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Bangladesh: Dhaka Power System Expansion and Strengthening Project

Main Report Part 1

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF POWER, ENERGY & MINERAL RESOURCES
DHAKA ELECTRIC SUPPLY COMPANY LIMITED (DESCO)



Environmental Impact Assessment
for
Dhaka Power System Expansion and Strengthening Project
in DESCO Area



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Submitted By



Center for Environmental and Geographic Information Services

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Abbreviations and Acronyms

ADB	Asian Development Bank
AEZ	Agro Ecological Zone
AIDS	Acquired Immuno-Deficiency Syndrome
AIS	Air insulated switchgear
BARC	Bangladesh Agriculture Research Council
BBS	Bangladesh Bureau of Statistics (BBS)
BDT	Bangladesh Taka
BEZ	Bio-ecological Zone
BFD	Bangladesh Forest Department
BIWTA	Bangladesh Inland Water Transport Authority
BMD	Bangladesh Meteorological Department
BNBC	Bangladesh National Building Code
BPDB	Bangladesh Power Development Board
BWDB	Bangladesh Water Development Board
CAAB	Civil Aviation Authority of Bangladesh
CEGIS	Center for Environmental and Geographic Information Services
CSC	Construction Supervision Consultants
DAE	Department of Agricultural Extension
DC	Deputy Commissioner
DEPC	Department of Environmental Pollution Control
DESA	Dhaka Electric Supply Authority
DESCO	Dhaka Electric Supply Company
DG	Director General
DIA	Direct Impact Area
DNCC	Dhaka North City Corporation
DoE	Department of Environment
ECA ₁	Environment Conservation Act
ECA ₂	Ecologically Critical Area
ECC	Environmental Clearance Certificate
ECP	Environmental Code of Practices
ECR	Environment Conservation Rules
EHS	Environment Health and Safety

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
ESMS	Environmental and Social Management System
FI	Financial Intermediary
FRSS	Fisheries Resources Survey System
GBV	Gender Based Violence
GD	Group discussions
GHG	Greenhouse Gas
GIS	Geographic Information System
GoB	Government of Bangladesh
GPS	Global Positioning Systems
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
H&S	Health and Safety
HDD	Horizontal Directional Drilling
HIV	Human Immuno-deficiency Viruses
HYV	High Yielding Variety
IBAT	Integrated Biodiversity Assessment Tool
IBBA	Important Bird and Biodiversity Areas
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IESC	Important Environmental and Social Components
IUCN	International Union for Conservation of Nature
KII	Key Informant Interview
LTWs	Line Transect Walks
MoEFCC	Ministry of Environment Forest and Climate Change
NCA	Net Cultivable Area
NGO	Non-Governmental Organization
O&M	Operations and Maintenance
OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
PA	Project Aid

PAP	Project Affected Persons
PCR	Physical and Cultural Resources
PGCB	Power Grid Company of Bangladesh Limited
PIU	Project Implementing Unit
PP	Project Proponent
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
RCC	Reinforced Cement Concrete
RH	Relative Humidity
RoW	Right of Way
RRA	Rapid rural appraisal
SCC	Site Clearance Certificate
SF ₆	Sulfur Hexafluoride
SPS	Safeguard Policy Statement
SRDI	Soil Resource and Development Institute
SS	Substation
STW	Shallow Tube Well
TL	Transmission Line
ToR	Terms of Reference
TSP	Triple Super Phosphate
UG	Under Ground
USD	United States Dollar
WASA	Water Supply and Sewerage Authority

Glossary

<i>Aman</i>	Group of rice varieties grown in the monsoon season and harvested in the post-monsoon season. This is generally transplanted at the beginning of monsoon from July-August and harvested in November-Dec. Mostly rain-fed, supplemental irrigation needed in places during dry spells;
<i>Cropping Intensity</i>	It refers to rising of a number of crops from the same field during one agriculture year. It can be expressed as: $\text{Cropping intensity} = (\text{Total cropped area} / \text{Net sown/cultivated area}) \times 100$;
<i>COVID-19</i>	Coronavirus disease
<i>Khal</i>	A canal, usually with flowing water and sourced from a river or a big lake;
<i>Kharif</i>	Pre-monsoon and monsoon growing season. Cropping season linked to monsoon between March-October, often divided into Kharif-I (March-June) and Kharif-II (July-October);
<i>Kharif-I</i>	An agricultural season (March-June) characterized by the uncertainty of weather of alternating dry and wet spells. Some agricultural potential land remains fallow in this season;
<i>Kharif-II</i>	An agricultural season (July-October) comprises wet and cloudy environment and heavy rainfall but uneven distribution, low solar radiation, high temperature and humidity;
<i>Mauza</i>	It is a type of administrative boundary corresponding to a specific land area within which there may be one or more settlements; terminology used mainly in the Indian sub-continent;
<i>Net Cultivable Area</i>	This represents the total area sown/cultivated with crops and orchards. Area sown/cultivated more than once in the same year is counted only once;
<i>Rabi</i>	An agricultural season (November-February) mainly dry with little to no rain and mainly marked with low sun intensity/daylight and low temperature;
<i>Thana</i>	May mean either a local police station or an Upazila (former name of);
<i>Upazila</i>	It is an administrative region (formerly known as 'thana') in Bangladesh. Multiple Upazila form a 'Zila' or a district. Upazila(s) function as sub-unit(s) of a Zila/ district;
<i>Zila</i>	A district; terminology used in Bangladesh. Bangladesh has 64 districts.

Weights and Measures

1 Acre	Unit of area, equals 3 Bigha, 100 Decimal or 60 Katha
1 Bigha	Equals 20 Katha or 33 Decimal
1 Decimal	Unit of area, equals 435.60 square foot or 40.47 square meter
1 Hectare	Unit of area, equals 2.47 Acre or 247 Decimal or 7.5 Bigha
1 Katha	Equals 1.653 Decimal
1 kg	Kilogram, SI unit of weight (1000 x gram)
1 Liter	Unit of volume in SI
1 m ²	SI unit of area, equals 10.77 square foot
1 ton	Unit of weight, 1000 x Kilogram
Acre	Unit of Area, equals to 4046.86 square meters
BDT	Currency of Bangladesh
dB	Decibel, Unit of loudness of sound
FY	The fiscal year (FY) of the Government of Bangladesh and its agencies ends on 30 June. "FY" before a calendar year denotes the year in which the fiscal year ends, e.g., FY2022 ends on 30 June 2022.
km	Kilometers, Unit of distance
kV	Kilo Volts, Unit of Voltage
Lac	100,000 units
m	Meters, Unit of length
Mm	A thousandth of a meter
MT	Metric Ton, a unit of weight equal to 1,000 kilograms
MW	Mega Watt, 1,000,000 x Unit of Power
SI Unit	International System of Unit
\$	Dollars - Currency of the United States
Tk	Taka – National currency of Bangladesh Tk1.00 = \$0.00936 \$1.00 = Tk106.83

Executive Summary

A sufficient and stable power supply is the backbone of economic development. This is realised by the Government of Bangladesh in developing its strategic vision for the country in its Eighth Five-Year Plan July 2020–June 2025. For the power sector, the government’s priority is to increase capacity and enhance infrastructure to meet the growing demand from existing and new customers. Due to the rapidly expanding city of Dhaka, its distribution network needs to both be expanded and strengthened to reliably supply the residential, commercial, and industrial sectors of the city. The proposed “*Dhaka Power System Expansion and Strengthening Project*” in the DESCO Area (the Project) has been planned to expand and strengthen distribution in the Dhaka area under **Dhaka Electric Supply Company Limited’s (DESCO’s)** distribution network. DESCO, incorporated in 1996, purchases electricity from the Bangladesh Power Development Board (BPDB) and is licensed to supply electricity to the northern parts of Dhaka, covering 16 divisions in North Dhaka, Gazipur and Narayanganj districts. The Project will construct substations, lay new underground cables and overhead lines to provide reliable power supply to 200,000 new and 1.1 million existing customers. The Government of Bangladesh has requested the Asian Development Bank (ADB) to finance the Project. The Project will be implemented over 5 years with a completion date by June 2028.

This Environmental Impact Assessment (EIA) report, including an Environmental Management Plan (EMP) was prepared for the Project to meet the environment assessment requirements of the Government of Bangladesh and ADB’s Safeguard Policy Statement (2009). Under national requirements the project is a “red category” requiring an Initial Environmental Examination (IEE) and then an EIA report, whilst under ADB’s Safeguard Policy Statement (2009) it is categorized B for environment requiring only an IEE. An IEE and then an EIA report complying with national requirements were submitted by DESCO to the Department of the Environment (DoE) during 2021-2022. Following the IEE submission, Site Clearance and the terms of reference for the EIA report was issued by DoE on June 15, 2021. On April 28, 2022 DOE approval of the EIA report was granted, with a number of conditions attached. This EIA approval was valid for one (1) year and expired on April 28, 2023. This revised EIA report represents an upgrade of the DOE approved EIA report (March 2022) to reflect on the final project scope and to comply with ADB’s Safeguard Policy Statement (2009) environment requirements. Whilst for ADB the environment safeguard document required for the project is referred to as an IEE report, this revised EIA report (August 2023) is the equivalent of the IEE report that is required by ADB for the purposes of processing the category B project. DESCO is planning to submit it to DoE and apply for renewal of their EIA approval. Once constructed, DESCO will need to secure Environment Clearance from DOE before operation of the project facilities commences.

The Project will see the construction of (i) four (4) new 132/33/11 kV gas-insulated and four (4) new 33/11 kV gas-insulated substations; (ii) installation of new underground cables, consisting of 30 circuit kilometers (ckm) at 132kV, 50 ckm of 33 kV, and 100 km at 11kV, and (iii) installation of 150 km of new 11kV and 0.4kV (low tension) overhead distribution lines. The substations will be automated and be equipped with 2-4 story control buildings, 5kW solar systems, transformers, batteries, internal access roads, surface drains etc. For the underground cables two new gas-insulated switchgear 132 kV bay extensions at an existing substation of Power Grid Company of Bangladesh Limited (PGCB) will be constructed, fiber optic cables will be installed alongside the conductors. There will be one (1) river-bridge crossing and several Horizontal Direction Drilling (HDD) crossings. For the overhead lines there will be related distribution transformers 750 x 11/0.4kV kVA and 70 x 11/0.23 kV) and 100 x GIS ring main units to be installed. The assessment has been undertaken based on the 8 substation locations and indicative routings for 132 kV and 33 kV with routings for 11 kV and

0.4 kV currently unknown. Environmental audit of 4 existing substations to which the 132kV underground cable connections will be made has also been conducted, with one of these substations (Mirpur Digun, owned and operated by PGCB) including two bay extensions within the existing site. Other components of the Project do not involve construction works and will have no or minimal environmental impact.

The Project Area is primarily urban, characterized by a very high population density with all the associated environmental challenges: dust, noise, heavy traffic and associated air pollution, and insufficient waste management. In the parts of the Project Area extending to the outskirts of Dhaka, pollution levels are less as the suburban environment is still under construction with empty plots for apartment buildings pegged out on previously rural, agricultural land as the city expands. DOE has historically granted EIA approvals for these developments, roads and power lines are already installed. To strengthen the distribution network, the developers of these areas have donated land to DESCO for the purposes of building substations. The only project site which is substantially different in character is the proposed substation at Tongi. The setting is also a suburban area under development, but it is more rural in character, still being used for agriculture, and the site lies adjacent to a sizeable, enclosed, temporary water body which develops during the rainy season, but reduces in size during the dry season. This is a natural waterbody albeit heavily modified. Land use includes paddy cultivation and low-key aquaculture. Initial desktop baseline investigations did not identify any particular biodiversity value of the site. However, as the waterbody is sizeable (3ha) and consultations with local people gave the impression migratory birds, which may also include threatened species, could be supported a bird survey by an avifauna expert was commissioned. The subsequent bird survey in the period of December 2022 – February 2023 counted a total of thirty-six (36) different species, including both migratory and resident species, albeit none of them are threatened. Chayakunka 5th Residential Project Authority (Housing Developer) has reportedly obtained Site Clearance from the DoE (DESCO has not been able to obtain the actual document to date), but reportedly has yet to receive EIA approval. As the landowner, it intends to infill 0.3 ha or about 10% of the 3ha waterbody, raise the level of the site, and donate the land to DESCO for the purpose of building a substation to support its planned development of this area. However, as there is uncertainty regarding the status of the landowner's EIA approval for these infilling works, DESCO will secure clearance for them from DOE itself. The potential impacts of infilling are assessed in this EIA. As the landowner will undertake these works, DESCO will supervise and monitor them to ensure the EMP is followed and that works are consistent with ADB's Safeguard Policy Statement (2009) requirements.

There are no indigenous people in the Project Area, nor will any involuntary resettlement be required for substation construction. A resettlement plan has been prepared as there might be temporary involuntary income losses to business due to the installation of overhead lines and construction of underground cables.

Overall construction, operation and maintenance of the Project is likely to give rise to direct, indirect, cumulative and induced environmental impacts that are mostly site-specific, generally reversible, temporary and of short duration. No protected area, internationally or nationally important biodiversity or physical cultural resources will be impacted. Given the urban setting of the proposed substation sites only about 70 trees will need to be cut, to be compensated for with three trees planted to each one cut. Felling of trees along the cable routes will be reduced to the absolute minimum and avoided, wherever possible. Significant adverse irreversible, diverse, or unprecedented environmental impacts are unlikely to arise. However, due to the densely populated urban setting many receptors will be affected by the impacts that do occur. The most significant impacts of the Project are increased noise and vibration, increased dust, and traffic levels during construction. Demolition of existing buildings, site clearance, and the need for piling to facilitate new substation construction will further increase noise, vibration and dust levels, especially at Kalachandpur

substation where residential apartments are immediately adjacent to the site. Temporary road blockages will be required, causing delays and congestion. Occupational and community health and safety risks will also be present. The potential for accidents will be increased, especially during the underground cable laying and overhead line works in the public domain. The underground cables will be laid in sections within the existing roads. Some underground cables will be laid using Horizontal Directional Drilling (HDD) where there are environmental and social sensitivities to be avoided which is the preferred option to minimize disruption and disturbance but, in most cases, on cost grounds, open trenching will be used. There is the potential for injury to pedestrians. These impacts need to be seen within the context of the Project Area's baseline where many other construction activities are ongoing in the urban area, and the noise levels are on occasion already exceeding the national standards. Baseline daytime noise measurements showed that noise levels range from a minimum of 41.3dB(A) near the former proposed substation site at Tongi to a maximum of 66.2dB(A) near the former proposed substation site at Purchabal. Due to this environment, the affected people may be more tolerant of disturbances, but cumulative impacts still need to be minimized. During operation and maintenance there remain safety risks due to the presence of electricity infrastructure. Use of polychlorinated biphenyls (PCBs) and asbestos in the substations will be prohibited. The four new 132/33/11 kV gas insulated substations will use SF₆, a potent greenhouse gas, so any leakage will need to be controlled and monitored.

The potential environmental impacts of the project are all well understood and can be mitigated by DESCO through adherence to national requirements and international good practice measures and standards as set out in the IFC General and Electric Power Transmission and Distribution Environment, Health and Safety Guidelines and the ILO Code of Practice on Safety and Health in Construction. Mitigation measures have been developed for all predicted adverse impacts and risks. Noise and vibration during construction will be managed and the community will be kept informed through regular communication. The construction period will be kept to a minimum, night-time construction in residential areas will be avoided, temporary acoustically designed noise barriers will be used and only well-operated and maintained equipment will be employed. Water spraying and use of screens will help to manage dust at the construction sites. The cable laying and overhead line works along the public roads will be clearly marked and sign-posted with pictorial signs and lights. In order to enable access to the roadside shops and other buildings, concrete or wooden bridges with side protection will be laid for pedestrians to be able to cross over unimpeded. Prior survey of existing utilities will be done to avoid damage being caused, and DESCO will ensure roads will be resurfaced in conjunction with Dhaka North City Corporation immediately on completion of each section to minimize disruption. Contractors will dedicate enough health and safety supervision staff to each underground cable or overhead line section (at least one health and safety steward per underground cable or overhead line, each steward will supervise a maximum of 50 workers) and develop a work plan to ensure each stretch is completed and the road restored before moving onto the next. The final surfacing works for the roads will be paid for by DESCO but done by Dhaka North City Corporation. It usually takes about 3-6 weeks to be completed. However, immediately following cable installation works, the contractors will infill the roads to the extent that they can be safely reused again by people and vehicles and will continue to maintain them to ensure safe travel whilst avoiding dust and erosion up until the final surfacing works are completed by the city corporation. DESCO must also ensure that when replacing overhead lines alternative arrangements are put in place to maintain health and safety and any street lighting and other cables that use existing poles prior to their removal. For any existing distribution transformers being removed (other than those in storage at an existing switching station to be demolished, removal is not anticipated at this stage) it must be confirmed that these do not contain PCB oil with environmentally safe and sound storage or disposal. There will remain high potential for grievances given the highly populated urban environment, and DESCO will set up a grievance redress mechanism for workers and local communities as well as ensuring works are

proceeded by extensive community consultation and advance information dissemination so the community are well aware of what is taking place and when.

All the mitigation measures to control these impacts are defined in the Project's EMP whose implementation by the contractors will be supervised and monitored by DESCO. The EMP includes (i) the mitigation and compensation measures reflecting national requirements and international good practice, (ii) the requirement to approve contractors' Construction Environmental Management Plans (CEMPs) including health and safety risk assessments and health and safety plans, prior to commencement of any works, (iii) an Environmental Monitoring Plan to ensure that the mitigation measures are effective, including the monitoring of health and safety incidents; and (iv) the requirement to submit regular environmental monitoring reports to ADB. It also includes the Corrective Action Plan informed by the environmental audit to address environment, health and safety management at existing substations to which the 132 kV underground cables will be connected. Implementation of the EMP will be assured by a program of environmental supervision and monitoring during the preconstruction, construction, and operation and maintenance stages by the contractors and DESCO. Any unanticipated impacts or requirements for corrective action during implementation will be reported by DESCO to ADB. To support DESCO with EMP implementation, supervision and monitoring an Environmental and Social Unit (ESU) initially with three staff will be established under the DESCO management structure. A Construction Supervision Consultant (CSC) including a full-time Environment Specialist, Health and Safety Specialist, Social Development Specialist, and Labor Specialist will also be appointed. The contractors will be required to have full-time on-site counterpart officers to the CSC.

A total of three-hundred and eighty-five (385) affected people and other interested stakeholders were consulted between October 2020 and May 2023 leading up to preparation of this EIA report. Of these, seventy-two (72) or 19% were female. Five (5) public stakeholder consultation meetings were held with six (6) Key Informant Interviews (KIIs) in addition to informal consultations both during the preparation of the EIA report and during ADB's Missions to the Project Sites in October 2022 and February 2023. General support for the project was expressed, as the need for a stable electricity supply in the Project Area is paramount. It was considered the project would support development of the area and potentially lead to more employment opportunities. The environmental and social concerns raised were related to the construction phase, including disturbance due to increased traffic and more traffic congestion than usual, due to road blockages during cable laying and overhead line installation, as well as noise and dust. The accident risk was mentioned too. The timing of works was raised, with the request that night-time work be limited as far as possible. The EIA report will be disclosed on ADB's website and locally by DESCO on their website, at their head office, at the substation sites, and at the underground cabling and overhead line construction site offices with a translation of the Executive Summary into Bengali. The meaningful consultation process will continue during project implementation to ensure that all affected people and other interested stakeholders are fully engaged and can participate in the project's development, particularly before the commencement of works and to inform the final routings for underground cabling and overhead lines.

DESCO will establish and advertise a Grievance Redress Mechanism (GRM) for workers and local communities to raise issues that cannot be dealt with informally by the contractors. This will consist of an entry tier and then a two-tier bottom-up Grievance Redress Committee (GRC) system. There will be an informal tier with the contractor before the three formal tiers begin. The three formal tiers include: first tier - site level resolution by the DESCO site team; second tier – GRC at the district level; and third tier – GRC at the project level. These GRCs will be established through gazette notifications from the Ministry of Power, Energy and Mineral Resources. Training will be provided under the project for all people involved in the GRM. The affected people will be informed through public consultation that they have a right to have their grievances redressed by the project. Contractors will

carry out awareness raising among workers on the GRM at the start of employment onsite. Contact details of the GRM are to be displayed at the substation sites, construction site offices and active construction sites. A suggestion box will be set-up at the project sites and will be regularly checked for any grievances received. Grievances will be resolved by the DESCO site team at the site level (first tier) as far as possible, but if unresolved at this level, they will be raised to the district level (second tier), and if the complainant is still not satisfied with the resolution, then they will be elevated to the project level GRC (third tier). Grievances will be redressed within a maximum of a month from the date of lodging the complaints, with pollution and, health and safety issues being redressed immediately. GRC decisions will be on a majority basis. Details of grievances will be disclosed in the environmental monitoring reports from the reporting period of receipt until the reporting period of closure. Complainants can access the national judicial system at any time during the GRM and is not contingent to the resolution of the grievance.

