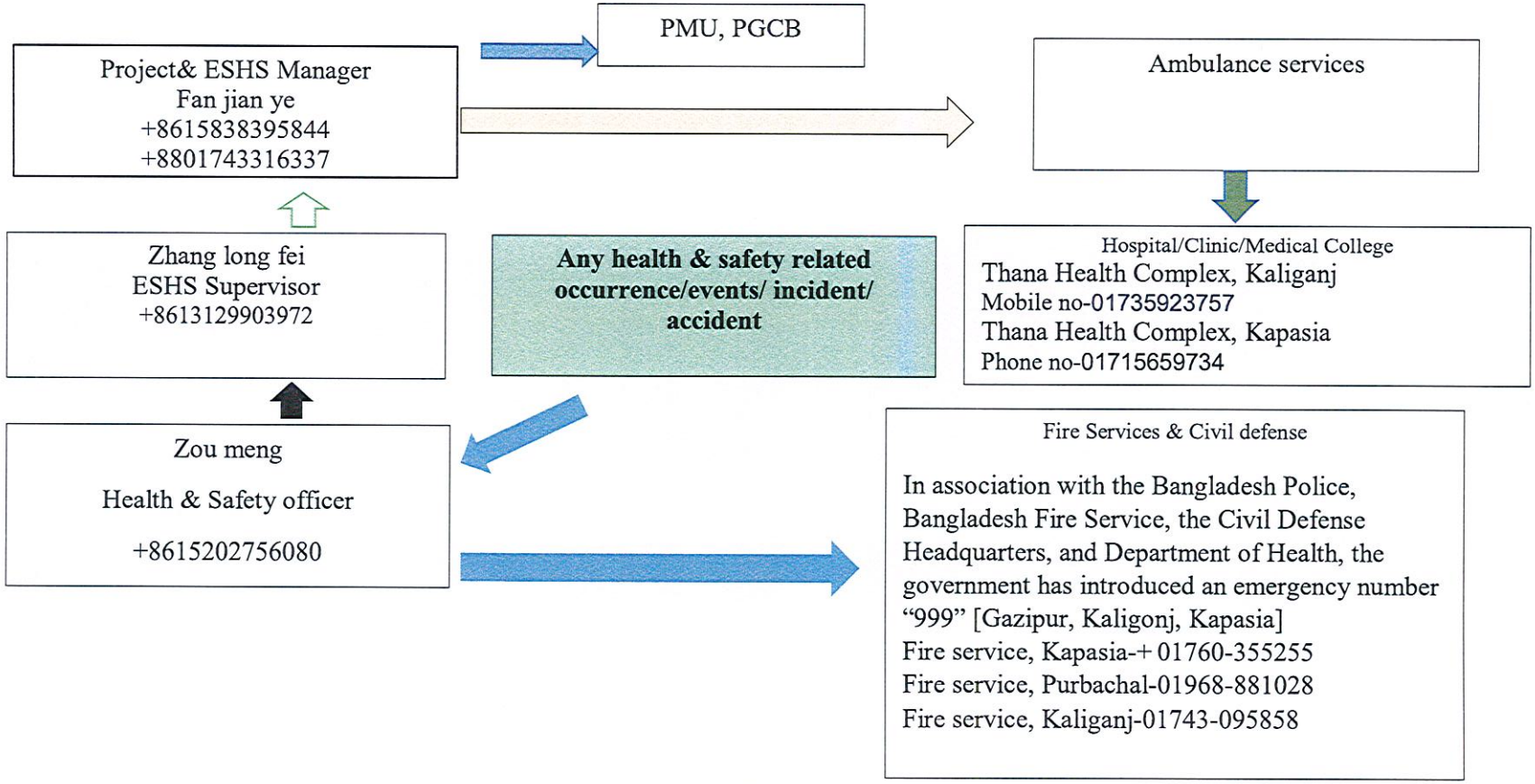


Fig: Site Specific Emergency Plan

Appendix S

SOP for Hazardous Materials

Standard Operating Procedure: Fuel oil, lubricant & Transformer oil

1.0 Reasons for Procedure

Material safety data sheets (MSDS) should be available in all work SS areas. Because they provide information relating to both health and environmental hazards, all personnel should have easy access to this important information. Fuel Oil might be contaminated upper soil near substation area or nearest cropland

Use of appropriate safety protection is a must, including gloves and safety glasses when handling lubricants or greases. If lubricants accidentally contact the skin, wash immediately with an approved hand cleaner followed by normal soap.