This EIA report, including EMP, is considered sufficient to meet national requirements and ADB's Safeguard Policy Statement (2009) requirements for the category B project. In case of any scope, sites or routing change, and/or unanticipated impact during project implementation, the EIA and EMP will be updated as required by DESCO for review and clearance by DOE (as required by law) and ADB (as per ADB Safeguard Policy Statement (2009) requirements) before any related works commence or are allowed to continue. Notably since the 132 kV and 33 kV routings assessed in this EIA report are only indicative and will not be finalized along with the 11 kV and 0.4 kV routings until the contractors are on board, during project implementation it will need to be updated, reviewed and cleared before final routings are approved by DESCO and works commence.

1. Introduction

1.1 Background of the Project and Environmental Impact Assessment

The Government of Bangladesh (the government) has adopted Vision 2041, a continuation of its Digital Bangladesh Vision 2021 which seeks to eliminate extreme poverty and enable Bangladesh to reach Upper Middle-Income Country (UMIC) status by 2031, and High-Income Country (HIC) status by 2041 with poverty approaching extinction. The government has already identified key areas where rapid development would be required in order to assist in the continuous growth of the country as well as meet the 2041 goal. Power sector is deemed by the government as one of the, if not, the most important area among them. This is understandable as the economic growth of any country is intertwined to its growing demand of electricity, and more significantly, that the demand is met on time.

To convert Vision 2041 into a development strategy, 'Making Vision 2041 a Reality: Perspective Plan of Bangladesh 2021-2041' (PP2041) has been developed. Sustainable power and energy is one of the key elements of PP2041. The objectives and targets set in PP2041 will put Bangladesh's power and energy sector on a sustained path toward a high-income economy. A core objective of the PP2041 power and energy strategy is to eliminate the existing demand gap while meeting the new demand. The peak demand grew from 4,530 MW in 2010 to 13,300 MW in 2020.¹ However, there is still a significant suppressed demand in the system. During this same time period, the generation capacity has increased almost 2.5 times with the addition of numerous medium to small scale power plants and stands at 12,738 MW. Between FY2021 and FY2041, an annual average expansion of 3,100 MW per year, or 62,000 MW in total, of power generation is anticipated. This power generation must be balanced with investment in transmission and distribution. PP2041 places a strong emphasis on the latter, so that there is no waste in terms of idle generation capacity and district-level power constraints to development are eliminated.² A sufficient and stable power supply being the backbone of economic development is also realised by the Government of Bangladesh in developing its strategic vision for the country in its Eighth Five-Year Plan July 2020–June 2025. For the power sector, the government's priority is to increase capacity and enhance infrastructure to meet the growing demand from existing and new customers.

Due to the rapidly expanding city of Dhaka, its distribution network needs to both be expanded and strengthened to reliably supply the residential, commercial, and industrial sectors of the city. The proposed "*Dhaka Power System Expansion and Strengthening Project*" in the DESCO area (the Project) has been planned to expand and strengthen distribution in the Dhaka area under **Dhaka Electric Supply Company Limited's (DESCO's)** distribution network. DESCO is one of the major distribution companies in Bangladesh. Its creation was part of power sector reforms initiated by the government. DESCO was created in November 1996 as a public limited company, incorporated under the Companies Act 1994, as a subsidiary of Dhaka Electric Supply Authority (DESA). It purchases electricity from the Bangladesh Power Development Board (BPDB) and is now licensed to supply electricity to the northern parts of Dhaka, covering 16 divisions in North Dhaka, Gazipur and Narayanganj districts.

The vision of DESCO is to be a role-model electric supply company in the region using most dependable technology and be a development partner in the continuous welfare of society. Also, the mission of

¹ BPDB annual report 15/10/2020

² Perspective Plan of Bangladesh 2021-2041

DESCO is to provide service to the utmost satisfaction of consumers through reliable and uninterrupted power supply. DESCO's distribution network operations started on 24 September 1998 with the Mirpur area from DESA. Since its inception, its network has expanded rapidly with the inclusion of Gulshan, Uttara and Tongi area subsequently. Further the area of DESCO has been expanded with the inclusion of new areas like Purbachal Model Town and Uttara Model Town (3rd Phase). The service area of DESCO is now about 245 square kilometers. It covers the areas bounded by the Mirpur Road, Agargaon Road, Rokeya Sarani, Bijoy Sarani, New Airport Road, Mymensingh Road, Mohakhali Jheel, Rampura Jheel connected with the Balu River in the South, the Balu River in the east and the Turag River in the West, areas under the Tongi Pourashava in the North and the "Purbachal Model Town" on the east side of the Balu River, adjacent to Dakshinkhan area of Uttara.

The proposed project, namely "***Dhaka Power System Expansion and Strengthening Project***" in the DESCO Area henceforth 'the Project' has been planned to expand and strengthen distribution in the Dhaka area under DESCO's distribution network. The Project will construct substations, lay new underground cables and overhead lines to provide reliable power supply to 200,000 new and 1.1 million existing customers. The Government of Bangladesh has requested the Asian Development Bank (ADB) to finance the Project. The Project will be implemented over 5 years with a completion date by June 2028.

This Environmental Impact Assessment (EIA) report, including an Environmental Management Plan (EMP) was prepared for the Project to meet the environment assessment requirements of the Government of Bangladesh and ADB's Safeguard Policy Statement (2009). According to the Environment Conservation Act (ECA₁) 1995 and Environment Conservation Rules 2023 the Project is under 'Red Category' projects which require Initial Environmental Examination (IEE) and then an Environmental Impact Assessment (EIA) to get 'Site Clearance' and 'Environmental Clearance' respectively from the Department of Environment (DoE). Safeguard requirements for all projects funded by ADB are defined under ADB's Safeguard Policy Statement (2009). For each ADB project, screening and categorization is conducted at the earliest stage of project preparation. ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. For a Category A project, an Environmental Impact Assessment (EIA) including an Environmental Management Plan (EMP) is required. For a Category B project, an Initial Environmental Examination (IEE) including an EMP is required and for a Category C project, an EIA or IEE is not required, although environmental implications need to be reviewed e.g., through preparation of a due diligence report. Since the proposed project does not involve components that will have significant adverse impacts that are irreversible, diverse, or unprecedented, accordingly, the environmental categorization of the project under ADB's Safeguard Policy Statement (2009) is Category B requiring only an IEE.

The above assessment requirements, propelled DESCO to award the Center for Environmental and Geographic Information Services (CEGIS) with the task of conducting an EIA for the Project due to CEGIS's commendable record of accomplishment in working on similar projects. An IEE and then an EIA report complying with national requirements were submitted by DESCO to the Department of the Environment (DoE) during 2021-2022. Following the IEE submission, Site Clearance and the approved terms of reference (ToR) for the EIA report was issued by DoE on 15 July 2021 (site clearance certificate is given in **Appendix I**). DESCO submitted the EIA report to DoE on 23 March 2022 and obtained the approval on 28 April 2022 with a number of conditions attached (**Appendix I**). This EIA approval was valid for one (1) year and expired on April 28, 2023. This revised EIA report represents an upgrade of the DOE approved EIA report (March 2022) by CEGIS and ADB funded TA

Consultants to reflect on the final project scope and to comply with ADB's Safeguard Policy Statement (2009) environment requirements. Whilst for ADB the environment safeguard document required for the project is referred to as an IEE report, this revised EIA report (August 2023) is the equivalent of the IEE report that is required by ADB for the purposes of processing the category B project. DESCO is planning to submit it to DoE and apply for renewal of their EIA approval. Once constructed, DESCO will need to secure Environment Clearance from DOE before operation of the project facilities commences.

1.2 Objectives of the Project

Due to rapid expansion of Dhaka, the distribution network must be strengthened and expanded to supply quality and reliable electricity to its residential, commercial and industrial customers. While the generating capacity has increased, transmission and distribution remain inadequate and require urgent network enhancement to cater for increasing demand and capacity additions. The main objective of the proposed project is to transmit power from transmission to distribution substations as then consumers. It is anticipated that 200,000 new and 1.1 million existing consumers with the fastest growing electricity demand will be provided with a reliable supply through the proposed substations, transmission and distribution lines.

The project's outcome will include improved energy efficiency, increased reliability and safety of Dhaka's distribution network in urban areas. From DESCO's perspective the main objectives the project will achieve are:

- It will reduce the burden on the distribution grid, reduce load-shedding and provide power at an expected voltage level and quality to the end users;
- It will modernize the existing distribution network and will enable provision of electricity supply to new areas; and
- It will satiate the ever-growing demands of residential, commercial as well as industrial consumers under DESCO's distribution area.

1.3 Scope of Work

The project has three (3) outputs of which only Output 1 on '**Climate- and disaster-resilient power distribution system established in urban areas of northern Dhaka**' will have environmental impact. The other two outputs relate to capacity development and are not considered further in this EIA.

The scope of work for Output 1 of the project is construction of (i) four (4) new 132/33/11 kV gas-insulated and four (4) new 33/11 kV gas-insulated substations; (ii) installation of new underground cables, consisting of 30 circuit kilometers (ckm) at 132kV, 50 ckm of 33 kV, and 100 km at 11kV, and (iii) installation of 150 km of new 11kV and 0.4kV (low tension) overhead distribution lines. The substations will be automated and be equipped with 2-4 story control buildings, 5kW solar systems, transformers, batteries, internal access roads, surface drains etc. For the underground cables two new gas-insulated switchgear 132 kV bay extensions at an existing substation of Power Grid Company of Bangladesh Limited (PGCB) will be constructed, fiber optic cables will be installed alongside the conductors. There will be one (1) river-bridge crossing and several Horizontal Direction Drilling (HDD) crossings. For the overhead lines there will be related distribution transformers 750 x 11/0.4kV kVA and 70 x 11/0.23 kV) and 100 x GIS ring main units to be installed. The assessment has been undertaken based on the 8 substation locations and indicative routings for 132 kV and 33 kV with routings for 11 kV and 0.4 kV currently unknown. Environmental audit of 4 existing substations to which the 132kV underground cable connections will be made has also been conducted, with one

of these substations with (Mirpur Digun, owned and operated by PGCB) including two bay extensions within the existing site.

Table 1.1: List of Proposed Project Interventions

Sl. No.	Proposed Gas Insulated Substations*
132/33/11 kV Substations	
1.	Airport
2.	Kalshi (Mirpur)
3.	Bashundhara
4.	Tongi
33/11 kV Substations	
5.	Purbachal
6.	Kalachadpur (Baridhara)
7.	Uttara (Rupayan City)
8.	Mirpur Ceramics (Mirpur)
Sl. No.	Transmission and Distribution Lines
1	30 ckm double circuit underground transmission cables (132kV) Fiber optic cables in parallel to underground transmission cables 2no. GIS bay extensions at existing Mirpur Digun substation PGCB
2	50 ckt km (33 kV) underground distribution cables Fiber optic cables in parallel 33 kV underground distribution cables 100 km (11 kV) underground distribution cables 150 km new 11 kV and 0.4 kV (low tension) overhead distribution lines 820 distribution transformers 100 GIS ring main units
* Substations will be automated and be equipped with 2-4 story control buildings, 5kW solar systems, transformers, batteries, internal access roads, surface drains etc.	

1.4 Objectives of the Environmental Impact Assessment

As a 'Red Category' project, DESCO must obtain site and environmental clearance certificates from DoE. Additionally, all ADB projects must comply with the requirements of ADB's Safeguard Policy Statement, 2009 and Operational Manual F1, 2013 to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. The overall objective of providing the Consultancy Services for Environmental Impact Assessment (EIA) on behalf of DESCO is to obtain the site and environmental clearance certificates from DoE, and secure clearance for the project from ADB in respect of demonstrating it meets ADB's Safeguard Policy Statement 2009 requirements. The specific objectives of the EIA study are:

- to identify the environment, health and safety legislative and approval requirements applicable for the project;
- to understand the project to be implemented in consultation with DESCO to inform the impact assessment;
- to identify the current environmental and socio-economic baseline of the study area through desk studies, site visits and field surveys to provide the baseline against which the impact assessment is undertaken;

- to identify important environmental and socio-economic components which may be impacted by the project;
- to assess the potential environmental impacts, including any residual impacts post-mitigation, of the project considering direct, indirect, cumulative, and induced impacts on biological, physical, social, and physical-cultural resources in the study area during the construction and operation and maintenance phases of the project;
- to identify the preliminary health and safety risks of the project during the construction and operation and maintenance phases of the project;
- to identify mitigation measures to minimize the predicted adverse environmental impacts and risks;
- to undertake consultations with affected communities and other interested stakeholders; and
- to prepare a Grievance Redress Mechanism and an Environmental Management Plan, including an Environmental Monitoring Plan.

The assessment has been undertaken based on the 8 substation locations and indicative routings for 132 kV and 33 kV which have been surveyed by CEGIS and the ADB TA Consultants with routings for 11 kV and 0.4 kV currently unknown. Since the 132 kV and 33 kV routings assessed are only indicative and will not be finalized along with the 11 kV and 0.4 kV routings until the contractors are on board during project implementation, the IEE will need to be updated, reviewed and cleared before the final routings are approved by DESCO and works commence. To assess the final routings of all 132 kV, 33 kV, 11 kV, and 0.4 kV transmission and distribution lines (including locations of distribution transformers and the RMUs on the distribution network) once surveyed by the contractor, an environmental assessment checklist and consultation proforma which are to be completed by DESCO (to be completed by the contractor and verified in the field by the CSC for DESCO approval) for each of the underground cable/overhead line rights-of-way are included in the EIA report as the basis for updating the IEE.

1.5 Study Area (Project Area of Influence)

The proposed project covers the major portion of the DESCO (North Dhaka, Gazipur and Narayanganj) area so that, the entire DESCO distribution area is considered as the study area consisting of 21 thanas/upazilas under 3 Districts namely Dhaka, Gazipur and Narayanganj which cover 53 unions/wards.

Out of the proposed 8 substations, 6 are in North Dhaka District, one substation area falls under the Tongi Pourashava under Gazipur District, and another substation area falls under Rupganj Thana of Narayanganj District. The administrative boundary was demarcated by spatial Geographic Information System (GIS).

Direct impacts will be restricted to the footprint of the project. The site-specific project area of influence for indirect impacts was generally taken as a 500 m radius around the substations. For transmission and distribution lines, given the dense urban nature of the study area, the site-specific corridor of potential impact was generally taken to be the road/street in which the installation works will be undertaken. In the most densely populated locations construction impacts are likely to be negligible beyond this; in the least densely populated locations receptors up to 50-100 m have been considered.

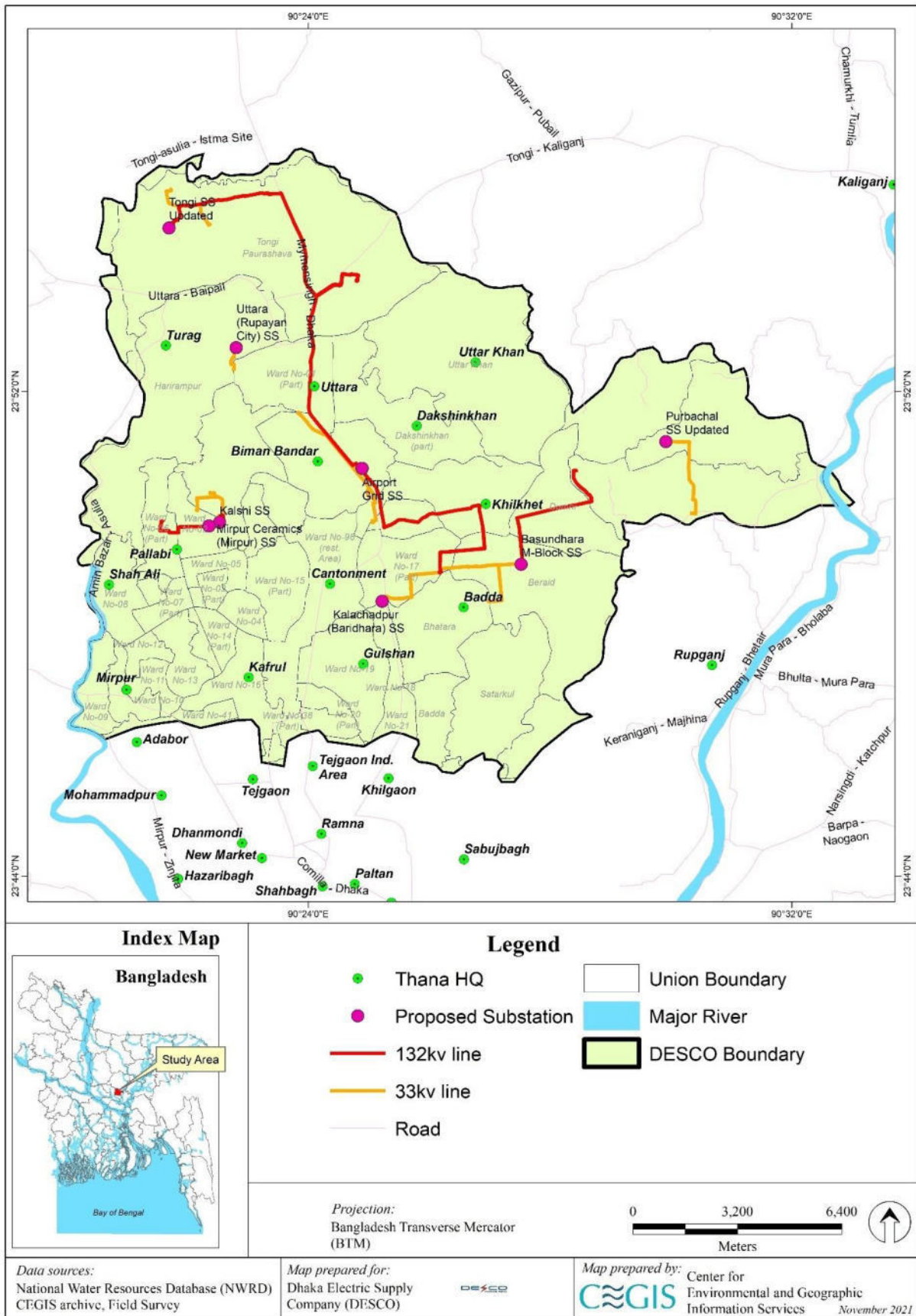


Figure 1.1: Map of Study Area Showing Proposed Substations as well as the 132 kV and 33 kV Underground Cables under the Project

1.6 EIA Study Team

This revised EIA report represents an upgrade of the DOE approved EIA report (March 2022) by CEGIS and ADB funded TA Consultants; the update was led by Ms Jenny-Baer Pasztory (international environment consultant) and Mr A. K. M. Rezaul Haque Khan (national environment consultant) with support of the original CEGIS EIA Study Team. The CEGIS EIA Study Team consisted of the following experts:

- Dr. Dilruba Ahmed, Sociologist and Restatement Expert
- Dr. Dr. Kazi Md. Noor Newaz, Environmental Expert
- Mr. Mohammad Mukteruzzaman, Environmental Expert
- Mr. Jalal Ahmed Chowdhury, Electrical Engineer
- Md. Wahiduzzaman Kallol, Health & Safety Expert
- Mrs Mashuda Parvin, Ecologist
- Mr. Mohammad Aminur Roshid, Soil and Agricultural Expert
- Ms Sharmin Akter, Fisheries Biologist
- Mrs Farhana Sharmin, Sociologist
- Mr. Hasin Ahmed, Water Resource Engineer
- Mr. Abid Kamal, GIS Specialist
- Ms Bilkish Sultana, Electrical Engineer

The bird survey was undertaken by Mr. Sayam U. Chowdhury, national ornithologist, under ADB TA.

1.7 Structure of the EIA Report

The report has been structured in compliance with the requirements of the ToR issued by DoE.

Chapter 1 Introduction:

The introduction chapter presents a brief overview of the EIA assignment along with the project background objectives and scope of work.

Chapter 2 Legislative and Administrative Framework:

Chapter 2 outlines the Policy and Legislation on environment, health and safety issues.

Chapter 3: Approach and Methodology:

This Chapter describes the approach and the methodology followed in conducting the EIA.