2.0 Purpose

Oils are defined as greasy, viscous substances from plant, animal, mineral sources (petroleum), and synthetics that are not soluble in water, and are usually flammable. These oils which have been used could be contaminated by physical or chemical impurities such as dirt, metal scrapings, and water. Oils that enter storm drains or waterways are a serious environmental hazard. The purpose of this procedure is to describe the proper means for handling and disposing of used oil from equipment maintenance operations, process procedures, and any other activities where used oils are generated.

3.0 Scope

This procedure applies to the disposal of any used oil that is collected during normal work functions at the substation work. Used oil may include

Fuel oils such as diesel fuel are petroleum based fluids which are somewhat volatile and flammable and can be ignited only when heated above 100 °F. Vapors can travel and flash from ignition sources and can accumulate to explosive levels in poorly ventilated areas. All fuel oils consist of complex mixtures of aliphatic and aromatic hydrocarbons such as kerosene, benzene, and styrene.

Lubricating oils such as motor oil and hydraulic fluids are not volatile but are combustible. For lubricating oil to catch fire some other intense heat source (i.e., other materials on fire, hot engine manifold, etc.) must be present. Mineral-based lube oils are refined from petroleum or crude oil and contain additives such as lead or metal sulphide and other polymers.

Transformer oil conducts heat away from and insulates equipment used to convert electricity from high amperage to low amperage lines. Transformer oil is a liquid by-product of the distillation of petroleum to produce gasoline

China Electric Power Equipment and Technology Co., Ltd

Cooking LPG/CNG is a volatile but highly combustible. This LPG or CNG is used for cooking at accommodation area of substation area

4.0 Responsibility

Managers and health & safety person must ensure all personnel reporting to them have received appropriate training in used oil disposal. Managers are expected to convey proper oil disposal requirements of this procedure to contractors if their personnel are handling used oil materials. Managers and health & safety supervisors are responsible for ensuring training is conducted with the most recent version of the SOP.

5.0 Identification

The four characteristics of hazardous waste are: ignitability; corrosivity; reactivity; toxicity. The labels of hazardous materials usually contain the words 'danger' or 'warning', along with relevant pictograms and details of hazards. In the substation project diesel fuel will use for diesel engines. This oil has capacity to contamination of top soil at the substation project. Firstly diesel oil is identified by it smell. LPG is one of the flammable hazardous materials. It is identified by the shape and size of container or cylinder of LPG.

6.0 Storage

The ideal conditions for storing diesel fuel include keeping fuel dry and at a cool temperature (below 70 degrees Fahrenheit). Such conditions ensure storage life between six to twelve months. To extend fuel life beyond twelve months, fuel stabilizers are required. The diesel fuel will be kept at wood plate or contactless place of top soil. Diesel fuel should not be keep at the side cooking area at the substation area.

7.0 Transportation

The most use full hazardous material is diesel; the following precaution will need for diesel oil transportation

(a) Diesel fuel shall be transported only by diesel fuel transportation units or in safety cans.

(b) No more than one safety can shall be transported on a vehicle at any time. The can must be protected from damage during transport. All other safety cans must be stored in permanent underground diesel fuel storage facilities.

(c) Safety cans that leak must be promptly removed from the mine.

(d) Diesel fuel transportation unit tanks and safety cans must be conspicuously marked as containing diesel fuel.

(e) Diesel fuel transportation units must transport no more than 500 gallons of diesel fuel at a time.

(f) Diesel fuel transportation units shall be parked only in permanent underground diesel fuel storage facilities or temporary underground diesel fuel storage areas when not in use.

(g) Tanks on diesel fuel transportation units must be permanently fixed to the unit and have a total capacity of no greater than 500 gallons of diesel fuel.

7.0 Disposal

Diesel fuel is no needed to dispose at the project site. Disposing of used lubricant diesel engine oil requires careful attention, but pays dividends for the environment. Lubricant is used in the diesel engine as a lubricating agent. After some days lubricant of diesel engine is collected in can. The used lube oil is highly soil contaminated hazardous materials in the SS project area. It is very easy way for selling to the vendor; they have capacity to recycle of used lubricant.

8.0 Precaution required

Diesel fuel will Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers that are clearly labeled. Label all secondary containers that this material is transferred into with the chemical name and associated hazard(s). Empty product containers or vessels may contain flammable vapors

9.0 Threats

Most of the oils (diesel oil, lube oil for diesel engines) are highly flammable. Any contraction of diesel oil and fire, it may be occurred explosion at the SS area. Oil is highly contaminated with soil. Soils can loss fertility for the crop production.

Appendix T

Safety Training on Substation Construction

1.0 Materials Handling:

In the training program of materials handling of substation project, the following matter will be discussed by China Electric Power Equipment and Technology Co., Ltd

- Aluminum is having sufficient conductivity. More ever it is light in weight. Which results in low conductor weight and less sag. The only limitation is its low tensile strength. To overcome this limitation steel core is used for increasing the tensile strength of aluminum conductor such as in ACSR (Aluminum conductor steel reinforced) conductor.
- In the unloading, handling, and storage of structures, care should be exercised so as not to damage the surface or surface coating, or deform the members. Bare wire rope or steel chains should not be used for handling without adequate protection of the surface. Structural members should not be dumped, dragged, rolled, dropped, nor used as loading or unloading skids or blocking.
- Heavy members should not be stacked on top of lighter members. The maximum weight of material bundles should not exceed a specified weight, typically 1600–1800 kg (3500–4000 lb), to facilitate handling and unloading. Components with dissimilar finishes should not be stored over one another to minimize discoloration of the lower members.
- Care should be taken for substation materials to ensure proper blocking, stacking, and handling of concrete members. Refer to the structure drawings and instructions to verify correct lifting methods, replacement of support blocking, and stacking limitations.
- It is very common for concrete poles of substation component to require a two-point pickup due to the weight and possible long lengths. Identifying the correct blocking locations is important to eliminate the potential of overstressing the member. China Electric Power Equipment and Technology Co., Ltd and PGCB should verify correct blocking and number of possible layers for stacking to avoid damage to concrete members lower in the stack.
- The white rusting action will stop after exposure to air. When extended transport or storage is anticipated, either of the following two methods can be used to prevent oxide formation: a) Spacers may be placed between the nested pieces to ensure adequate ventilation.

  b) Galvanized members may be treated with a solution which will inhibit oxide formation for six months to one year.
- Weathering steel fasteners, though rarely used on concrete poles, and other materials subject to deterioration should be protected from the elements during storage.
- During the course of the substation project, the material yard should be kept relatively neat and clean and the growth of vegetation kept to a minimum. Good housekeeping

minimizes damage and loss of material in the yard, facilitates material handling and periodic physical inventories, and complies with environmental considerations.

- ❖ If delivery of material is made initially to the structure site for storage, care should be taken to avoid interference with foundation construction, access roads, or drainage. Truck delivery of complete structures from the manufacturer directly to the structure site can be advantageous since it eliminates at least one unloading and loading cycle.
- ❖ However, security of material stored at a structure site is minimal and the subsequent loss of time due to missing items can result in significant construction cost increases.

2.0 Pilling Safety

Pile foundations are responsible for transmitting heavy concentrated loads of the superstructure to the underlying competent strata. Installation of pile foundations requires a lot of heavy-duty equipment, which makes it essential to follow the standard safety protocols.