Chapter 4 Description of the Project

Chapter 4 describes the project interventions including the project location, project components and various activities to be undertaken during different phases of implementation, work schedule and project costs.

Chapter 5: Environmental and Social Baseline:

This chapter describes the environmental baseline conditions (physical and biological) of the Project area of influence. This chapter also describes the social baseline conditions (population, demographics, settlements, housing, traffic and transport, utilities, economy and employment etc.) of the Project area of influence.

Chapter 6: Alternative analysis:

This chapter outlines the alternative analysis of the main project components i.e., the substations, transmission and distribution lines.

Chapter 7: Important Environmental and Social Components:

Presents the environmental and social components likely to be impacted by the proposed project

Chapter 8: Potential Impact Prediction and Analysis:

Presents the potential adverse impacts on the environmental and social components with mitigation measures to be adopted for the pre-construction, construction and post-construction phases of the project.

Chapter 9: Stakeholder Consultation:

This chapter presents a description of the extent of stakeholder consultation that was undertaken and its outcome.

Chapter 10: Grievance Redress Mechanism:

The Grievance Redress Mechanism (GRM) which will be adopted by DESCO to address community and worker concerns is outlined in this chapter.

Chapter 11: Environmental Management Plan:

This chapter describes the environmental management, mitigation and monitoring measures that will be put in place to reduce the anticipated adverse environmental impacts of the Project to acceptable levels.

Chapter 12: Conclusions and Recommendations:

This chapter presents the findings, conclusions and recommendations of the EIA.

2. Legislative and Administrative Framework

2.1 Introduction

For this chapter, all relevant environment, health and safety (labor) policies and legislation pertaining to the Government of Bangladesh (GoB), particularly the Environment Conservation Act (ECA)₁ 1995 (with subsequent amendments) and the Environment Conservation Rules (ECR) 2023 were assessed. The ECA and ECR are the main legal instruments related to the environmental impact of project development, obliging all project activity to have the necessary clearance certificate in place. In the following sections, the summary of relevant policies and legislations is presented. DESCO, will ensure adherence to all applicable regulations and standards for environmentally acceptable operation of this Project.

2.2 Procedure for Clearance Certificate

The ECA₁, 1995 (subsequent amendment till 2010) clearly states that an Environmental Clearance Certificate (ECC), that follows the ECR must be approved by the Director General (DG) of the Department of Environment (DoE) prior to establishing or undertaking any project. The ECR, 2023 categorizes different industries or projects into four categories: Green, Yellow, Orange, and Red. Since the project includes the construction of eight substations and 330 km of transmission and distribution lines, according to the ECR 2023 categorization, the project falls under the “RED” category. A “RED” category project is one which has an impact on the environment and human health and must reduce its environmental impact by protecting the environment and taking pollution control measures. This category requires mandatory submission of an Initial Environmental Examination (IEE) and an Environmental Impact Assessment (EIA) including EMP by the project proponent (DESCO) to the DoE for receiving the ‘Site Clearance Certificate’ (SCC) as well as the ‘Environmental Clearance Certificate’ (ECC) through approval of the IEE and EIA report. The following documents/materials are to also be submitted with the application:

- Feasibility Report for the Project (where applicable)
- No Objection Certificate from relevant Local Authority (where applicable)
- Other necessary information, (where applicable)

The DoE has issued guidelines on undertaking the EIA for several industrial sectors and activities. Each Project Proponent shall conduct an EIA and is expected to consult and follow the DoE guidelines. The DoE has issued an application procedure for obtaining site and environmental clearances. Figure 2.1 shows this procedure for obtaining the environmental clearance from the DoE for the “RED” category of projects under the Environment Conservation Rules 2023. It should be noted that the environmental clearance for this project was first secured under the previous Environment Conservation Rules, 1997 which has been repealed with the issue of the ECR 2023. The application process was similar, and any renewal will be issued under the Environment Conservation Rules, 2023. Clearance certificates will expire after 30 days if not renewed.

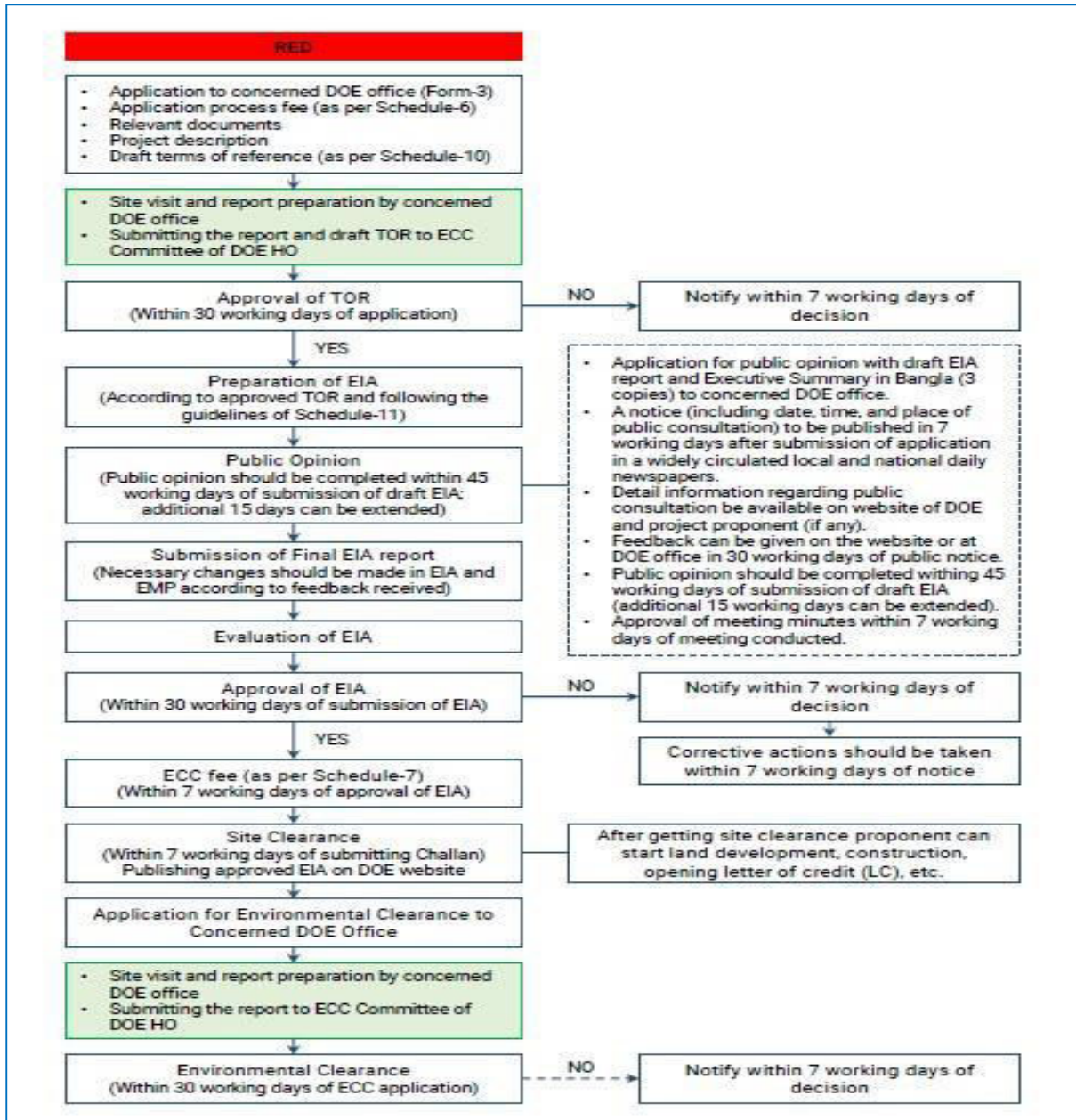


Figure 2.1: Process for Getting Clearance Following the DoE Guidelines

2.3 Environmental Standards

Environmental quality standards of Bangladesh for varying water sources, industrial effluent, discharges and emissions are prescribed under the Environment Conservation Rules 2023. The standards intend to impose restrictions on the volume and concentration of liquid waste and emissions discharged into the environment. In addition, a number of surrogate pollution parameters like Biochemical Oxygen Demand or Chemical Oxygen Demand; Total Suspended Solids, etc. are specified in terms of concentration and/or total allowable quality discharged in case of waste water discharges. Additionally, specific parameters depending on the manufacturing process are specified such as Phenol, Cyanide, Copper, Zinc, Chromium etc. Air emission standards refer mostly to concentration of mass emission of various types of particulates, sulfur dioxide and oxides of nitrogen and in some cases volatile organic compounds and other substances. Whilst the previous version of the Environment Conservation Rules contained standards for ambient air quality, they do not anymore. Standards for ambient air were moved to the Air Pollution Control Rules (APCR) 2022.

Similarly, the ambient noise standards are provided for within the Noise Pollution (Control) Rules 2006.

The Bangladesh standards, in general, are less stringent compared to the developed countries. This is to ensure that they are not too restrictive and thus hinder industrialization in the country. The Bangladesh standards are not for any specific period e.g., 1 hour, 24 hours meaning they cannot be directly compared to international environment quality guidelines. There is no provision for partial compliance either.

2.4 Organizations Related to Enforcement of Environmental Standards

Roles and responsibilities of various Ministries and Departments involved in the enforcement of environmental requirements are described below:

Ministry of Environment, Forest and Climate Change

The Ministry of Environment, Forest and Climate Change (MoEFCC) 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 replaced the Ministry of Agriculture and Forest in 1989 and is at present a permanent member of the Executive Committee of the National Economic Council. This 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 and implementing agencies.

Department of Environment

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 the opportunity 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, Chattogram, Khulna, Barishal, Sylhet and Rajshahi. A special presidential order 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 DG. 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 any 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 Environmental Clearance Certificate (ECC) from the DoE. The procedures to take such clearance are in place.
- Failure to comply with any part of the Environment Conservation Act (ECA₁), 1995 with subsequent amendments may result in punishment by imprisonment or a fine of or both.

Forest Department

This department under the MoEFCC is responsible for the protection and management of all reserve forests in the country. Department personnel extend down to the union level in areas where there are reserve forests. The department has recently started some agroforestry programs and its officers are also responsible for the protection of wildlife in the forests.

Other Related Organizations

There are several other organizations, which have 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 Labor and Employment

2.5 National Legislations Relevant to Environment

National Policies, Legislation, Acts and Rules that are relevant to this proposed project are discussed in the following Table 2.1. Of these, the Environment Conservation Rules (ECR) 2023, are the key legislation.

In 2023, MoEFCC approved the ECR 2023 as a replacement to the ECR 1997, strengthening the requirements and clarifying the procedures for industries or projects to assess and manage environmental impacts associated with their activities. The ECR 2023 detail provisions for the environmental clearance process, such as on scoping, project categorization, site clearance, environmental assessment, cross-sector and stakeholder consultations, compliance monitoring of the conditions of the ECC, among others. Additionally, the ECR 2023 regulates access to information and stakeholder participation throughout the environmental clearance process, particularly for those activities that require a full EIA. This was absent from the previous ECR, 1997. The ECR 2023 has updated the water quality and sewerage standards, as well as waste emissions and liquid waste standards for industries and projects. However, the ECR 2023 do not include noise and odor standards, which were part of the ECR 1997. Standards for ambient air were moved to the Air Pollution Control Rules (APCR) 2022 and noise standards are contained in the Noise Pollution (Control) Rules 2006.

Although the ECR 2023 are expected to improve the ECC process, additional guidelines are required to clarify assessment criteria and procedures related to key themes, such as: screening of projects that are not pre-categorized in the ECR, analysis of project alternatives (including the “no-go” option), mitigation hierarchy approach, monitoring program after ECC issuance, resource efficiency, Occupational Health and Safety (OHS), labor and workers’ rights, differentiated treatment of vulnerable groups in the assessment and management measures, among others.

Although the list of Ecologically Critical Areas has been removed from the ECR 2023, it has been regularly updated through gazette notifications (DoE, 2019). The ECR 2023, as in the 1997 version, kept limited provisions on DoE’s responsibilities of policy formulation, data collection, environmental quality monitoring and enforcement (including, for example, the use of new technologies for oversight activities).

Table 2.1: Relevant Bangladesh Policies and Legislation

Policy/Act/Rules	Compliance Requirements	Applicability
National Environment Policy, 2018 and Action Plan	This policy provides a framework for establishment of legislation for protecting the environment. It outlines all the criteria for IEE and EIA approval as well as provides basic framework of environmental action for sustainable development	The Dhaka Electric Supply Company Limited (DESCO) must follow the policy and comply with provisions while implementing the project.
The Environment Conservation Act, 1995 and amended till October 5, 2010 (hereinafter referred as ECA ₁).	This Act is the key legislation in relation to environment protection in Bangladesh. It is promulgated for environment conservation, standards, development, pollution control, and abatement. It has repealed the Environment Pollution Control Ordinance of 1977. The Act has been amended in 2000, 2002, 2007 and 2010. Failure to comply with any part of the Environment Conservation Act, 1995 may result in punishment to a maximum of 10 years imprisonment or a maximum fine of BDT 1,000,000 or both.	This project triggers this act because the project proposes for construction and the provisions of the act apply to all the project intervention phases during the project life cycle to ensure the environment is protected and conserved.
The Environment Conservation Rules, 2023 (hereinafter referred to as ECR)	These rules categorize all the industries and projects as well as the types of environmental assessments that should be conducted in relation to each category of industries or projects. Additionally, this regulation establishes national criteria for environmental quality in water quality and sewerage and waste emissions.	The proposed project falls into the RED category, for which SCC/ECC is required upon submission of EIA report and EMP. Moreover, DESCO needs to follow the guidelines presented in the ECR to prepare the documentation required to apply for and obtain the clearances required to initiate any intervening activities from the DoE. DESCO will follow the EMP mentioned in this EIA report and follow the environmental quality and other applicable standards mentioned in ECR. SCC/ECC will be valid for 1 year from the issuance date and shall be renewed at least 30 days prior to expiry. DESCO will notify the Director General (DG) of DOE in case of pollutant emission/discharge in excess of prescribed standards or where there is a possibility of the same.
Solid Waste Management Rules, 2021	These rules require (i) source segregation of waste into dry and wet waste, (ii) standards for composting, (iii) anaerobic digestion and waste-to-energy projects, (iv) guidelines for landfilling, and (v) standards for the placement of secondary storage bins, and primary and secondary collection of waste.	Applicable as the project needs to manage solid wastes during construction and operation.
Hazardous Waste (e-waste) Management Rules, 2021	The E-waste rule covers the products listed in the Schedule (home appliances, monitoring and control equipment, medical equipment, automatic machines, IT and communication	Applicable as the project needs to manage e-wastes during construction and operation.

Policy/Act/Rules	Compliance Requirements	Applicability
	<p>equipment), and establishes obligations for manufacturers, assemblers, collectors, sellers, and consumers of the products. The rule also sets provisions to limit the use of the 10 substances covered by the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive. This regulation entered into force upon publication. The main provisions of this regulation are: i. 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 the Waste Electrical and Electronic Equipment (WEEE) management plan; ii. Registered manufacturers, recyclers, etc. shall obtain environmental clearance in accordance with the Bangladesh Environmental Protection Rules, 1997 iii. Manufacturers must establish individual or joint collection centers and set aside funds for the implementation of the WEEE; iv. 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; v. Manufacturers, importers, etc. shall meet the collection targets for the 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). vi. In order to facilitate the proper management of the 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; vii. Traders, sellers and collectors of the WEEE shall receive them from consumers at designated points and transport them to collection centers.</p>	
Air Pollution Control Rules (APCR), 2022	<p>APCR, 2022 contains air quality standards based on WHO Guidelines (Interim Goals); emissions limits and technical specifications for key sectors; mandates and coordination mechanisms among relevant line ministries to control both household and outdoor air pollution. The rules elevated the air quality management (AQM) dialogue and leadership beyond the environment sector, by establishing the National Committee on Air Pollution Control (NCAPC), a multi-sector decision-making body</p>	<p>These rules are applicable to this project as it will involve emissions (primarily dust and exhaust emissions) during construction.</p>

Policy/Act/Rules	Compliance Requirements	Applicability
	<p>presided by the Cabinet Secretary to coordinate the APCR implementation and instruct relevant agencies on specific interventions to comply with the new rules. The NCAPC is mandated, for example, to impose emergency measures depending on the levels of air pollution, such as restricting activities of industries or projects, vehicles, or any source of air pollution in a certain area, and closure of educational institutions. APCR also envisage the objectives and minimum requirements of its implementation management tools, such as a National Air Quality Plan (also covering HAP interventions and targets); degraded airsheds declaration and management plan; publication of list of highly air polluting industries and activities; prevention plans; monitoring and control systems. Other relevant regulatory development for AQM refers to the 2019 Amendment of the Brick Manufacturing and Kiln Installation Act, 2013. The amendment set phased targets to reduce the use of clay-fired bricks in public works from 2019 to 2025, except for the construction of base/sub-base of the high-ways. However, implementation of this phased reform is delayed.</p>	
<p>Bangladesh National Building Code (BNBC), 2020</p>	<p>The purpose of the Code is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property and public welfare.</p>	<p>BNBC, 2020 is applicable as this project will involve construction of buildings along with substations.</p>
<p>Electricity Act, 2018</p>	<p>Under this Act, any 'Person' may obtain license to supply electrical energy and/ or lay down or place electric supply lines over or under land (Section 13 – Right of Way) or by acquiring land (Section 14 – Land Acquisition) for the conveyance of electrical energy. For such, the Licensee shall give considerable amount of time and written notification (Section 13) to or acquire the land following land acquisition laws (Section 14) from the land owners.</p> <p>Under this Act, the Licensee:</p> <ul style="list-style-type: none"> • Shall obtain permission from appropriate personnel or authorities to open and break up the soil and/ or pavement of any or part of street, railway, tramway, etc. to lay down any line on either side of, underneath or above the aforementioned facilities; the same shall apply in case of laying of line on either side of, submerged in, inside of or above canals, tunnels and /or waterways or 	<p>DESCO, here the Licensee, shall need to obtain necessary permission, provide appropriate compensation following national laws/Act, and comply with all the requirements described in this Act.</p>

Policy/Act/Rules	Compliance Requirements	Applicability
	<p>do other work following appropriate procedures as stated in Section 6 of this Act.</p> <ul style="list-style-type: none"> • Shall take prior 'Permissions' from the respective authorities in case of works near other utility services (such as gas, water, sewer, etc.) as well as providing 'Notice' of commencement of work bar emergency situation as stated in Section 8 of this Act. • Shall be responsible for any repair-works of road, pavement, sewerage, etc., including refilling of excavated soil and disposal of generated waste as a direct result of their interventions as stated in Section 9 of this Act. • Will be responsible for providing 'Notice' to any Telecommunication and /or Internet Service provider to commence any work related to electrical activities that share their service space whether they are new works or repairing of existing works bar emergency situation. However, the Licensee shall provide a 'Notice' after completion of emergency work to the aforementioned service providers as stated in Section 10 of this Act. • Can construct Overhead (Aerial) Lines along or crossing the roads, rail-lines, canals or waterways with prior permission from the Government as stated in Section 11 of this Act. • Make full compensation for any damage, detriment or inconvenience caused by them or by anyone employed by them as stated in Section 12 of this Act. 	
Electricity Rules, 2020	<p>This rule has been formulated under section 59 of the Electricity Act 2018. It provides clear guidelines on electricity production, transmission and distribution. In addition to this, it also gives clear direction regarding maintenance and change in electricity line, cable etc.</p> <p>In Rule 51(5) and Schedule-2 of the Electricity Rule, 2020 defines the minimum distance to be maintained on either side of the electric wire, which in fact defines the ROW for transmission and distribution lines and associated safety clearance corridors. And this also defines safety measures relating to electrical works.</p>	<p>This rule is triggered under this project as the rule provides directives regarding permissions and construction and maintenance of power transmission line and distribution line as well as substations.</p> <p>RoW and safety clearance with voltage levels relevant to the Project are given below. There is no specification for 0.4 kV but as same poles are used as for 11 kV so 11 kV</p>

Policy/Act/Rules	Compliance Requirements	Applicability												
		<p>RoW and safety clearances used for 0.4 kV:</p> <table border="1" data-bbox="986 421 1385 748"> <thead> <tr> <th data-bbox="986 421 1091 618">Voltage Level (kV)</th> <th data-bbox="1091 421 1235 618">RoW (from the either side of the outer conductor)</th> <th data-bbox="1235 421 1385 618">Safety clearance from the line unscreened conductor</th> </tr> </thead> <tbody> <tr> <td data-bbox="986 618 1091 663">11</td> <td data-bbox="1091 618 1235 663">2.50</td> <td data-bbox="1235 618 1385 663">2.50</td> </tr> <tr> <td data-bbox="986 663 1091 707">33</td> <td data-bbox="1091 663 1235 707">3.50</td> <td data-bbox="1235 663 1385 707">2.80</td> </tr> <tr> <td data-bbox="986 707 1091 748">132</td> <td data-bbox="1091 707 1235 748">3.7</td> <td data-bbox="1235 707 1385 748">3.80</td> </tr> </tbody> </table>	Voltage Level (kV)	RoW (from the either side of the outer conductor)	Safety clearance from the line unscreened conductor	11	2.50	2.50	33	3.50	2.80	132	3.7	3.80
Voltage Level (kV)	RoW (from the either side of the outer conductor)	Safety clearance from the line unscreened conductor												
11	2.50	2.50												
33	3.50	2.80												
132	3.7	3.80												
<p>Acquisition and Requisition of Immovable Property Act, 2017</p>	<p>Land acquisition and requisition in Bangladesh is governed by a) the Acquisition and Requisition of Immovable Property Act, 2017 (henceforth, the 2017 Act). The 2017 Act provides certain safeguards for the owners and has provision for payment of “fair value” for the property acquired.</p> <p><u>Chapter-2: Acquisition</u></p> <ul style="list-style-type: none"> The Deputy Commissioner (DC) in all cases, determines the “market value” of acquired assets on the date of notice of acquisition (notice under Section 9 of the 2017 Act). The assessment of this market value is done considering the average price of immovable properties of the same class, with similar facilities and within the vicinity of the “to be” permanently acquired land and assets. The DC then adds 200% and 300% premium of the assessed value for cash compensation under law (CCL) of the land and assets including house for government and non-governmental acquisitions respectively. For any other losses as specified above, i.e. from (b) to I³, the DC adds 100% premium of the assessed value to pay as compensation. If land acquired has standing crops cultivated by tenant (bargadar) under a legally constituted written agreement, the law requires that part of the compensation money be paid in cash to the tenants as per the agreement. If there is a dispute regarding the amount of compensation, 	<p>The project mostly requires land requisition for which clauses described in Chapter-3 are applicable for DESCO. In the case of land acquisition for tower footings (if any), Chapter-2 will be applicable. DESCO must comply with these clauses for either or both acquisition or/and requisition.</p>												

³ (b) loss of crops or trees; (c) loss of affected immovable property separated from existing immovable property; (d) loss of other immovable property or movable property or income; (e) transfer cost of affected residential and commercial properties.