Safety Program for pilling

- ✓ All operations shall be carried out under the immediate charge of a qualified and competent foreman who shall also be responsible for the safety arrangements of the work.
- ✓ For work during the night, the lighting of at least 100 lux intensity shall be provided at the worksite.
- ✓ Every crane driver or hoisting appliance operator shall be competent to the satisfaction of the engineer-in-charge
- ✓ The personnel under the age of 21 years shall not be in charge of any hoisting machine including any scaffolding, winch, or give signals to the operator.
- ✓ In the case of deep foundations (20 meters), working in compressed air requires several precautions to be taken to safeguard the workmen against severe hazards to life, compressed air disease, and related ailments.
- ✓ Depth of pilling depend on the soil test report which will be done by China Electric Power Equipment and Technology Co., Ltd before started the civil work at substation locations

2. Piling Rig Safety

- The pile drivers shall not be erected in dangerous proximity to electric conductors.
- If two pile drivers are to be erected at one place, these shall be separated by a distance at least equal to the most extended leg in either rig.
- The frame of the rig shall be structurally safe for all anticipated live, dead, or wind loads.

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- A suitable test shall be carried out by the structural foreman whenever there is any doubt about the structural strength.
- No pile driving equipment shall be taken into use until it has been inspected and found to be safe.
- The pile drivers shall be firmly supported on heavy timber sills, concrete beds, or other secure foundations.
- The rig shall be secured with a minimum of four guys to ensure the stability to prevent accidents due to wind, storm, gales, and earthquake.
- The pile driving equipment in use shall be inspected by a competent engineer at regular intervals, not exceeding three months.
- The pile lines and pulley blocks must be inspected by the foreman for any type of defects or wear and tear, before the beginning of each shift,
- The defective parts of pile drivers, such as mechanical slings, sheaves, and hose shall be repaired only by competent persons and inspected by foreman-in-charge of the rig.
- Any air or steam equipment shall be repaired while it is in operation or under pressure.
- The hoisting ropes on pile drivers shall be made of galvanized steel.
- Easily accessible shut-off valves shall control steam and airlines.
- The hose of air and steam hammers shall be securely lashed to the hammer to prevent it from whipping if a connection breaks.
- When the hammer is not in use, it shall be in dropped position and held in place by a cleat, timber, or another suitable means.
- For every hoisting machine and every chain rig hook, shackle, swivel and pulley block used in hoisting, the safe working loads shall be ascertained.
- Regular testing shall be carried out on the hoisting machines, and the working load shall be considered as half of the tested load.

1. Motor gearing, electrical wiring, transmission, and other dangerous parts of hoisting machine should be provided with adequate safeguards.
2. The workers are employed on electrical installations work, which is already energized, insulating mats, and wearing apparel, such as gloves, etc., shall be made mandatory.
3. When loads have to be inclined, they must be adequately counterbalanced, and the tilting device shall be secured against slipping.
4. Necessary precautions shall be carried out to prevent a pile driver from overturning if a wheel breaks.

5. Adequate precautions shall be carried out to prevent the hammer from missing the pile.
6. To prevent the long piles and heavy sheet piling against falling, they shall be secured in place prior to piling work.
7. When steam boilers are used, the safety regulations of boilers shall be strictly followed, and safety valves shall be adjusted to 7N/cm^2 in excess of working pressure accurately.

3. Safety Precaution during Operation of Equipment

- The workers employed in the vicinity of pile drivers shall wear helmets conforming to accepted standards.
- The pile shall be prepared at a distance at least equal to twice the length of the longest pile from the pile driver.
- Piles being hoisted in the right should be so slung that they do not have to be swung or whip-round.
- A hand rope shall be tied to a pile that is being hoisted to guide and control its movement.
- When a pile is guided into position, workers shall not put their hands or arms between the pile and the inside guide, but shall use a rope for guiding.
- A pile shall be provided with an iron ring or cap over the driving end to prevent grooming before the pile is hoisted.
- When creosoted woodpiles are being driven, necessary precautions shall be taken to prevent workers from receiving skin or eye injuries from splashes of creosote.
- No air or steam shall be blown down until all workers are at a safe distance.

3.0 Excavation & Foundation Work Safety

Spread foundations, drilled shaft foundations, pile foundations, and anchors are treated. This guide is intended to be used as a reference source for those involved in the ownership, design, and construction of transmission structures. substation excavation and foundation work shall be carried out to the satisfaction of the PGCB in accordance with the technical specifications and conform to location, lines, grades and cross sections shown on the construction drawing or as directed by the PGCB . China Electric Power Equipment and Technology Co., Ltd will be give instruction to the labours about the total technical specification of Piling depth, pile cup and total foundation of substation tower

4.0 Testing and Commissioning of 400 kV Substation Equipment

- The whole 400 kV SS will be subjected to inspection and witnessing the tests by the PGCB during manufacture, erection and on completion.

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- PGCB or their designated representatives will be entitled to attend the **factory acceptance tests**, which shall be performed at the Manufacturer's works/testing laboratories in country or abroad
- **China Electric Power Equipment and Technology Co., Ltd** shall be responsible for bearing all costs for the mentioned training.
- Prior to each use, all measuring and testing equipment used in inspection shall be calibrated and adjusted against certified equipment having a known valid relationship to inter-nationally recognized standards.
- The transformer shall be designed, manufactured and tested in accordance with the best international engineering practices under strict quality control to meet the requirement stipulated in the technical specification which will be confirmed by **China Electric Power Equipment and Technology Co., Ltd**
- The manufacturer of all equipment shall provide all necessary information and calculations to demonstrate that the transformer meets the requirements for short circuit strength and durability;
- The design review shall be conducted generally following the "User Guide for the application of Gas Insulator Switchgear (GIS) rated voltage
- Triplicate sets of all test records, test certificates and performance curves, whether or not they have been witnessed by the Engineer of PGCB, shall be supplied to the Engineer for all tests carried out in accordance with the provisions of this contract document and specification.
- **China Electric Power Equipment and Technology Co., Ltd** shall provide test pieces as required by the Engineer to enable him to confirm the quality of the material supplied under this contract document and specification
- Tests at Manufacturers' works shall include mechanical, electrical and hydraulic tests to ensure that the plant being supplied complies with the requirements of the Specification. Works tests shall include all routine electrical, mechanical and hydraulic tests in accordance with the relevant IEC or British Standards
- All equipment for substation automation system, control, relay protection and metering shall be fully assembled at the Manufacturer's works and subject to the complete routine and functional tests.
- All circuits shall be subjected to the high voltage test specified in the relevant IEC or approved standard. The insulation resistance of all circuits shall be measured before and after any high voltage tests.
- All panel equipment is to be examined to ensure that it is in proper working condition and correctly adjusted, correctly labeled and that cases, covers, glass and gaskets are in good order and properly fitting.

- Tests on load shall also be done to demonstrate the stability and operation of protection relays as required by PGCB. All tripping, control, alarm and interlocking circuits shall be functionally tested to prove satisfactory and fool-proof operation and/or resetting. The functional and safety aspects of all shorting and/or isolation links, fuses and switches devices shall be proved.
- Routine tests shall include general inspection and electrical operation tests. Each size and rating of PVC cable shall be subjected to type tests as specified in BS 6346. Routine tests are detailed in Section 5 of this document.
- All circuit breakers shall be fully assembled at the Manufacturer's works and subjected to routine tests according to the IEC 62271-100.
- All current transformers and voltage transformers shall be fully assembled at the Manufacturer's works and subjected to routine tests according to the IEC 60044.
- All tanks, conservators and oil-filled compartments, which are subjected in service or during maintenance to oil pressure, shall withstand without leakage a hydraulic pressure test equal to 69 kN/m² or the normal pressure plus 34kN/m² whichever is the greater
- Back to back tests shall be carried out to determine the satisfactory operation of the teleprotection equipment.
- During the course of erection, **China Electric Power Equipment and Technology Co., Ltd** shall provide access as required by the Engineer for inspecting the progress of the works and checking its accuracy to any extent that may be required.
- A general check of all the main switchgear and ancillary equipment shall be made and shall include a check of the completeness, correctness and condition of earth connections, labeling, arcing ring and horn gaps, clearances, painted surfaces, cables, wiring, pipework, valves, blanking plates and all other auxiliary and ancillary items. Checks shall be made for oil and gas leaks and those insulators are clean and free from external damage.
- Circuit breakers shall be visually inspected. In the case of gas type circuit breakers testing will be required on the gas system to prove the gas pressure, quantity, dryness and dielectric strength.
- During commissioning, the transformer ratio and polarity shall be checked using a primary voltage high enough to give a clearly measurable secondary voltage or by using rated primary voltage and comparison with an already proven voltage transformer.
- During the commissioning phase, the PGCB's operating staff will operate plant and equipment under the supervision of the **China Electric Power Equipment and Technology Co., Ltd's** supervisors.
- After satisfactory completion of the tests on completion, the PGCB will issue a Taking over Certificate for the 400 kV Kaligonj SS. The issue of any such certificate shall not

however relieve the Contractor of any of his responsibilities in respect of proving that the performance of the plant meets the guaranteed values.