Policy/Act/Rules	Compliance Requirements	Applicability
	<p>there is an option for arbitration and the procedures for such is in place.</p> <p><u>Chapter-3: Requisition</u></p> <ul style="list-style-type: none"> • When any property is required temporarily for a public purpose or in the public interest, the Deputy Commissioner can make a requisition of the property. • The Deputy Commissioner may take possession of the requisitioned property and use it for the purpose for which it was requisitioned. • The amount of compensation payable for the requisition of any property shall consist of: <ul style="list-style-type: none"> ○ A recurring payment, in respect of the period of requisition, of a sum equal to the rent which would have been payable for the use and occupation of the property ○ Such sum as may be found necessary to compensate the persons interested for all or any of the following matters, namely: <ul style="list-style-type: none"> ✓ Expenses on account of vacating the requisitioned property; ✓ Expenses on account of re-occupying the property upon release from requisitioned; and ✓ Damages, other than normal wear and tear, caused to the property during the period of requisition, including the expenses that may have to be incurred for restoring the property to the condition in which it was at the time of requisition. • If the persons entitled to compensation do not consent to receive 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 of the compensation for the requisitioned property without any prejudice to the claim of the parties to be determined by the Arbitrator. • Where any requisitioned property is released from requisition, the Deputy Commissioner shall restore it to the person from whom the property was requisitioned 	

Policy/Act/Rules	Compliance Requirements	Applicability
	<p>or to his successor-in-interest or to such other person as may appear to the Deputy Commissioner to be entitled to such restoration.</p>	
<p>Wildlife (Conservation and Security) Act, 2012</p>	<p>This Act provides for the conservation and safety of biodiversity, forest and wildlife of the country by repealing the previous laws i.e., Wildlife (Preservation) Act of 1973. The Department of Forest (BFD) has the primary responsibility for implementing this Act. The key features of this Act are:</p> <ul style="list-style-type: none"> • Prohibition made in relation to wild animals and plants that no person can hunt any wild animal without a license or willfully pick, uproot, destroy or collect any plant; • Determination of vulnerable, endangered and critically endangered species of wild animals and plants; • Declaration of sanctuary for the conservation of forest and habitat of wildlife and prohibitions made on such sanctuary; • Requirement of license to cultivate, extract, manufacture, rear, export or import any wild animal or part of its body, meat, trophy, uncured trophy or any plant; and • Restriction on import, export and re-export of wild animals and plants. 	<p>There is a possibility of damage and disruption of wildlife species and their habitats due to the proposed activities for which mitigation measures need to be implemented. Therefore, DESCO must comply with this Act for ensuring wildlife conservation and their security.</p>
<p>Bangladesh Water Act, 2013</p>	<p>The Water Act 2013 is based on the National Water Policy, and is designed for integrated development, management, extraction, distribution, usage, protection and conservation of water resources in Bangladesh.</p> <p>As per this Act, all forms of water (e.g. surface water, ground water, sea water, rainwater 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 individual or organization will be allowed to extract, distribute, use, develop, protect, and conserve water resources, nor they be allowed to build any structure that impedes the natural flow of rivers and creeks.</p>	<p>The proposed transmission and distribution lines will cross rivers, canals and waterbodies, and eventually may obstruct water use and deteriorate the water quality. Therefore, DESCO must comply with this Act as well as following the mitigation measures described in the EIA report during the construction and operation period of the project.</p>
<p>The National Fisheries Policy, 1999 and Protection and Conservation of</p>	<p>The policy broadly aims at fisheries development, regulation of aquaculture, biodiversity conservation and formulation of laws to ban the disposal of any untreated industrial effluents into the water bodies. The</p>	<p>There are several water-bodies in the Project area. Most of these water-bodies are home to many aquatic species. Therefore, the Protection and Conservation of Fish Act, 1950</p>

Policy/Act/Rules	Compliance Requirements	Applicability
Fish Act, 1950 (as amended in February 16, 1995) and Rules, 1985.	act was promulgated for conservation of fish and their protection from indiscriminate fishing, poisoning due to industrial effluent disposal into water, oil spills, etc.	and Rules, 1985 are both applicable for this Project. DESCO shall ensure that the aquatic species of this area are not adversely affected due to the project activities.
Noise Pollution (Control) Rules, 2006	The Noise Pollution Rules, 2006 addresses that the sound levels to be no more than 50dB in Silent Zones ⁴ during daytime (6 am to 9 pm) and 40 dB at night-time (9 pm to 6 am). In residential areas these levels are 55 dB and 45 dB, in mixed area ⁵ 60 dB and 50 dB, in commercial and industrial areas 70 dB and 60 dB and in industrial areas 75 dB and 70 dB for daytime and night-time respectively.	Material transportation, earthworks, piling and vehicle movements will generate noise in and around the construction sites. Most of the land along the RoW of the cables – both underground and overhead – are urban in nature with residential and Silent Zones. Several of the substation sites are very close to residential receptors. DESCO should take these locations into consideration and abide by the Noise Pollution (Control) Rules, 2006 by implementing mitigation measures.
Bangladesh Labor Act, 2006 (as amended through 2018)	Bangladesh's employment law is regulated by the 2006 Labor Act ("Act") amended up to 2018 and the 2015 Labor Rules ("Rules"). The laws and regulations prescribe working hours, weekly vacations, annual leave, medical leave etc. In addition, it also stipulates that, children under 18 years are not allowed to be employed during the project life cycle in hazardous works. Chapters pertaining to occupational health and safety, and compensation due to accidents are entailed below: Health and hygiene - cleanliness of any facility, drinking water supply, ventilation, lighting, dust, etc. Safety - issues regarding safety of building and machinery, precautions in case of fire, fencing of machinery, work on or near machinery in motion, hoist and lifts protection of eyes, explosive and inflammable dust/gas etc. Special provisions related to health, hygiene and safety for hazardous operations Welfare - provisions to be facilitated in the facility regarding first aid appliances, safety record books,	It is applicable because it provides health safety and wellbeing of work force during project life cycle. DESCO shall ensure compliance with the provisions mentioned in this Act with respect to health and safety management, labor recruitment and working conditions.

⁴The area within 100 meters from hospital, academic institutions or places identified/identifiable by the government;

⁵ An area, which is primarily a residential area with either or both commercial and industrial parts in it;

Policy/Act/Rules	Compliance Requirements	Applicability
	washing facilities, canteens, shelters, room for children, etc. Chapters chapters pertaining to labor benefits and entitlements are as follows: <ul style="list-style-type: none"> • Condition of Service and employment • Employment of Adolescent • Maternity Benefits • Working Hours and Leave • Wages and Payment • Workmen’s Compensation for injury by Accidents • Trade Unions and Industrial Relations Regulation of Employment and Safety of Dock Workers 	
Disaster Management Act, 2012	The Act specifies the duties and responsibilities of relevant Ministries/Divisions of the Government and provides for establishment of high-level National Disaster Management Council (NDMC) headed by the Prime Minister and other committees at local levels.	Natural disasters such as earthquake or thunderstorms may pose severe threats to the substations and transmission and distribution lines of this Project. DESCO shall have a contingency plan in case the Project is hit by a disaster during the construction or operational phase.
Fatal Accident Act, 1885	This Act was promulgated to provide compensation to families for loss occasioned by the death of a person caused by actionable wrong. The company will be liable to pay compensation in case of death of any worker/employee or damages in case death has not ensued but such circumstances could have resulted in death.	DESCO shall ensure compliance with the provisions mentioned in this Act.

2.6 ADB’s Safeguard Policy Statement, 2009

ADB's environmental and social safeguards form the cornerstone of its support for 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 key safeguard areas which must be addressed are (i) environmental; (ii) involuntary resettlement; and (iii) indigenous peoples.

The environmental objectives of the SPS are to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process.” The objectives also include helping borrowers strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB adopts a set of specific environment and social safeguard requirements that borrowers or clients are required to meet in addressing environmental and social impacts and risks associated with a specific project. ADB’s environmental safeguards emphasize development and implementation of a comprehensive EMP. Key elements of EMPs are mitigation measures, monitoring programs, budgets, and institutional arrangements for implementation. In addition, the environmental assessment process emphasizes meaningful consultation, information disclosure, and consideration of alternatives.

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 ADB-financed and/or ADB-administered sovereign and non-sovereign projects, and their components, regardless of the source of financing.

ADB's Environmental Safeguard Requirements

ADB's Safeguard Policy Statement (2009) defines the requirements to be followed with regards to project screening and classification, information disclosure, consultation and participation, due diligence, monitoring and reporting, local grievance redress mechanisms, and ADB's Accountability Mechanism.

Project screening and classification: ADB's Safeguard Policy Statement (2009) requires screening as early as possible to (i) determine the significance of adverse impacts; and (ii) identify the level of assessment and institutional resources required; and (iii) determine disclosure requirements. A project's category is determined by its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts.

Category of the project: Table 2.2 presents ADB's system of Project Categorization. Accordingly, this project has been categorized B as no significant irreversible, diverse or unprecedented adverse environmental impacts are anticipated. The projected environmental impacts are site-specific and mostly will occur during the construction phase. They can be readily mitigated through the implementation of an Environmental Management Plan following national requirements and good international industry practice.

Information disclosure: ADB's Safeguard Policy Statement (2009) requires information about environmental safeguard issues to be made available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and other stakeholders, including the general public, so they can provide meaningful inputs into project design and implementation. For illiterate people, suitable communication methods will be used. During project implementation DESCO will need to submit the following for posting on ADB's website: (i) final and updated EIA (IEE) and corrective action plans upon receipt by ADB; and (ii) environment monitoring reports submitted by DESCO during project implementation upon receipt by ADB.

Consultation and participation: ADB's Safeguard Policy Statement (2009) requires communities, groups, or people affected by proposed projects, and civil society to be engaged by DESCO through information disclosure, consultation, and informed participation in a manner commensurate with the risks to and impacts on affected communities. Meaningful consultation processes are defined as those that are, (i) beginning early in the project preparation stage and being carried out on an ongoing basis throughout the project cycle; (ii) providing timely disclosure of relevant and adequate information that is accessible to affected people; (iii) being free of intimidation and coercion; (iv) being gender inclusive and responsive; and (v) enabling the incorporation of all relevant views of affected people and other stakeholders in decision making. The consultation process and its results are to be documented and reflected in the EIA (IEE) report.

Monitoring and reporting: ADB's Safeguard Policy Statement (2009) requires that DESCO comply with national laws and regulations and implements the EMP as provided in the legal agreements, submitting periodic environment monitoring reports to ADB on their implementation performance. Given the Project is category B for environment, DESCO is required to (i) establish and maintain procedures to monitor EMP implementation and progress toward intended outcomes; (ii) document and disclose environmental monitoring results, identifying necessary corrective actions, in periodic environmental monitoring reports; (iv) follow up on these corrective actions to ensure progress toward the desired outcomes; and (v) submit the periodic environmental monitoring reports as agreed with ADB. In this case semi-annual environmental safeguards monitoring reports are required

to be submitted up until the completion of construction reverting to annual throughout the operation period until project closure. ADB will also monitor projects on an ongoing basis until a project completion report is issued.

Local grievance redress mechanisms and ADB's Accountability Mechanism: ADB's Safeguard Policy Statement (2009) requires that DESCO set up and maintain a GRM to receive and facilitate resolution of affected peoples' concerns and grievances about their environmental performance at project level. It should address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people. Affected people can also take complaints to ADB's Accountability Mechanism as a last resort, although they should approach the local GRM and BRM in the first instance; but the GRM should not impede access to the country's judicial or administrative remedies.

Environmental guidelines: The project will follow the more stringent standards of national and international good practices related to environment, health and safety including those set out in the IFC Environment, Health and Safety (EHS) General Guidelines 30 (30 April 2007). Table 2.4 presents national and World Health Organization standards for noise and air quality referred to by these guidelines. The IFC EHS Guidelines for Electric Power Transmission and Distribution (30 April 2007) also need to be considered while designing the substations and transmission and distribution lines, and in undertaking the environmental assessment. These guidelines require consideration of terrestrial and aquatic habitat alteration, electric and magnetic fields, hazardous materials, occupational health and safety and community health and safety. The project is required to comply with these guidelines regarding assessment of potential impacts and management measures, performance indicators and monitoring guidelines. As a project proponent, DESCO shall follow the IFC EHS Guidelines for this project and shall also ensure that all appointed contractors and their subcontractors follow these guidelines.

ADB's prohibited investment activities list will also apply. Thus, any use of CFCs, PCBs, and asbestos containing materials will be prohibited. In relation to child labor, considering capacity for supervision, no under 18s will be permitted to work on the construction site or in operational areas due to the hazardous nature of work involved.

Table 2.2: ADB's Environmental Safeguards Categorization and Requirements

Category	Definition	Assessment Requirement
A	Likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, and may affect an area larger than the sites or facilities subject to physical works.	Environmental Impact Assessment (EIA)
B	Likely to have adverse environmental impacts that are less adverse than those of Category A. Impacts are site-specific, few if any of them irreversible, and in most cases mitigation measures can be designed more readily than Category A.	Initial Environmental Examination (IEE)
C	Likely to have minimal or no adverse environmental impacts.	No environmental assessment is required but the environmental implications of the project will be reviewed.
FI	Project involves investment of ADB funds to or through a Financial Intermediary (FI).	FIs will be required to establish an Environmental and Social

Category	Definition	Assessment Requirement
		Management System (ESMS) commensurate with the nature and risks of the FI's likely future portfolio to be maintained as part of the FI's overall management system.

Source: ADB. *Safeguard Policy Statement 2009*, p. 19. <http://www.adb.org/sites/default/files/institutional-document/32056/safeguard-policy-statement-june2009.pdf>

2.7 Compliance with DESCO Health Environment and Safety Requirements

DESCO is committed to managing its operations in a safe, efficient and environmentally responsible manner. It does not have a policy or requirements for compliance related to environment, but it does have its own policy and requirements for compliance relating to health and safety issues for its operations. DESCO's Health and Safety Program (2018) includes manuals, guidelines, procedures and plans for health and safety management. These are important tools indicating their commitment. It has ISO 45001 certification for health and safety with several substations certified. However, DESCO has no environment or social safeguards staff or unit to support implementation of this health and safety program or ensure DESCO engineers comply with national laws and regulations. Engineers are usually responsible for environment, health and safety requirements. It is the usual practice to appoint consultants to obtain environmental clearance and monitor project implementation, but this means although DESCO has undertaken several ADB projects, no in-house capacity has been developed or retained.

2.8 Comparison of Environmental Safeguard Principles between ADB and Bangladesh

Table 2.3 presents a summary comparing the environmental safeguard principles/requirements of ADB and the government.

Table 2.3: Comparison of Environmental Safeguard Principles

SPS 2009			Government	Gaps (if any)
No.	Principles	Delivery Process		
1	Use of screening process to determine the appropriate environmental assessment	<p>Uses sector-specific rapid environmental assessment checklist for screening and assigns categories based on potential impacts:</p> <ul style="list-style-type: none"> A- EIA required (irreversible, diverse or unprecedented adverse environmental impacts) B - IEE required C - no environmental assessment required but a review of environmental implications FI - ESMS required 	ECA ₁ 1995 and ECR, 2023 set screening criteria to classify industries/projects based on potential environmental impacts as follows: Green (pollution-free), Yellow, Orange and Red (environmental impacts). The screening criteria are based on project or industry type and do not consider the scale and location. The category determines the level of environmental assessment.	No major gaps, this EIA for Red category project under ECR, 2023 is equivalent to an IEE for ADB category B project

SPS 2009			Government	Gaps (if any)
No.	Principles	Delivery Process		
2	Conduct an environmental assessment	<ul style="list-style-type: none"> EIA and IEE - Identify potential impacts on physical, biological, physical cultural resources, and socioeconomic aspects in the context of the project's area of influence Assess potential transboundary and global impacts, including climate change 	Requirement for environmental assessment based on industry/project category. For Red category both IEE and EIA are required.	No major gaps, this EIA has been prepared to meet national and ADB requirements
3	Examine alternatives	<ul style="list-style-type: none"> For Category A projects analyze alternatives to the project's location, design, and technology Document rationale for selecting the project location, design, and technology Consider "no project" alternative 	Regulations (i.e., ECA ₁ 1995 and ECR, 2023) do not require specifically the identification and analysis of alternatives	No major gaps, not required by law or for ADB category B project but discussion on analysis of alternatives has been included.
4	Environmental planning and management	<ul style="list-style-type: none"> Follow the mitigation hierarchy – avoid, minimise, mitigate, offset Key considerations include no significant harm to third parties, polluter pays principle, the precautionary approach and adaptive management. EMP to include mitigation, monitoring, performance indicators, emergency procedures, capacity development, schedule, budget and implementation arrangements. 	EMP and procedures for monitoring included in the IEE and EIA (i.e., for Red category projects)	No major gaps, the EMP has been prepared to meet national and ADB requirements
5	Carry out meaningful consultation and GRM	<ul style="list-style-type: none"> Starts early and continues during implementation Undertaken in an atmosphere free of intimidation Gender inclusive and responsive Tailored to the needs of vulnerable groups Allows for the incorporation of all relevant views of stakeholders Establish a grievance redress mechanism 	<ul style="list-style-type: none"> Public consultation is required as per ECR 2023 Grievance redress mechanism is not mentioned in ECA₁ 1995 and ECR 2023 EIA format required by DoE includes stakeholders' consultation 	No major gaps for consultation, but no requirement for GRM. However, GRM is established per the ADB requirement

SPS 2009			Government	Gaps (if any)
No.	Principles	Delivery Process		
6	Timely disclosure of draft environmental assessment (including the EMP)	<ul style="list-style-type: none"> • Draft IEE prior to appraisal • Final or updated IEE upon receipt 	No requirement for public disclosure of environmental reports but DoE posts the Minutes of the Meeting on the application for environmental clearance certificate to its website, http://www.doe-bd.org/minutes.php	No requirement for public disclosure of environmental reports, but the EIA and environmental monitoring reports will be locally disclosed per the ADB requirement
7	Implement EMP and monitor effectiveness	<ul style="list-style-type: none"> • Monitor and document progress on EMP implementation. • Corrective action if non-compliance is identified. • Disclose environmental monitoring report submitted by borrowers upon receipt 	Environmental clearance is subject to annual renewal based on compliance of the conditions set by DoE	No requirement for public disclosure of environmental reports, but the environmental monitoring reports will be locally disclosed per the ADB requirement
8	Biodiversity	<ul style="list-style-type: none"> • Avoid areas of critical habitats • Procedures for implementing projects in natural habitats, critical habitats, and Legally Protected Areas • Use of precautionary approach to the use, development and management of renewable natural resources 	ECA ₁ 1995 and ECR 2023 identifies ecologically critical areas and the rules to protect them	No major gaps, biodiversity impacts are considered in the EIA per national and ADB requirements
9	Pollution prevention and control	<ul style="list-style-type: none"> • Use pollution prevention and control technologies and practices consistent with international good practices • Refers to IFC/World Bank's Environmental Health and Safety (EHS) General Guidelines 2007 (or any update) • If national regulations differ, more stringent will be followed • If less stringent levels are appropriate in view of specific 	<ul style="list-style-type: none"> • Effluent standards, emission standards included in ECA₁ 1995 and ECR 2023 • Ambient air quality in Air Pollution Control Rules (APCR) 2022 • Ambient noise levels included in Noise Pollution Control Rules 2006 	No major gaps but the most stringent levels will be applied to the project, pollution impacts are considered in the EIA per national and ADB requirements

SPS 2009			Government	Gaps (if any)
No.	Principles	Delivery Process		
		project circumstances, provide full and detailed justification		
10	Health and safety	Provide workers with safe and healthy working conditions Refers to IFC/WB EHS General Guidelines 2007 (or any update)	Occupational health and safety standards included in the Bangladesh Labor Law 2006 amended to 2018, and Bangladesh Labor Rules 2015.	No major gaps, health and safety risks are considered in the EIA per national and ADB requirements
11	Physical Cultural Resources (PCR)	<ul style="list-style-type: none"> • Conserve Physical Cultural Resources (PCR) and avoid destroying or damaging them • Use of field-based surveys and experts in the assessment • Consult affected communities on PCR findings • Use chance find procedures for guidance 	Preservation and protection of cultural resources are within the Antiquities Act 1968.	No major gaps, PCR impacts are considered in the EIA per national and ADB requirements

ADB = Asian Development Bank, DoE = Department of Environment, EARF = Environmental Assessment and Review Framework, ECA₁ = Environment Conservation Act, ECR = Environment Conservation Rules, EHS = Environmental Health and Safety, EIA = Environmental Impact Assessment, EMP = Environmental Management Plan, ESMS = Environmental and Social Management System, FI = Financial Intermediary, IEE = Initial Environmental Examination, NGO = Non-Governmental Organization, PCR = Physical Cultural Resources, ToR = Terms of Reference, WB = World Bank.

Table 2.4: An Overview Table of National and International of Noise Levels and Air Quality

Sl. No.	Zones	The Noise Pollution (Control) Rules 2006. (dBA)		WHO Guideline in IFC, 2008 (dBA) as 1 hr LAeq	
		Day	Night	Day	Night
1	Silent zone	50	40	-	-
2	Residential zone	55	45	55	45
3	Mixed zone (mainly residential area, simultaneously used for commercial and industrial purposes)	60	50	-	-
4	Commercial zone	70	60	70	70
5	Industrial zone	75	70	70	70

Air Quality		
Criteria Pollutants	PM ₁₀	PM _{2.5}
The Air Pollution (Control) Rules 2022	50 µg/m ³ (1 year) 150 µg/m ³ (24-h)	35 µg/m ³ (1 year) 65 µg/m ³ (24-h)
WHO Air Quality Guidelines in IFC, 2008	20 µg/m ³ (1-year) 50 µg/m ³ (24-h)	10 µg/m ³ (1-year) 25 µg/m ³ (24-h)
WHO Air Quality Guidelines (Global Update 2021)	15 µg/m³ (1-year) 45 µg/m³ (24-h)	5 µg/m³ (1-year) 15 µg/m³ (24-h)
Bold: highlights the most stringent requirement applicable to the project		

2.9 International and Regional Treaties, Agreements and Conventions

Bangladesh has signed and ratified most of the major international treaties, conventions and agreements. The Constitution of Bangladesh explicitly mandates to protect and improve the environment and to preserve and safeguard the natural resources, biodiversity, wetlands, forests and wildlife for the present and future citizens (Article 18A). A screening was carried out of these treaties regarding their applicability to this project. Key international/regional conventions and declarations agreements that Bangladesh is signatory to and relevant for the project are provided in **Table 2.5**. The interventions proposed under the project shall be implemented in compliance with the requirements of these applicable international regional conventions and declarations to which Bangladesh is a party.

Table 2.5: Relevant Environment Related International Convention and Treaties

International Convention and Treaties	Status and remarks
International Labour Organization (ILO) conventions and protocol	ILO conventions and protocol conventions and protocol ratified by Bangladesh related to the core labor standards.
Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979 (Amended 1988)	This provides a framework for agreements between countries important to the migration of species that are threatened
Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973 (Popularly known as CITES)	This provides a framework for addressing over harvesting and exploitation patterns which threaten plant and animal species. Under this convention governments agree to prohibit or regulate trade in species which are threatened by unsustainable use patterns
Protocol to the United Nations Framework Convention on Climate Change (Kyoto, 1992)	Applicable to achieve stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level low enough to prevent dangerous anthropogenic interference with the climate system, SF ₆ is a GHG used in gas insulated substations and switchgear.
United Nations Framework Convention on Climate Change (Rio De Janeiro, 1992)	Applicable as the proposed project might emissions GHG from project components from all GIS substations.
The Vienna Convention for the Protection of the Ozone Layer, 1985	The Vienna Convention, concluded in 1985, is a framework agreement in which States agree to

International Convention and Treaties	Status and remarks
	cooperate in relevant research and scientific assessments of the ozone problem, to exchange information, and to adopt "appropriate measures" to prevent activities that harm the ozone layer.
Basel Convention (1993)	Applicable; Bangladesh is a signatory to Basel Convention but it did not sign the Basel Ban Amendment that deals particularly with wastes and hazardous wastes management and its transboundary movement.
Stockholm Convention of Persistent Organic Pollutants (POPs) (1972)	This ensures the environmentally sound management and the disposal of POPs including PCBs. Bangladesh signed this convention on 23 May 2001. The convention gives governments until 2025 to phase out "in-place equipment" such as electrical transformers containing PCBs, as long as the equipment is maintained in a way that prevents leaks. It grants them another three years to destroy the recovered PCBs. The recovered PCBs must be treated and eliminated by 2028.

3. EIA Approach and Methodology

3.1 Approach

Environment Impact Assessment (EIA) is estimating potential environmental impact of a proposed project, done within a very short time based on preliminary information at hand or information, which can be readily acquired through environmental reconnaissance. The EIA report has been prepared based on the project activities supplied by DESCO as presented in Chapter 4. Environmental and social data from different sources (BBS, DoE, Department of Meteorology, and other EIA reports) of the proposed project area were collected to prepare an environmental baseline profile as set out in Chapter 5. The ADB TA consultants and CEGIS Consultant's multi-disciplinary EIA team of experts undertook exploratory and reconnaissance site visits to visualize the condition of the project site and its surroundings and to identify considerations for the assessment. The EIA study has been done based on both primary and secondary data. Primarily environmental and social data was collected through field work and a questionnaire. A composite and interdisciplinary approach has been developed for this EIA study based on the guidelines of DoE. The approach to impact identification includes the application of expert judgment, systematic and sequential approaches, spatial analysis through the application of remote sensing and GIS, and local community participation. The identification of interactions between the project activities and the important environmental and social components was made based on a checklist. This checklist was prepared following the DoE guidelines for selected industries (DoE, 1997), Environmental Guidelines for selected industrial and water development projects (ADB, 1990), ADB's REA Checklist, and the ADB TA consultants and CEGIS Consultant's experience with similar projects. Public consultation was also undertaken to obtain the people's view, as suggested in the EIA guidelines. The project components, environmental baseline, possible environmental impacts, mitigation measures and environmental management plan are presented in this report following ADB and DoE's guidelines. The EIA study has specifically followed the steps described below.

3.2 Methodology

The Environmental Impact Assessment study of the proposed project has followed a number of steps and the process shown in Figure 3.1. The activities undertaken at each of the steps of the EIA process are described in the following sections.



Figure 3.1: Steps of Environmental Impact Assessment

3.2.1 Step 1: Project Design and Description

Environmental impacts are triggered by physical interventions in natural and human systems for which it is essential to understand the proposed interventions while conducting EIA studies. The multi-disciplinary EIA team members attained a thorough understanding on the proposed interventions and their possible environmental consequences by collecting detailed information about the project from DESCO. This information helped in designing baseline data collection programs.

The following issues have been included in the brief description of the project:

- Location of the project and its accessibility;
- Rationale of the project;
- Physical features and project activities;
- Use of raw materials, their quantities, characteristics, arrangements for transport to site, and storage facilities;
- List of main equipment and machinery, built-in pollution control equipment; and
- Description of the detailed construction process, operation and maintenance work.

3.2.2 Step 2: Environmental and Social Baseline

The study team conducted the baseline survey with the help of keyhole marked up zipped (KMZ) files and Google Earth maps of the proposed area to determine the exact routes and locations of various project components. At this stage only the substation locations and indicative routes for the 132 kV and 33 kV underground cables are available, so further baseline will need to be collected for the

overhead lines during project implementation and the IEE updated. The EIA team has collected primary baseline data, both environmental and social, from the field during the field investigations. Secondary data have also been collected from government and non-government (with proper credentials) organizations as well as from the data repository already available in the organization.

a. Physical Environment

The professional observations of the multi-disciplinary team members backed by feedback from the local community during field visits were the main tools for determining the physical environment of the area. The determination of the physical environmental conditions was backed by secondary data, high resolution recent satellite images and field observation. Analysis of the spatial data has been carried out with standardized tools and the result is presented with the GIS interface. Primary data has been collected by the CEGIS EIA team for water quality and noise levels with secondary CAMS data being obtained for air quality. Since the monitoring periods for noise were not recorded the results are not directly comparable to international noise guidelines (WHO) and these and other primary baseline data collection will need to be recollected following robust monitoring protocols pre-construction.

The meteorological data such as rainfall, evapo-transpiration, temperature, sunshine hours, humidity, and wind speed and wind direction have been collected from different Bangladesh Meteorological Department (BMD) stations which are located near the proposed project sites. The geological and seismic issues have been investigated using secondary information and field observations. The general geological features and the seismicity of the project and its surrounding areas have been collected from available secondary literature and the Geological Survey of Bangladesh. The lithology of the project area has been collected from the National Water Resources Database. Information on water resources have been collected from secondary sources. Data on specific fields of interest on special hydrological events such as drainage congestion, water logging, erosion – sedimentation etc. have been collected. The baseline for land resources has been developed by considering the criteria of Agro-Ecological Zone (AEZ), land type with net cultivable area (NCA), land use and soil texture. The AEZ of the proposed project area has been identified using information from secondary sources {Bangladesh Agriculture Research Council (BARC), 2012}. Information on land type, soil texture, and soil nutrient status has also been collected from different publications of Soil Resource and Development Institute (SRDI). The secondary data on these parameters have been verified at field level through physical observations as well as through consultation with the local people during field visits.

b. Biological Environment

Agricultural Resources: Data was collected on agricultural resources include existing cropping patterns, crop variety, crop calendar, crop yield, crop damage and agricultural input. Agriculture data have been collected from primary sources through extensive field survey by developing questionnaires and in consultation with local people and relevant agricultural officials. Data on agricultural resources have also been collected from secondary sources.

Ecological Resources: Ecological data have been collected from primary and secondary sources. The primary sources were Line Transect Walks (LTWs) and Key Informant Interviews (KIIs). In the winter of 2022/23 a Bird Survey was undertaken at the proposed Tongi Substation site to establish whether its wetland character is of particular value for birds. Secondary sources of information were the Forest Department, International Union for Conservation of Nature (IUCN), Bangladesh Asiatic Society's Encyclopedia of Flora and Fauna of Bangladesh, and other relevant sources through literature review. In addition, the Bio-Ecological Zone (BEZ) classification of Bangladesh by IUCN-Bangladesh (2002)

has been used for the bio-ecological zoning of the study area, and an IBAT proximity report has been run.

Fishery Resources: Fisheries data have been collected for this EIA study by considering the seasonal variance of dry and wet seasons. Prior to data collection, a checklist/questionnaire was developed. The checklist included Fish Habitat, Fish Production, Fish species diversity of the study area. The data have been collected by informal discussion with local communities, specific attention was paid to the fishing community in the larger waterbodies that are adjacent to the substation sites. Fisheries Resources Survey System (FRSS) of Department of Fisheries was the main source of secondary data.

c. Socio Economic Resources

To establish a baseline for this EIA study, socioeconomic data have been collected from different sources which can be grouped into two categories:

Primary sources: Data have been collected from the project area and concerned unions and municipalities of the districts through rapid rural appraisal (RRA) tools such as mapping/diagramming/ranking, consultation meetings, and informal interviews. Due to the COVID pandemic situation some early consultation meetings and informal interviews were conducted in limited scale maintaining safe social distance.

Secondary sources: To prepare the baseline situation of the study area, information on some important socio-economic parameters was collected from the reports of the Bangladesh Bureau of Statistics (BBS), 2011 and estimated for 2019.

Technique of data collection: Different techniques have been used to gather relevant information on the existing socio-economic condition of the study area. Quantitative and qualitative data have been collected from secondary and primary sources. Quantitative data have been collected through literature review, survey, group discussions (GDs) and key informant interviews (KIIs), informal interviews and consultation meetings (Table 3.1).

Table 3.1: Variables and Associated Data Collection Techniques

Variables	Techniques
Demographic and household information	Literature review
Quality of life	RRA, survey
Safety net and poverty reduction measures	RRA, informal interview
People's perception	Consultation meetings, RRA

The data collected from consultation meetings, RRAs and informal interviews were analyzed using appropriate statistical tools and instruments. The sum and percentage of total values were used to specify the percentage of households containing different values on different variables.

3.2.3 Step 3: Scoping

A scoping process was followed for identifying Important Environmental and Social Components (IESCs), which are likely to be impacted by the transmission and distribution lines and substations. This was done in two stages. Individual professional EIA team members made a preliminary list of the components pertaining to their disciplines, which could be impacted by the project. The second stage included affected person-scoping sessions where stakeholder perceptions were obtained about the environmental and social components, which could be impacted by the project interventions. Professional judgment of the EIA team members as well as the stakeholder opinions obtained in the scoping sessions were considered in selecting the IESCs.

3.2.4 Step 4: Bounding

The geographical boundary of the "General Impact Area-"GIA" and the potential "Direct Impact Area - DIA" were delineated as a requirement of the EIA study. The DIA is the physical location of the proposed transmission and distribution lines and the substations of the project while the "GIA" covers the entire geographic extent of the environmental and socioeconomic impacts resulting from the implementation of the proposed project during construction and during operation and maintenance.

3.2.5 Step 5: Major Field Investigation

Further data on the IESCs were collected through RRA, Participatory Rural Appraisal (PRA), and FGD using checklists for water resources, agriculture, ecosystems and socio-economic components. Consultation with the local community was carried out in each case to obtain affected people's participation. The multidisciplinary EIA team members also made professional observations during the field visits. The historical status of the IESCs and the possible condition of the same against the proposed interventions was considered during this step.

3.2.6 Step 6: Environment and Social Impact Assessment

Once the potential impacts are identified, each potential impact was described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent).

3.2.7 Step 7: Impact Quantification and Evaluation

The potential impacts were qualitatively assessed based on the above characteristics to determine whether they are potentially significant or not. The significance of potential impacts was assessed using an assessment methodology that considers impact magnitude and sensitivity of receptors. The potential implications of the project have been categorized as major, moderate, minor or minimal based on consideration of parameters such as i) duration of the effect; ii) spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria. The detailed method of impact assessment is presented in Chapter 7.

3.2.8 Step 8: Environmental Management Plan

The environmental management plan (EMP) has been compiled once the impact assessment has been completed and mitigation measures have been identified. During the EMP compilation, institutional arrangements for environmental and social management of the project have been recommended, mitigation and monitoring plans have been formulated, documentation and reporting protocols have been defined, training needs have been assessed and the cost of EMP implementation has been estimated.

3.2.9 Step 9: Preparation of EIA Report

Finally, this EIA Report was prepared, based on the findings of the EIA Study.

4. Description of the Project

4.1 Project Rationale

Bangladesh is striving to be in the rank of middle-income countries; her economy is experiencing a significant progress in various sectors. Consequently, demand for electricity is growing very rapidly. With an aim to fulfill the targets of the Government's "Vision 2041; the government has prioritized the generation of electricity. Meanwhile, initiatives are set in motion to deliver electricity all over the country within this time frame.

In order to strengthen the distribution network, reduce distribution losses and distribute quality power under the coverage area of DESCO new substations and transmission and distribution lines have been proposed. The new substations would be able to receive power from the national grid (PGCB) and distribute the power among the distribution network to fulfil the rapidly growing consumer demand.

The main project components are:

- Construction of eight (8) new substations
- Construction of 80 ckm of new underground transmission and distribution lines, both 132 kV and 33 kV.
- Construction of 250km 11kV and 0.4kV distribution lines to the various end users (approximately 50% underground and 50% overhead lines).

4.2 Type of Project

As mentioned in Chapter 2, this project is classified as "Red" Category (ECR, 2023), which requires an Environmental Impact Assessment (EIA) study. As per the ADB's Safeguard Policy Statement 2009, the project is classified as category B, requiring an IEE with EMP. This document represents the required IEE, but it is referred to as the EIA per national requirements.

4.3 Project Details

In order to meet the load requirement as per the present load forecast up to 2030, it is necessary to install adequate number of 132/33 kV grid substations and 33/11kV substations at suitable locations in the DESCO area. DESCO has thus planned to construct new substations, transmission and distribution lines to meet the load requirements under its distribution network. Major components of the project are- i) construction of four (4) 132/33/11 kV and four (4) 33/11 kV substations ii) installation of approximately 30 ckm of underground 132 kV transmission line and (iii) approximately 300 km of distribution line (33 kV, 11 kV and 0.4kV), of which 150 km is underground and 150 km overhead.

Transmission and distribution lines, both the underground and overhead sections, will follow existing roads as much as possible. Major crossings, such as railroads, major roads and large water courses will be constructed using Hydraulic Directional Drilling (HDD) in most cases with one (1) river bridge crossing. The bundling of infrastructure with existing roads will avoid introducing construction impacts to quieter areas, less disturbed by traffic and noise. HDD will avoid the need for road traffic and railway disruption and, in the case of watercourse crossings, minimize the impact to the waterbodies.

Table 4.1: List of Project Interventions

Sl. No.	Proposed Gas Insulated Substations*
132/33/11 kV Substations	
1.	Airport
2.	Kalshi (Mirpur)
3.	Bashundhara
4.	Tongi
33/11 kV Substations	
5.	Purbachal
6.	Kalachadpur (Baridhara)
7.	Uttara (Rupayan City)
8.	Mirpur Ceramics (Mirpur)
Sl. No.	Transmission and Distribution Lines
1	30 ckm double circuit underground transmission cables (132kV) Fiber optic cables in parallel to underground transmission cables 2no. GIS bay extensions at existing Mirpur Digun substation PGCB
2	50 ckt km (33 kV) underground distribution cables Fiber optic cables in parallel 33 kV underground distribution cables 100 km (11 kV) underground distribution cables 150 km new 11 kV and 0.4 kV (low tension) overhead distribution lines 820 distribution transformers 100 GIS ring main units
* Substations will be automated and be equipped with 2-4 story control buildings, 5kW solar systems, transformers, batteries, internal access roads, surface drains etc.	

4.4 Project Location

The proposed project is located in the distribution network region of DESCO which is under the North Dhaka, Gazipur and Narayanganj Districts. Names of the district along with thanas and unions covered by the proposed substations are given in Table 4.2. Table 4.3 and 4.4 shows the area covered by the indicative routes of the 132 kV lines and 33 kV underground cables under the project interventions with district, thana and union names.

It can be mentioned here that routes of the 11 kV underground cables as well as the 11 kV and 0.4 kV overhead lines are yet to be selected, as the routes will be planned after the completion of substation construction for which the IEE will need to be updated. However, the works will be undertaken within the North Dhaka, Gazipur and Narayanganj Districts (Table 4.5) and so only site-specific assessment will be needed.