- Use PPEs as per the PPE matrix during testing and commissioning.

5.0 Usage of PPEs

Personal Protective Equipment (PPE) is to be worn during conditions of work when engineering and administrative controls do not provide adequate protection from hazards. The use of PPE is to be considered a last resort and is not to be considered as an alternative to following proper Safety Procedures and Rules. PPE is issued by the China Electric Power Equipment and Technology Co., Ltd on the understanding that employees will take good care of it and will return it when it is no longer required. China Electric Power Equipment and Technology Co., Ltd will take steps to recover any losses due to the loss, abuse, or misuse of PPE supplied. China Electric Power Equipment and Technology Co., Ltd will be make site rules; NO PPE NO WORK". China Electric Power Equipment and Technology Co., Ltd will give training on

- Head protection - Hard hats must be worn properly at all times.
- Eye & Face protection: Safety glasses complete with side shields must be worn by all employees except when working in areas where eye protection is not required (i.e. offices, enclosed equipment, vehicle cabs). In addition to safety glasses, mono-goggles will be worn for added protection where designated. When using grinders, cut-off saws, high pressure wash systems or similar equipment a face shield will be worn in addition to safety glasses.
- Cloths: The minimum standard requires that long pants cover the entire leg and that shirt sleeves cover the arms for at least 6" from the shoulder.
- Hand protection: Gloves must be worn where hazards to the hands exist. The selection of appropriate hand protection will depend upon the hazard involved. Gloves must be worn when handling wire rope, lifting/carrying objects with sharp edges, or where the hands may be exposed to chemical hazards.
- Safety Shoe: Safety footwear which has been designed and constructed to protect the feet against a variety of injuries including impact, compression and puncture, will be worn on all work sites. The minimum standard is safety work boots that are at least 6" high at the ankle and the boot laces must be fully laced up to provide ankle support.

6.0 Work on height: fall protection

- Fall protection: Fall protective equipment shall be used to prevent vertical falls where the working platform is at or more than 2.5 meters above floor level (the next level to which a worker could fall). The minimum standard for fall protection is a full body harness,

with a lanyard tied to a secure anchor point. Use of safety belt and training on work at height will be given by China Electric Power Equipment and Technology Co., Ltd.

7.0 **Environmental Protection and Basic Hygiene**

Environmental protection based on the controlling and prevent air water contamination by the substation civil work. Noise protection and controlling of work place noise. Water uses will be minimum and water for work will be re-use to again and again. Lastly water will be resettling in hole with a certain period of time. After settled the waste water, upper portion of water from sludge will be discard to the nearby land. Fugitive dust is major air pollutants at the work site, water spray will be continuation always until fugitive dust mixed with water. China Electric Power Equipment and Technology Co., Ltd will give training of workplace noise and noise as per ECR 1997. Basic hygiene will be needed to accommodation place of labours and workers. China Electric Power Equipment and Technology Co., Ltd will be given facilities of 1;15 ratio toilet to accommodation location or rental house. Use of toilet, personal hygiene and safety from hygiene will be included in the training program.

8.0 Incident Reporting

Depending on the incident, official forms of incident reporting may have to be completed and submitted. The employee who reported the accident has to cooperate if called in for questioning to provide details needed. As a general rule, the employee must provide information in the incident report as accurately as possible on the following:

- The place of the accident
- The date and time of the accident
- The people involved or injured.
- Their position or involvement in the accident.
- Their actions immediately after the accident

China Electric Power Equipment and Technology Co., Ltd will take further necessary actions if any incidental occurrence will be happened during the construction of substation project.