Table 4.2: Names of Substations by District, Thana, Union

Sl.No.	Substation Name	District	Thana	Union
1	Kalachadpur (Baridhara)	Dhaka	Gulshan	Ward No-18
2	Bashundhara	Dhaka	Badda	Beraid
3	Mirpur Ceramics (Mirpur)	Dhaka	Pallabi	Ward No-02
4	Kalshi (Mirpur)	Dhaka	Pallabi	Ward No-02

Sl.No.	Substation Name	District	Thana	Union
5	Airport	Dhaka	Biman Bandar	Dakshinkhan (part)
6	Purbachal	Narayanganj	Rupganj	-
7	Uttara (Rupayan City)	Dhaka	Turag	Harirampur (Part)
8	Tongi	Gazipur	Gazipur Sadar	Tongi Pourashava

Source: GIS SpatiSal Analysis, 2020; NWRD, 2012

Table 4.3: Names of 132 kV Underground Transmission Lines by District, Thana, Union

Transmission line route	Tentative Length (Circuit km)	District	Thana	Union
i) Airport Grid (DESCO) to Bashundhara D Block Grid (PGCB)	9	Dhaka	Khilkhet	Ward No-17 (part), Dakshinkhan (part)
			Badda	Ward No-17 (part), Beraid
			Biman Bandar	Dakshinkhan(part)
ii) PGCB Mirpur Digun Grid to Mirpur Kalshi Grid (DESCO)	3.5	Dhaka	Pallabi	Ward No-02, 06
			Turag	Harirampur
iii) PGCB Purbachal Grid to Bashundhara M Block Grid (DESCO)	5.5	Dhaka	Badda	Beraid
		Dhaka	Khilkhet	Dumni
		Narayanganj	Rupganj	Rupganj
iv) PGCB Purbachal Grid to Airport Grid (DESCO)	10	Dhaka	Biman Bandar	Dakshinkhan (part), Ward No-98 (part)
			Khilkhet	Dakshin khan
		Narayanganj	Rupganj	Rupganj
v) PGCB Tongi Old Grid to Tongi Rajanagar Grid (DESCO)	2	Gazipur	Gazipur Sadar	Darail

Table 4.4: Names of 33 kV Underground Distribution Lines by District, Thana, Union

Distribution line route	Tentative Length (Ckt km)	District	Thana	Union
i) Airport Grid to Airport Terminal-3	$2^6 \times 2=4$	Dhaka	Biman Bandar	Dakshinkhan (part), Ward No-98(rest. Area Part)
ii) Airport Grid to Civil Aviation Authority of Bangladesh (CAAB)	$1^7 \times 3=3$	Dhaka	Biman Bandar	Ward No-01(part), Dakshinkhan (part) Ward No-98 (rest. Area Part)
iii) Airport Grid to Nikunja	$2 \times 2.90=5.80$	Dhaka	Biman Bandar	Dakshinkhan (part), Ward No-98(rest. Area Part)
			Khilkhet	Ward No-17 (part), Dakshinkhan (part)

⁶ double circuit

⁷ single circuit

Distribution line route	Tentative Length (Ckt km)	District	Thana	Union
iv) Bashundhara M-Block to Bashundhara I-Extension	2 x 2.35=4.70	Dhaka	Badda	Beraid, Bhatara
v) Bashundhara M-Block to Kalachadpur	2 x 6.30=12.60	Dhaka	Badda	Ward No-17 (part), Beraid, Bhatara
			Gulshan	Ward No-18
vi) Kalshi Grid to Mirpur DOHS-1	1 x 2.20=2.20	Dhaka	Pallabi	Ward No-02
vii) Kalshi Grid to Mirpur DOHS-2	2 x 1.50=3	Dhaka	Turag	Harirampur
viii) Kalshi Grid to Mirpur Ceramics	2 x 1.20=2.40	Dhaka	Pallabi	Ward No-02
			Turag	Harirampur
ix) Purbachal S-2 Grid to Purbachal-3 S/S	2 x 3.5=7	Gazipur	Kaliganj	Nagari
		Narayanganj	Rupganj	Rupganj
x) Tongi Grid to Tongi-27 SS	1 x 2.56=2.56	Gazipur	Gazipur Sadar	Ward No-01,02
xi) Uttara Grid to Rupayan City	1.15 x 2=2.30	Dhaka	Turag	Harirampur
xii) Airport Grid to ADA	1 x 0.15=0.15	Dhaka	Uttara	Ward No-01(part)
Total	=49.71 ⁸			

Source: Feasibility Report, GIS SpatiSal Analysis, 2020; NWRD, 2012

Table 4.5: Breakdown of Overhead Lines

SI	Name of District	Construction	
		0.4 kV LT Line (Quantity in km)	11 kV HT Line (Quantity in km)
1	Dhaka	64	64
2	Gazipur	8	8
3	Narayanganj	3	3
Total		75	75
SI	Type of Conductor	Construction	
		LT Line (Quantity in km)	HT Line (Quantity in km)
1	Covered Conductor	75	75
Total		75	75

⁸ Total is 49.71km, rounded up to 50km

Table 4.6: Type of 132 kV Underground Power Cables

SI	Description	Unit	Quantity
1	132 kV single core 1200mm ² XLPE insulated, aluminum sheathed and MDPE sheathed copper underground cable	ckm	12
2	132 kV single core 800mm ² XLPE insulated, aluminum sheathed and MDPE sheathed copper underground cable	ckm	18
3	Fiber Optic Cable with Accessories	km	30

Table 4.7: Type of 33 kV and 11 kV Underground Power Cables

SI	Description	Unit	Quantity
1	33 kV 3 x l x 500sqmm XPLE copper underground cable	ckm	50
2	11 kV 300sq mm 3-core XPLE copper underground cable	Km	100
3	Fiber Optic Cable with Accessories ⁹	km	60

4.5 Project and Associated Facilities

The construction of the eight (8) new substations and 30 ckm of 132 kV underground cable will be funded by the ADB project, two contract packages (DG1 and DG2) will be awarded for these project facilities following international competitive bidding and ADB procurement rules. The contractor will be required to comply with the EMP of the Project in undertaking these works. However, the 50 ckm of 33 kV underground cable and the 250km of 11 kV and 0.4kV underground cable/overhead line are associated facilities of the project because, although the equipment will be purchased under five goods contracts (DG3-DG5 and GD6-GD7) funded by the ADB project, the installation of the equipment will be undertaken by DESCO with its own resources. For these works, contracts will be locally awarded by DESCO following its own procurement rules. In addition, infilling at Tongi substation will be undertaken by the landowner and so is not included in the project cost. All these associated works have been assessed in the scope of this EIA, the EMP for them will also be followed by the contractors, under the supervision and monitoring of DESCO.

4.6 Existing Facilities

The Project will be supported by several existing facilities. The planned new 132 kV and 33 kV lines will be connected to the operational stations of DESCO and Power Grid Company of Bangladesh (PGCB) as shown in Table 4.8.

Table 4.8: Existing Facilities Required for Project

	Name of Station	Type of Substation (SS)
1	Uttara	Grid 132/33/11 kV
2	Purchabal S-2	Grid SS 132/33kV/11 kV
3	Bashundara D-Block	Grid SS 132/33 kV/11 kV
4	Mirpur (Digun) – operated by PGCB	Grid SS 132/33 kV

⁹ Fiber Optic Cable 50 km for 50 ckm 33 kV underground cable, plus 10 km for SCADA integration of new 8 substations

The construction and installation work of the 132 kV underground cables to connect to these grid substations will be carried out under the ADB project. The works include the construction of two new gas-insulated switchgear 132 kV bay extensions within the existing PGCB substation at Mirpur Digun. These will be located on the south side of the substation. No bay extensions are required at the three other existing substations; equipment upgrades within the control buildings will be undertaken to connect the underground cables to the network, these works will have minimal environmental impact.

As Existing Facilities for the Project, an Environmental Audit of all four Grid Substations was undertaken in March and April 2023, including the development of a Corrective Action Plan (CAP) which has been integrated into the EMP (see Appendices IX (Mitigation Plan) and XV (Audit Report of Existing Facilities)).

No existing facilities (substations) need to be upgraded for the 33 kV, 11 kV and 0.4 kV distribution lines to be connected to the network.

Note: none of the existing facilities are likely to contain PCBs as they were set up after 1980 when PCB production or use in electrical transformers was either stopped or restricted in the electrical transformers manufacturing countries. Existing transformers in the distribution network may contain PCBs although no existing transformers are being replaced under the distribution component.

4.7 Physical Features of the New Substations and Bay Extensions

4.7.1 Introduction

Eight Gas Insulated Switchgear (GIS) type substations and two GIS bay extensions are going to be part of this project. In GIS systems, all the live components are enclosed in a grounded metal enclosure, and then the whole system is housed in a chamber full of gas. GIS substations use sulfur hexafluoride (SF₆) gas as the primary insulator. Though SF₆ is a greenhouse gas, it has many advantages - it is non-toxic, maintains atomic and molecular properties even at high voltages and has high cooling and superior arc quenching properties. In addition, it is safe. SF₆ has superior dielectric properties compared to other gases and thereby provides favorable insulation for the phase to ground moderation. In a substation setup, the gas is contained in a grounded metal enclosure containing the conductors, current and voltage transformers, circuit breaker interrupters, switches, and lightning arrestors.

4.7.2 Advantages and Disadvantages of GIS

GIS has several advantages, as follows:

- the earthed metal enclosure makes for a safe working environment for the attending personnel;
- compartmentalized enclosure of the live parts makes for a very reliable system due to reduced disruption of the insulation system;
- by reducing the distance between active and non-active switchgear parts, less space is required in comparison to the normal Air-Insulated System (AIS);
- low maintenance requirements due to expedient design and protection against external elements;
- under scheduled maintenance, SF₆ neither ages nor depletes. There should be no need to “top up” the SF₆ gas levels throughout the equipment’s lifetime (approximately 40 years);
- quick assembly due to extensive pre-assembly.

The disadvantages are:

- high installation costs compared to AIS type substations;
- procurement and supply of SF₆ gas can be a problem, thereby further increasing the costs;
- maintenance requires highly skilled personnel;
- internal faults tend to be very costly and severe when they occur, these faults often lead to long outage periods; for example, the use of impure gas, as well as presence of dust, can lead to flashovers and explosions.

The substations (indoor) will include switchgear, circuit breakers, transformers, control and protection systems. The key physical features of the substations are given in Table 4.9 and Table 4.10. Substations will be automated and be equipped with 2-4 story control buildings to house the substation, 5kW solar systems, batteries, internal access roads, surface drains etc. Bay extensions (outdoor) will only include 132 kV switchgear, control and protection systems sited within the existing substation.

Table 4.9: Physical Features of the 132/33/11 kV GIS SS

Features	Specification
Type	GIS (Indoor)
Land Ownership	DESCO
Voltage Levels	132/33/11 kV
No. and capacity of transformer (132/33 kV)	3 x 80/120 MVA or 2 x 80/120 MVA
Maximum installed capacity (132/33 kV)	360 MVA or 240 MVA
No. and capacity of transformer (33/11 kV)	3 x 28/35 MVA or 2 x 28/35 MVA
Maximum installed capacity (33/11 kV)	105 or 70 MVA
Insulation Medium Power Circuit Breaker	SF ₆ Gas
Transformer Insulation	Oil Insulated
Control System	Both manual and automation
Communication System	Optical fiber communication
Fault Detector	Relays
Fire Protection System	Auto Fighting Water Spray System
Duration of Project Implementation	Approximately 30 months from contract signing

Source: PD Office, DESCO

Table 4.10: Physical Features of 33/11 kV GIS SS

Features	Specification
Type	GIS (Indoor)
Land Ownership	DESCO
Voltage Levels	33/11 kV
No. and capacity of transformer (33/11 kV)	3 x 28/35 or 2 x 28/35 MVA
Maximum installed capacity (33/11 kV)	105 or 70 MVA
Insulation Medium Power Circuit Breaker	SF ₆ GAS
Transformer	Oil Insulated
Control System	Both manual and automation
Communication System	Optical fiber communication
Fault detector	Relays
Fire Protection System	Auto Fighting Water Spray System
Duration of Project Implementation	Approximately 30 months form the contract signing

Source: PD Office, DESCO

4.8 Brief Site Description of Proposed Substations and Bay Extension Site

The EIA study team visited all of the eight new substation sites jointly with DESCO. A brief description of the proposed sites is given below. (It should be noted that three of the sites, namely Tongi, Purchabal and the Airport site, have been changed since submission and approval of the EIA (March 2022) to DoE with the new sites reflected in this EIA report). In addition, the bay extension site was visited as part of the environmental audit and a brief description of that site is included in Appendix XV (Audit Report of Existing Facilities).

Airport Substation

The Civil Aviation Authority has donated two plots of land to DESCO for the proposed 132/33/11 kV substation. The plots, of a total size of 40 Katha or 0.51 ha¹⁰, lie on either side of the access road to DESCO's existing 11kV substation. Currently the main plot is occupied by an office building of the Civil Aviation Authority. This will be demolished by the Civil Aviation Authority prior to hand-over to DESCO. There is a waterbody behind the land plot, this will not be directly impacted by the substation.

The surrounding neighborhood around the proposed substation site is residential in nature. Apartments lie immediately adjacent to the proposed site. A large number of the residents are employees of the Civil Aviation Authority. There is a school on the other side of the existing substation which renders the site as Silent Zone where stricter noise standards will apply (refer to Table 5.2). Especially piling works will need to be restricted to a 4-hour window and no nighttime work will be possible. The demolition and construction works will need to be undertaken with robust dust and noise mitigation in place.

The existing access road to the site which passes the residential area will be used for construction. During site clearance a total of seventeen (17) trees of common species will need to be cleared, whilst three (3) can be retained. Adopting the 3:1 tree compensation key, a total of fifty-one (51) trees will be planted to compensate for the loss.

¹⁰ 1 Katha=0.01265 ha



Figure 4.1: Proposed Project Location Airport SS

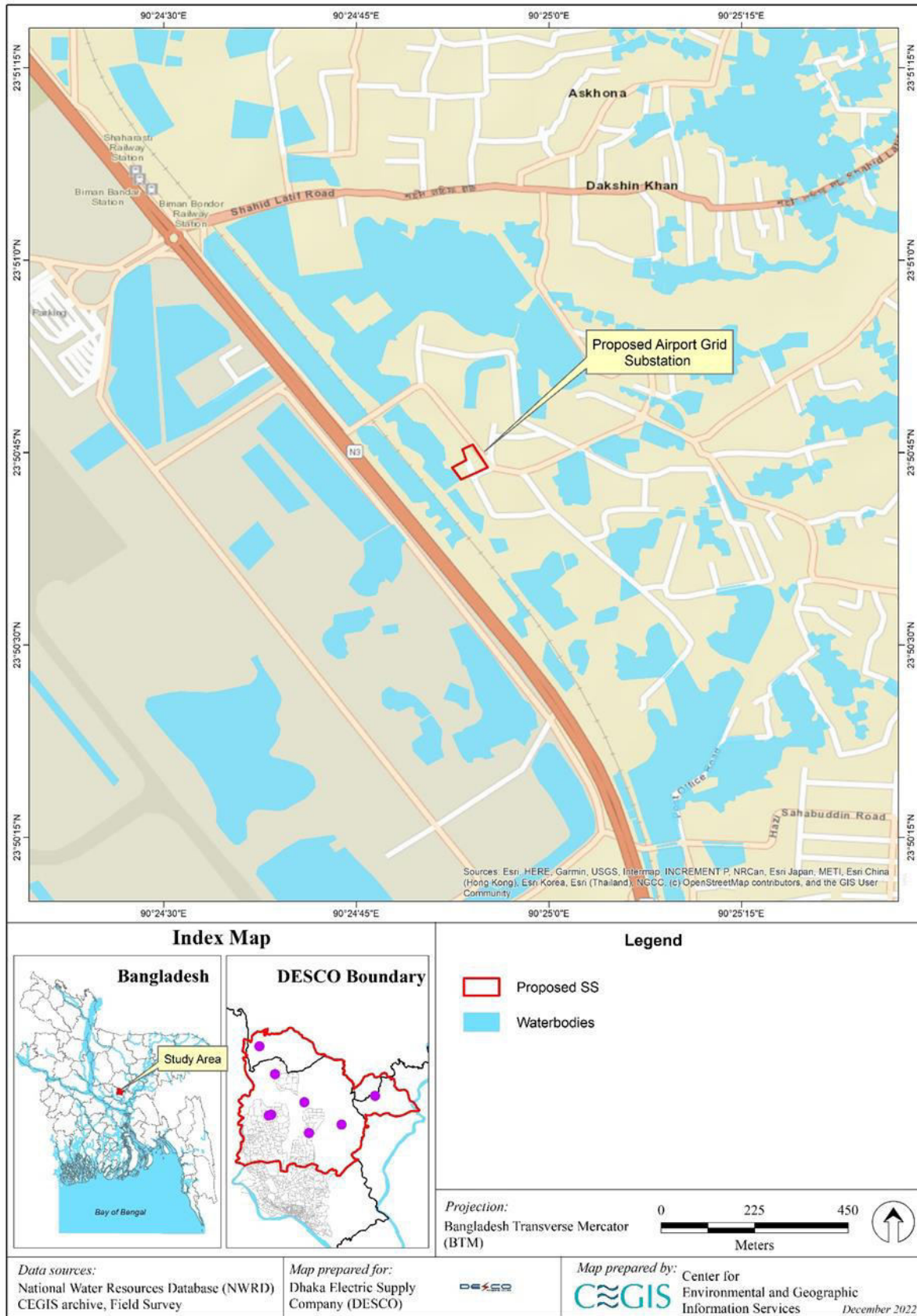


Figure 4.2: Base Map of Proposed Airport Substation

Kalshi (Mirpur) Substation

The site is overgrown with many trees and shrubs and waste has been dumped into it. It is surrounded by a boundary wall constructed by DESCO. The site lies adjacent to a new apartment complex in Kalshi which is currently being developed by National Housing (Figure 4.4) and will mainly accommodate government officials. The surrounding area can be described as mixed residential/light commercial. College buildings of Bangabandhu College are located just over 100m to the south of the proposed site.

The vacant plot of 24.44 Katha or 0.31 ha belongs to DESCO.

The existing access road to the site which passes the residential area will be used for construction. For site clearance twenty-two (22) trees will need to be felled. To compensate for this loss, sixty-six (66) trees will be planted.



Figure 4.3: Proposed Project Location for Kalshi SS

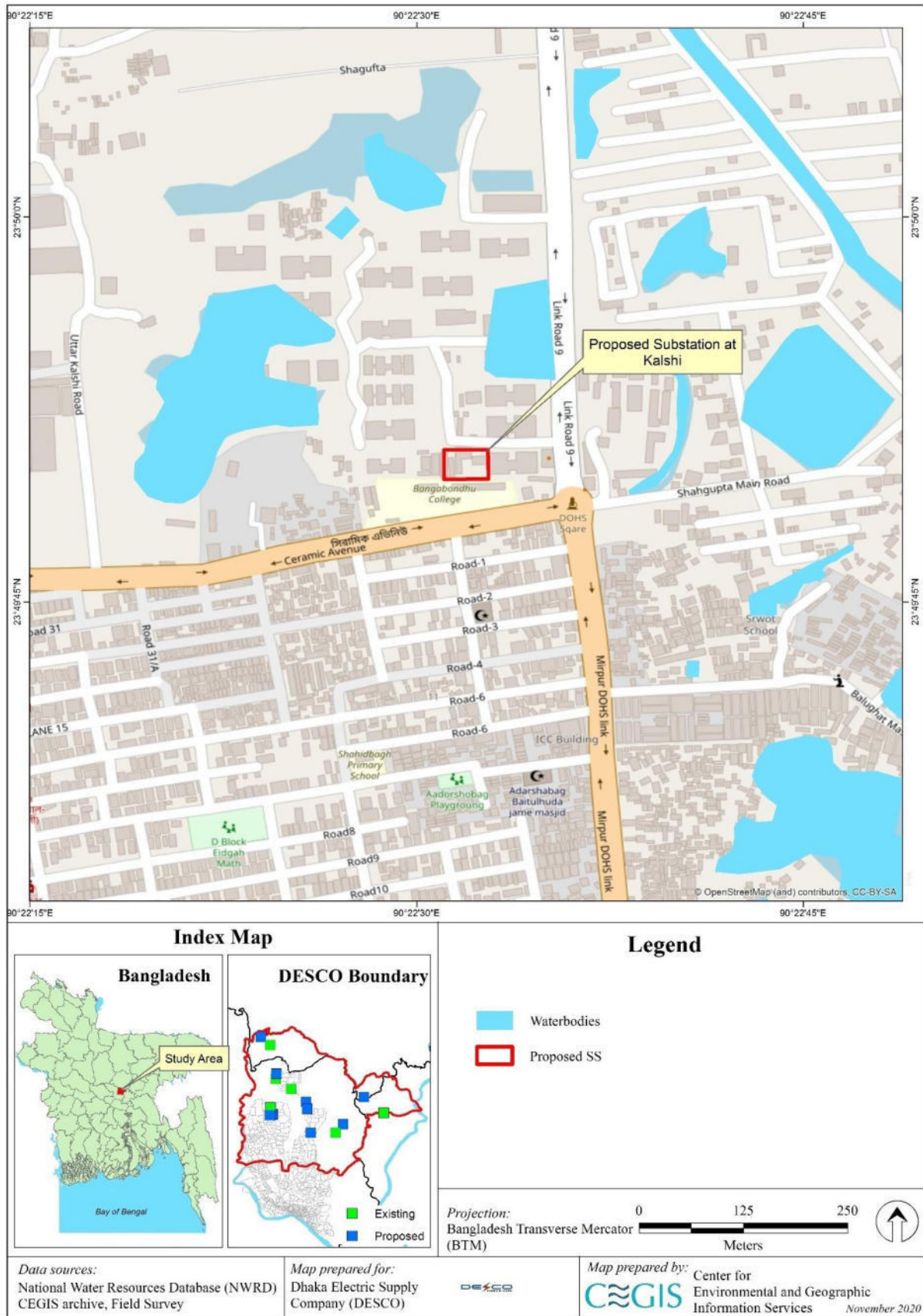


Figure 4.4: Base Map of Proposed Kalshi Substation

Bashundhara Substation

About 47 Katha or 0.60 ha plot (number 2430) at M-block in Bashundhara Residential Area was donated to DESCO for the proposed substation. The area is characterized by ongoing private residential development which started in the 1980s and for which Environmental Clearance was earlier issued to Bashundhara Housing Authority (date unknown). At present, a temporary office building of the Housing Authority is located onsite (Figure 4.6). This building, together with a septic tank and drainage, will be demolished and removed from site by the Housing Authority before substation construction work begins.

A recent site visit showed that a school is being constructed within approximately 70m of the site boundary, consequently the stricter noise standards of a Silent Zone will need to be complied with. In addition, the Contractor will need to develop a Detailed Design for the substation where the transformers will be located as far away as possible from this future school to reduce noise disturbance during operation.

The existing access road to the site which passes through the residential area will be used for construction. Sixteen (16) trees will need to be cut during site clearance. To compensate for this loss, forty-eight (48) trees will be planted.



Figure 4.5: Proposed Project Location for Bashundhara SS

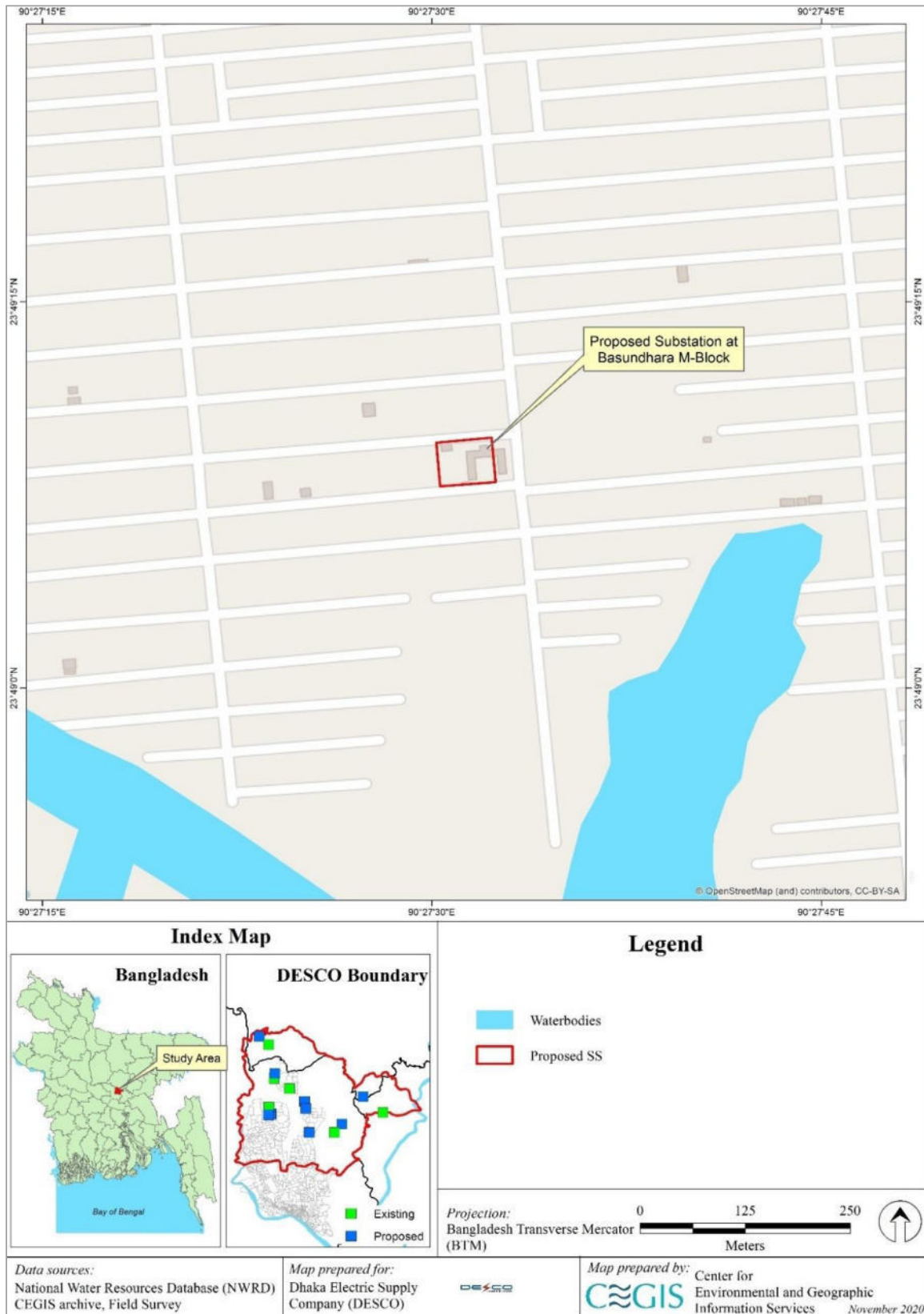


Figure 4.6: Base Map of Proposed Bashudhara Substation

Tongi Substation

Around 40 Katha or 0.51 ha of land at Darail, Ashulia in Tongi West Thana, Gazipur will be needed for the proposed substation. The proposal is to build the substation on the edge of a wetland area, which is defined as agricultural land in the land record (Appendix XVII) thus DOE has confirmed infill will not be contrary to DESCO's environmental clearance conditions. This is a natural waterbody albeit heavily modified. A sizeable 3ha waterbody develops during the rainy season and then reduces in size – naturally, due to evaporation and artificially, due to active drainage by the local residents. The area is used for low-scale agricultural practices in the form of paddy field cultivation and some fish aquaculture. When the water level starts to drop naturally the residents expand their paddy fields. Then they drain the area even further with the help of pumps to enable the harvesting of the fish in shallow water.

Whilst the overall wetland area is proposed for housing development, an Environmental Clearance Certificate (ECC) for this is yet to be obtained. It is understood that a Site Clearance Certificate (SCC) was issued in 2015 based on an IEE, although it is unclear if since 2017 it has been renewed. The site is already handed over to DESCO but an agreement has been reached whereby the developer, Chayakunka 5th Residential Project Authority, will infill the land using imported (pumped) sand on behalf of DESCO for which a contractor is already on board. The nameplate of DESCO marks the edge of the site (Figure 4.8). Since infilling is being undertaken in anticipation of ADB finance it must be ensured that it follows both national and SPS requirements; there must be a valid approval from DOE to complete the infill.

The road to the site was in bad condition during site visits but being improved by the city corporation, road works are now completed. This existing access road to the site which passes through congested residential areas will be used for construction. There are residential properties adjacent to the site boundary and one residential property is currently accessed through the site. This access will need to be maintained.

The ecological value of the site, including its value for birds, is described in more detail in Chapter 5. At this site no trees will need to be cleared for site preparation.



Figure 4.7: Proposed Project Location for Tongi SS

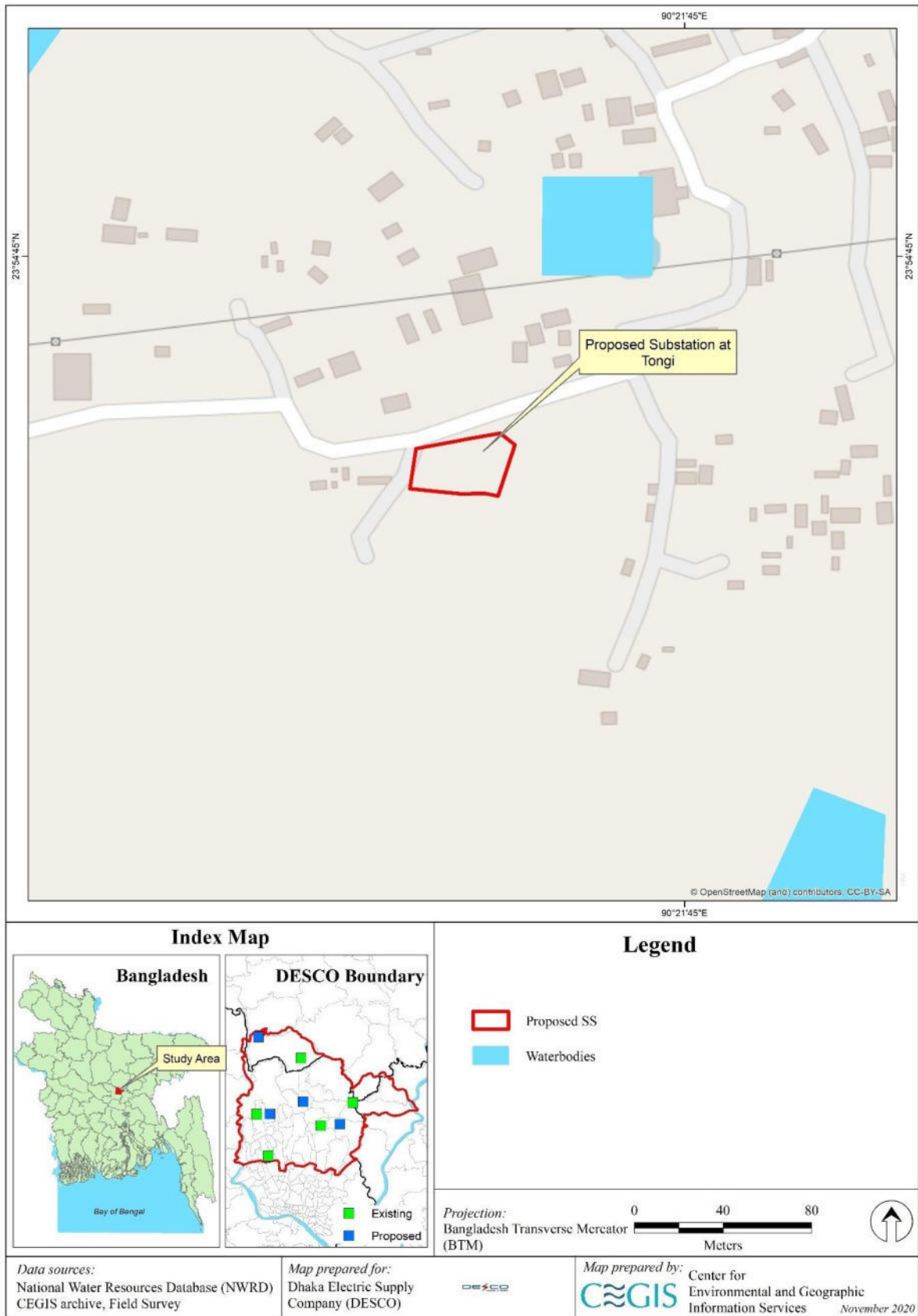


Figure 4.8: Base Map of Proposed Tongi Substation

Purbachal Substation

The proposed location of the substation will be at Plot:113, 115, 117 Road: 114 and 207, Sector: 18, Purbachal. The size of the land plot for substation is 10 Katha or 0.13 ha (Figure 4.10). The site is on vacant land that was previously agricultural in an area of ongoing housing development. For this ongoing development, an Environmental Clearance Certificate (ECC) was granted to the Capital Development Authority of Dhaka nearly 10 years back, exact date unknown, with housing development proceeding.

Adjacent to the site boundary are some informal settlement properties of eight settlers. As part of the housing development they will be relocated to new property but they will not be directly impacted by the substation. A small waterbody (pond) is located adjacent to the site but will not be directly impacted by the substation.

The existing access road to the site will be used for construction. In terms of trees, the four (4) trees along the site boundary can be kept, whilst seven (7) others will need to be felled. To compensate this loss, twenty ones (21) trees will be planted.



Figure 4.9: Proposed Project Location for Purbachal SS

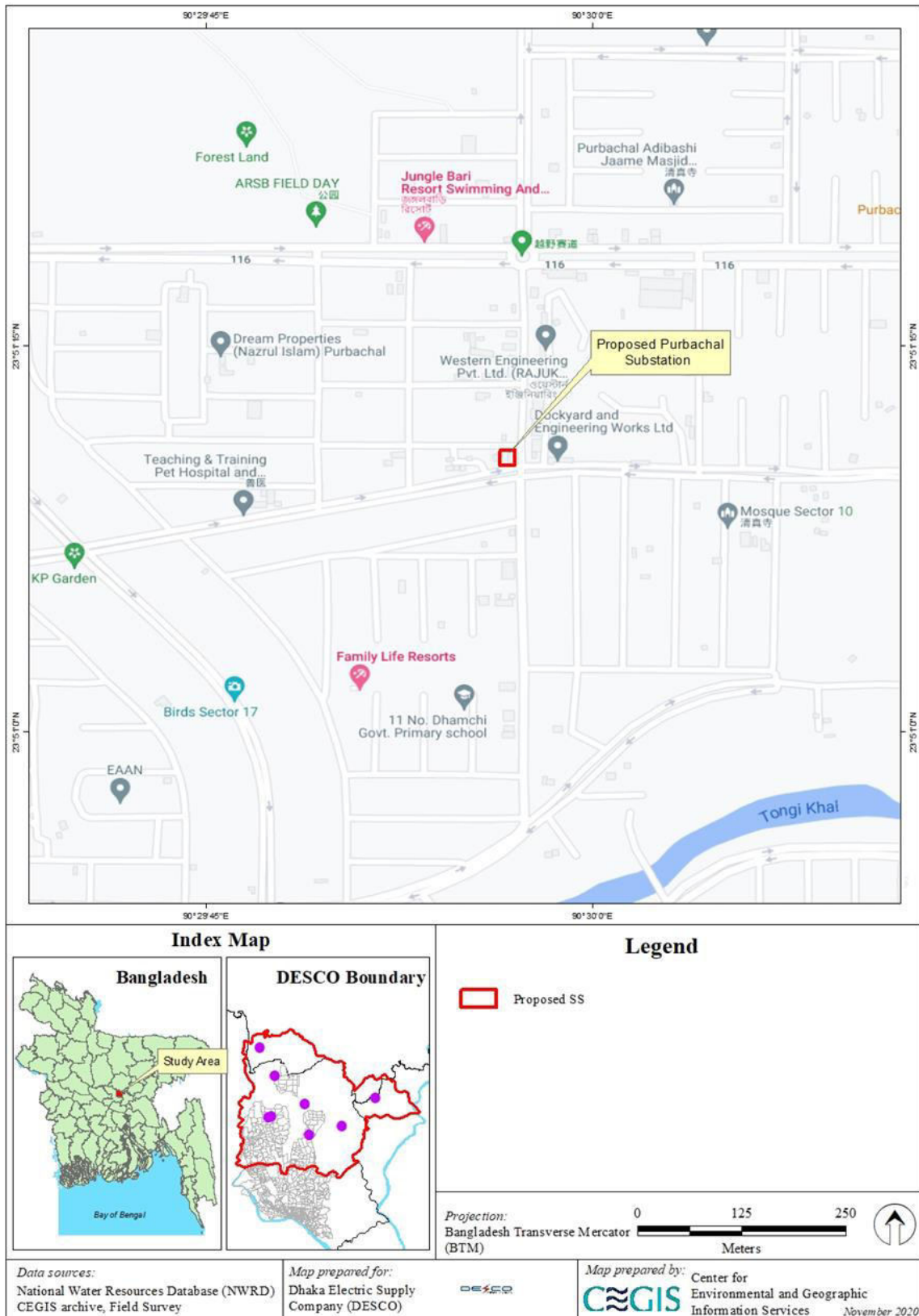


Figure 4.10: Base Map of Proposed Purbachal Substation

Kalachandpur (Baridhara) Substation

The substation will be constructed on the grounds of an existing 11kV indoor switchyard of DESCO, in a quiet residential area of Gulshan. The closest residential receptor (an apartment block) is immediately adjacent, within a distance of only 1-2 meters. As the switchyard is no longer needed for the modernized distribution system of DESCO, it will be demolished. The building of the switching station to be demolished is three storied and the total area is about five (5) Katha or 0.06ha (Figure 4.12).

The switchyard is of AIS type, so it does not contain SF6. Disused transformers and some batteries are being stored here and will have to be removed by the contractor.

DESCO confirms the access to the site will be through existing roads in the existing residential area. The wall that splits this area from the main road will categorically not be removed such that there will be no temporary or permanent relocation of those properties which are backing onto it. HDD cables will be installed to connect the substation, but this will only involve drilling of cables below the wall and also the properties.

During site clearance four (4) trees will need to be removed, only one can be retained. As compensation for this, twelve (12) trees will be planted, in line with the 3:1 compensation requirement.



Figure 4.11: 11 kV Switching Station at Proposed Project Location

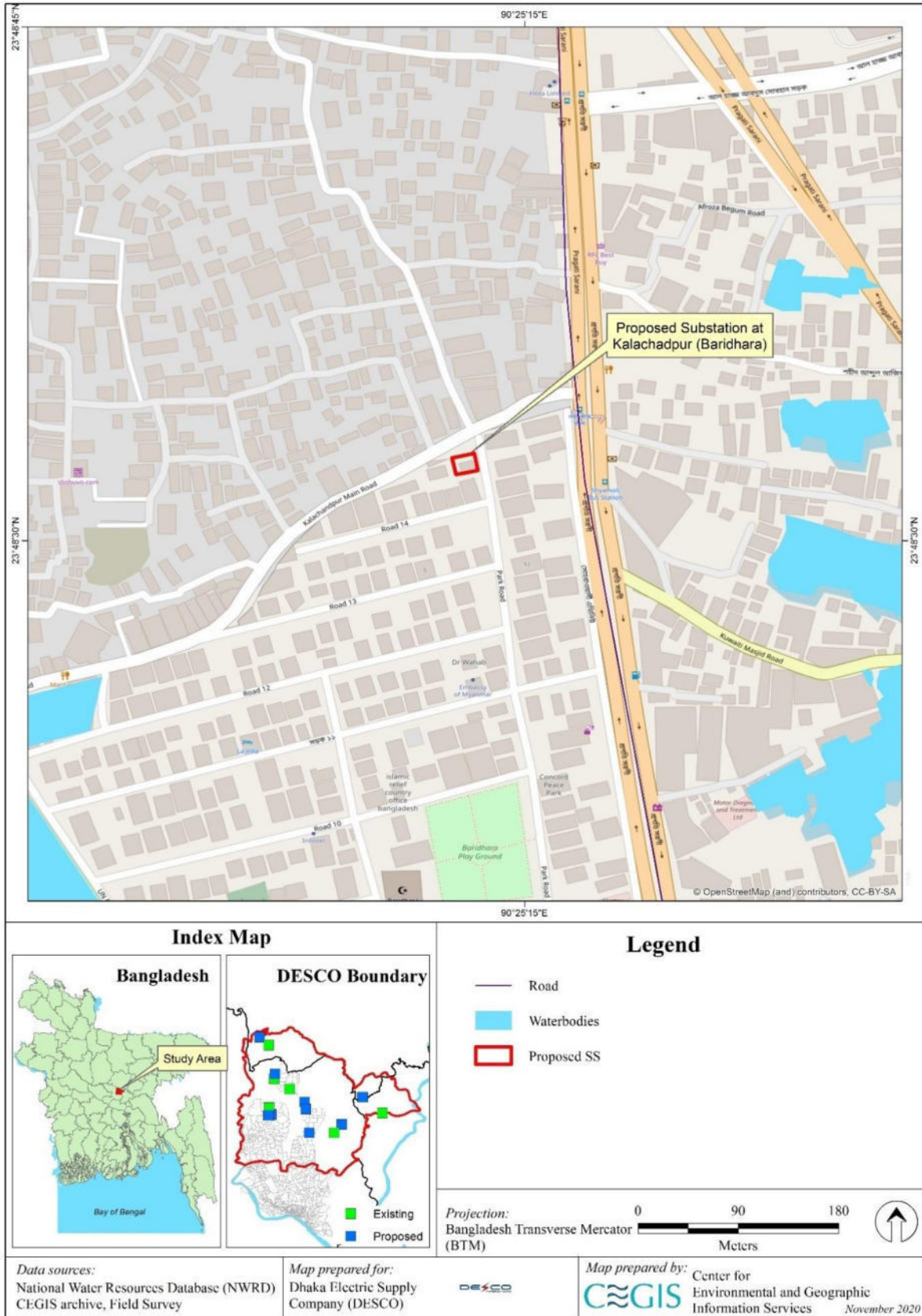


Figure 4.12: Base Map of Proposed Kalachadpur (Baridhara)

Uttara (Rupayan City) Substation

A 10 Katha or 0.13 ha plot adjacent to sector 12 in Rupayan City, Uttara is proposed for the substation. (Figure 4.14).