9.0 Electrical Safety and tool box talk

Electrical safety is a general practice of workers who are exposed to handling and maintaining electrically powered equipment. This type safety will be needed during testing and commissioning of substation from one substation to another substation. The safety training based on

- High voltage 400 kV
- Metal conductors
- First aid after electrical shocked
- Tool box talk

10 First aid

Introduction to First Aid, Cardio Pulmonary Resuscitation (CPR),Choking, Bleeding, Fit, Fainting & unconsciousness, Shock, Bites, Dressing of wounds, Burn, Bone fracture, and Transportation of casualties. The content of first aid box as per Bangladesh Labour Rules 2015 which is attached in appendix I

12.0 Medical Treatment case

A medical treatment case is any injury sustained on the substation project job by an employee/labours/worker which requires medical treatment from a professional physician. A medical treatment case does not necessitate time off work beyond the date of the injury to be classified as such. China Electric Power Equipment and Technology Co., Ltd will be kept the contact number of ambulance services and list of contact number of health complex, potential doctor at TL project site. Any emergency situation one's can call ambulance and contact with health complex/hospital or a doctor.

13.0 Fire safety Training

Fire Accidents may be because of petroleum substance leak from containers, oil/gas leakage, or spillage in transportation & cylinder, diesel engines, electric short circuit, nature calamity, sabotage, etc. Broad measures for protection from fire incidences and control along with specific protection devices, systems are required in place and operational all the time. Fire Water system, Fire alarms and communication system, different types of fire extinguishers with standard operating procedure defined is must. All fire extinguishers should be ISI marked. In the fire training issues, the following aspect will be included

- Fire Triangle- A fire needs 3 elements in order for it to ignite – oxygen, fuel and heat – and a fire can be extinguished by removing one of these elements. For instance, covering a fire with a fire blanket removes the oxygen supply.
- Discovering a fire (assembly points)- training on how to at the appropriate assembly point of the substation project area
- Use of fire extinguishers- How to use a fire extinguisher for Pull the pin out and how the nozzle at the base of the fire.
- Mug drill for fire incident will be done by China Electric Power Equipment and Technology Co., Ltd at substation project site and storage area.

14. Earthquake Training

Earthquakes usually give no warning at all. "Earthquakes don't kill people, but unsafe buildings acts to do it." Before the earthquake: Check and safeguard accommodation place and overall facility. Report the concerned official about the cracks in the walls, loose attachments /

equipment and unwanted debris, junk that may create problem. The training on earthquakes will be including from the end of the training, participants

- will enhance the understanding of the concept of Disaster Risk Reduction especially for Earthquake hazard
- will gain knowledge on the concept of Earthquake hazard and its impact (structural and non -structural)
- will strengthen their capacity on earthquake risk reduction such as preparedness and response

Earthquake modules will provide brief the concept of earthquake hazard and structural, social and economic impacts, historical events of earthquakes at substation work place, accommodation locations and storage areas. Safety tips will be trained for earthquake (before, during, after) steps of conducting community participatory through earthquake mug-drill.

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Environmental Monitoring Checklists

Appendix V: Environmental Monitoring Checklist

Environmental issue/ parameters	Inspection Items	Implemented?		N/A	Remarks
		Yes	No		
Land acquisition/ requisition	Have the landowners been informed before the commencement of construction activities?				
	Has proper compensation been paid by DC office of Gazipur to the owner for their land?				
Top soil	Has any action been taken to reduce the spillage of oil or chemicals?				
	What measures have been taken to reduce the side slope erosion of the access road?				
Clearing of vegetation	Have the owners been adequately compensated before clearing the plants?				
Fauna (wildlife)	Has proper management plan been prepared by the contractor?				
	Are there any bird nests in or around the project site?				
	Are the workers disturb or kill any wildlife?				
Waste	Do you have a waste management plan?				
	Is separate bin used for storing hazardous, non-hazardous, recyclable waste?				
	Are there any waste disposal areas?				
	Do you have sanitation waste management plan?				

	Is site waste properly transported and disposed off?				
Drainage congestion and flooding	Is the culvert provided at the access road of the substation?				
	Have proper canal and creek to manage piling waste slurry?				
	Is pumping in congested water? if needed;				
Noise level	Are noise plug used?				
	No construction work should be allowed during night time (9 PM to 6 AM). Are these rules followed?				
	Is the use of excessive noise generating equipment at night avoided?				
	Is construction work stopped at night?				
	Do vehicles maintain hydraulic horns use rules?				
	Is the generator placed in the room?				
	Is noise monitoring done when needed?				
Air quality & dust	Does the vehicle used to carry construction materials emit dark or smoky emission?				
	Are the project related persons or workers given specific training on reducing dust and exhaust gas emissions from vehicles?				
	Is water regularly sprayed on the dry and loose surface of the construction site?				
	Does the soil maintained adequate moisture content during transportation,				

	compaction and handling?				
	Are construction materials (sand, gravel, and rock) and spoil materials be transported by trucks covered with tarpaulins?				
	Is water regularly sprayed on loose construction materials?				
	Are speed control measures implemented in the project corridor? (e.g. speed limit sign)				
	Are there enclosures around the main dust-generating activities?				
	Is musk provided to all workers in areas at risk of dust emissions during the entire period of construction?				
Soil quality	Have any proper measures been taken to prevent of spillage and leakage of hazardous liquid at construction site and camp?				
	Have the owners been adequately compensated before clearing the plants or other?				
Sitting of construction camps	Are construction camps located away from residential settlement, culture				
	Have you followed the Bangladesh Road Traffic Authority (BRTA) traffic rules and regulations?				
Traffic congestion/ road accident	Are you using off-peak hours to deliver materials?				
	Do drivers follow traffic rules?				
	Does the driver have driving experience?				
	Are signal lights provided at night?				
Community health and safety (H&S)	Are there safety barriers and warning signs around the				

	construction site?				
	Is generator being placed in the closed room?	Y			
	Is the emergency risk management plan formulated and implemented by the contractor?				
	Have you hired an experienced health and safety manager for the project?				
	Is certified and trained staff working on this project?				
	Are regular tool box meetings arranged by the H&S manager for employees?				
Occupational health and safety (H& S)	Are first aid kits and personal protective equipment (PPE) and other supplies provided to workers?				
	Safety helmets				
	Safety shoes				
	Eye protection glasses				
	Ear plugs/muffs				
	Waist belts				
	Masks				
	Hand gloves				
	Do the following sign are shown in the project area:				
	Safety sign				
	Health sign				
	Warning sign				
	Emergency escape sign				
	First aid sign				

Environmental Monitoring Checklists

	Information sign				
	Signboard				
Emergency Preparedness and Response	Are fire extinguishers / fighting facilities properly maintained?				
	Dose fire extinguisher available in the proper place?				
	Have first aid box for worker's emergency treatment?				
	Are accidents and incidents reported and reviewed?				
	Does corrective & preventive actions identified and recorded?				
	Are sand buckets available in the project camps?				
	Does preventive measure for severe weather or earthquake?				
	Has any training been arranged on hazard or earthquake preparedness?				
	Is there any contact with any hospital for worker's emergency treatment?				
	Are there available ambulance facilities for the workers in the project area?				

Tree management plan appendix

Tree management plan

A Tree Management Plan is required:

- To plan for the protection and conservation of trees affected by the project.
- To manage the removal of trees and plantation process.

A comprehensive and proactive Tree Management Plan will ensure that the trees hampered within the scope of the project and managed responsibly and according to best practices. As per current practice 1:3 policy will be initiated and implemented with concurrence of project office. For felling of one tree three trees will be planted related to possible scenario (fruit bearing, forestry & medicinal).

Tree Management Program

A comprehensive and proactive Tree Management Program should reflect and balance forest and ecosystem health, ecosystem services, aesthetics, social values, and risk management. The Tree Management Program will focus on the following areas:

- Tree Classification
- Maintenance & Monitoring
- Removals
- Renewal
- Protection & Conservation
- Communication & Education

Associated procedure will be followed and reported with project progress and compliance associated reports. Guidelines from ADB/AIIB will be considered and followed.