The plot is located on the edge of the major Rupayan City construction site, where high end apartments are being built with the proposed substation increasing the stability of the required electricity network. An ECC was granted for this development 7-10 years back, exact date unknown. Construction activities are ongoing and will continue for the next few years. The relevant land for the substation was donated to DESCO by Rupayan City.

Informal settlement properties are found adjacent to the site boundary wall. Access to the site will be provided from the existing main road through the site boundary wall. No trees will need to be felled for site preparation.



Figure 4.13: Proposed Project Location for Uttara (Rupayan City) SS

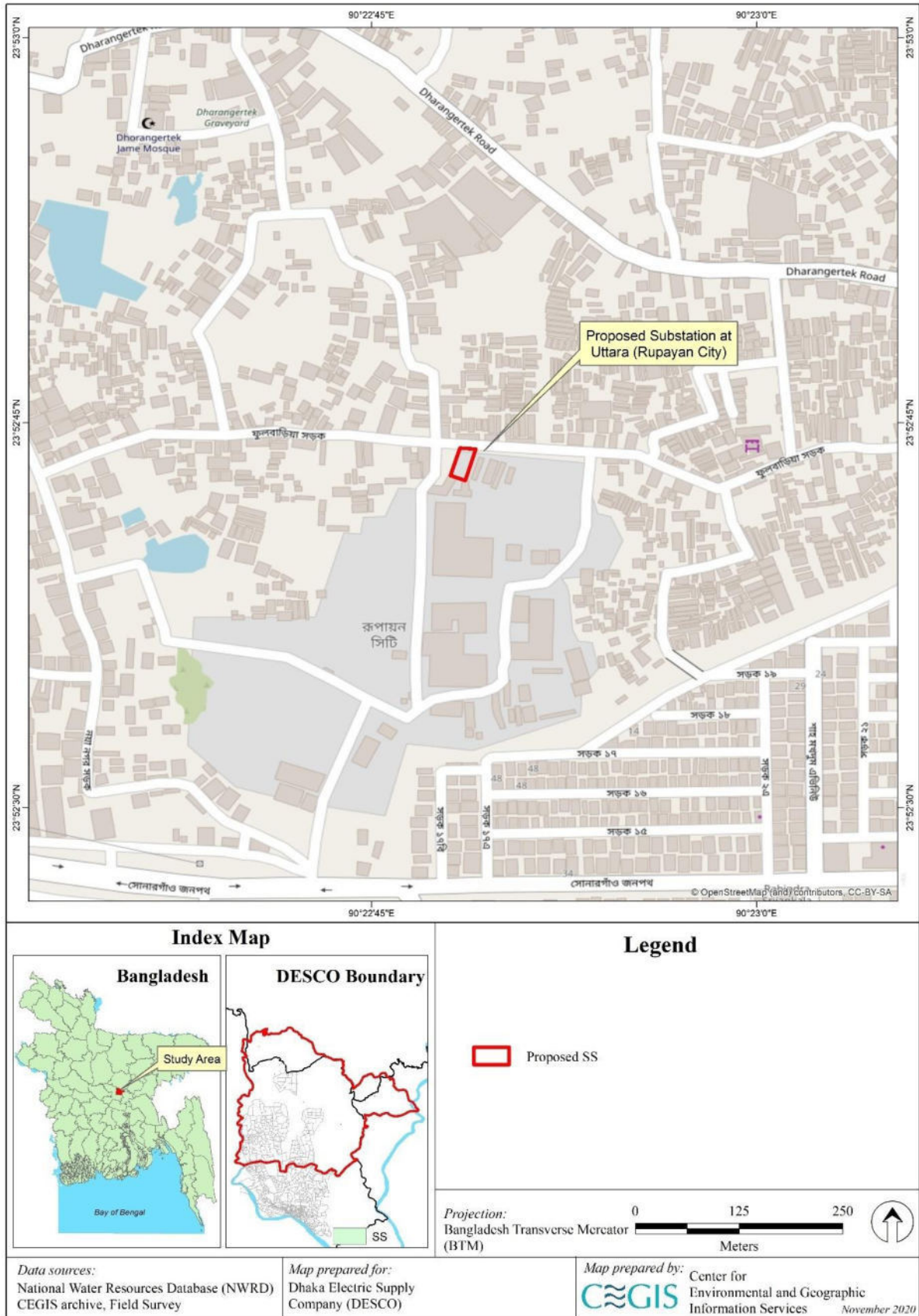


Figure 4.14: Base Map of Proposed Uttara (Rupayan City)

Mirpur Ceramics (Mirpur) Substation

The proposed site of 8 Katha or 0.10 ha for Mirpur Ceramic SS lies within the boundaries of Mirpur Ceramic Industries who donated the land to DESCO as their activities require reliable electricity supply as stated by their officials during consultation. Onsite there is a temporary shed for their laborers plus garden which will be moved to another part of Mirpur Ceramic's adjacent land. This will be done by Mirpur Ceramics Industries themselves (Figure 4.16) and the EPC contractor will then demolish the buildings onsite.

DESCO has already constructed the boundary wall.

The site is immediately adjacent to a Madrasah (located approximately 100m from the site boundary) and near residential apartments. As a consequence, the noise standards for Silent Zones will need to be complied with.

New access to the site will be established from the existing main road through the existing boundary wall. In terms of tree cutting during site clearance, three (3) will need to be removed and will be compensated for by planting nine (9) new trees.



Figure 4.15: Workers Shed in Proposed Substation Area

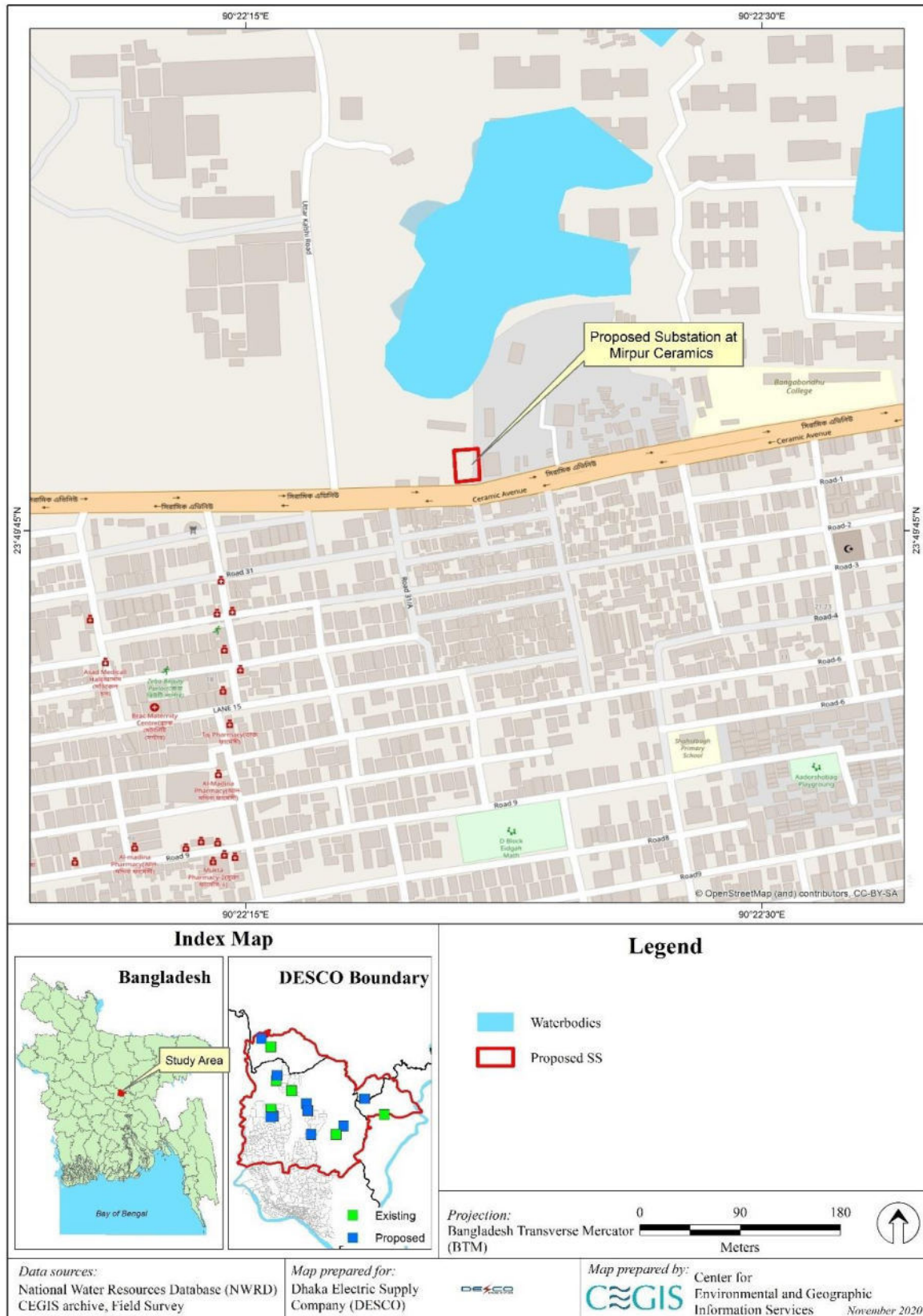


Figure 4.16: Base Map of Proposed Mirpur Ceramics (Mirpur)

4.9 Physical Features of the Transmission and Distribution Lines

The proposed 132 and 33 kV transmission and distribution lines will all be laid underground, as will about half (100km) of the 11 kV lines in parallel with fiber optic cables where these are required. For health and safety marker tape is placed above the underground cables in case of future excavation work. The major physical features of the underground cables are given in Table 4.11. View of the cable bundle in situ is shown in Figure 4.18.

The physical features of the 11 kV and 0.4 kV overhead distribution lines plus their support poles are given in Table 4.12. All these overhead lines will be new installations (no replacement of existing lines and distribution transformers) and use covered conductors, e.g., a conductor covered with a dielectric material having no rated dielectric strength. Covered conductors reduce electrocution risk and so are much safer than bare conductors, they also has the advantage of preventing pilferage of electricity. A typical cross-section of the 11 kV poles (same poles also used for 0.4 kV) is presented in Figure 4.19.

Installation of the 11kV and 0.4kV distribution lines will also involve the installation of 820 distribution transformers (750 x 11/0.4kV kVA and 70 x 11/0.23 kV) and 100 GIS ring main units. The transformers will be pole mounted along the distribution lines; their location will not be determined until the contractor has determined the routing of the distribution lines to which they will connect. The ring main units (RMU) are a factory assembled, compact set of switchgear, enclosed in a metal cabinet, which is installed at the load connection points of a ring-type distribution network. Ring main conductors enter and leave the cabinet, inside are switches that can connect the load to one or both conductors, a circuit breaker, and a switch that connects by a cable to the distribution transformer. Installation of RMUs will reduce outage times by detecting faults early and automatically reconfiguring the network. They will be sited in the street, in an allocated space of a few square meters, but their location will not be determined until the contractor has determined the routing of the distribution lines to which they will connect.

Table 4.11: Physical Features of Underground Cables

Sl. No.	Features	Specifications
1	Voltage Rating	132 kV, 33 kV, 11 kV
2	Conductor for 132 kV	1c-800 mm ² XLPE and 1c-1200 mm ² XLPE
3	Conductor for 33 kV	1c-800 mm ² XLPE
4	Conductor for 11 kV	3c-300 mm ² XLPE
6	Standard formation of the cable	Trefoil (Triangle)
7	Type of earthing	System neutral effectively grounded

Table 4.12: Physical Features of 11 kV and 0.4 kV Overhead Distribution Line

Sl. No.	Physical Features	Attribute
1	Voltage Rating	11 kV and 0.4 kV
2	Type of Line	Double/Single Circuit
4	Type of Line Support	11 kV Spun Pre-stressed Concrete (SPC) poles/steel poles
5	Tentative height of pole	10/12 m
6	Minimum ground clearance (Standard)	5.2 m
7	Line Insulator	Disc type, Porcelain
8	Conductor	1c x 95 mm ² sq Copper Cable NYY (covered conductor)

Source: PD office, DESCO, 2018

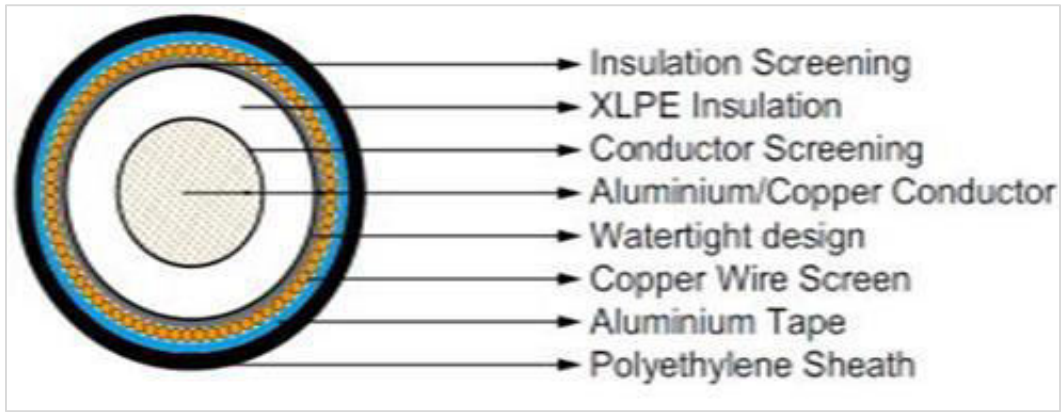


Figure 4.17: Typical Cross-section of Underground Cable



Figure 4.18: Underground Cable

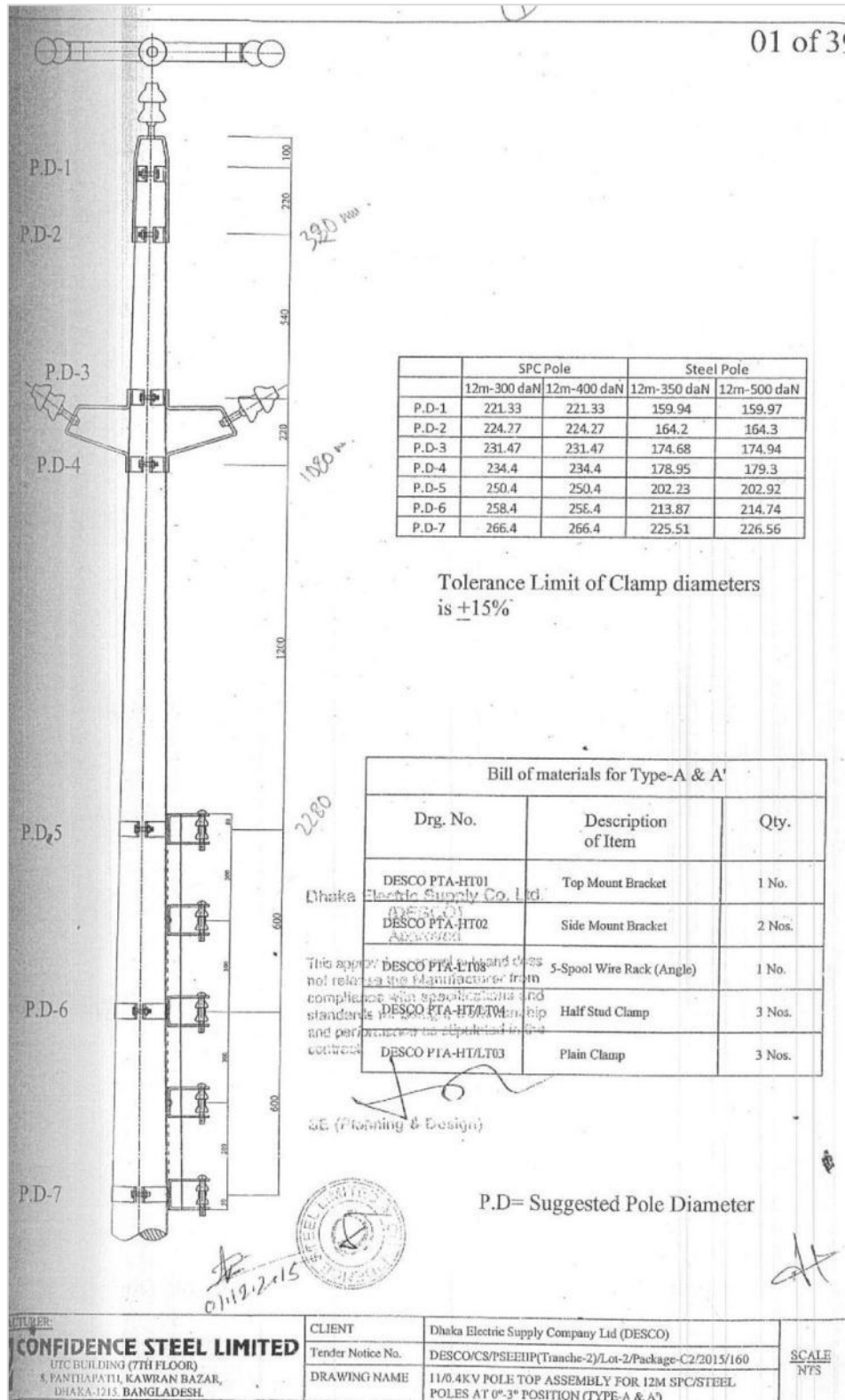


Figure 4.19: Drawing of 11 kV Pole

The Right of Way of the proposed underground cables will follow existing roads within the DESCO distribution area. A No Objection Certificate (NoC) from Dhaka North City Corporation (DNCC) for this plan has already been obtained by DESCO. In most cases open trenching will be used. Where the proposed underground cable crosses major roads, railway lines and water bodies, alternative

techniques, such as Horizontal Directional Drilling (HDD)¹¹ will be employed to minimize the environmental and social impacts of the open trench method. For Turag River/Tongi Khal and Balu River, crossing via a cable bridge has been proposed in the feasibility study report. For Turag River/Tongi Khal a new cable bridge crossing of up to 150m will be constructed. For Balu River, the cable would be installed along the already existing cable bridge. Balu River already has a cable bridge and the cable route has been planned accordingly to tie up to it. The main crossings are listed in Table 4.13.

Table 4.13: Railway and Water Body Crossings by the Proposed Underground Cables

Sl no.	Line Name	Voltage Level (kV)	Tentative Width (m) (Waterbody name)
Railway Crossings			
1.	Airport Grid to Airport Terminal-3	132	5
2.	Airport Grid to CAAB	33	5
3	Airport Grid to Nikunja		5
4	Airport Grid to Airport Terminal-3		5
Water Body Crossings			
1	Tongi Old Grid to Airport Grid	132	50 (Tongi Khal)
			5 (Unknown waterbody)
2	Airport Grid to Basundhara D Block Grid		30 (Unknown waterbody)
3	Purbachal Grid to Basundhara M Block Grid		75 (Balu River)
4	Airport Grid to Nikunja	33	5 (Unknown waterbody)
5	Airport Grid to Airport Terminal-3		5 (Unknown waterbody)
6	Purbachal S-2 Grid to Purbachal-3 S/S		5 (Unknown waterbody)
7	Basundhara M-Block to Basundhara I-Extension		5 (Unknown waterbody)

Source: GIS SpatiSal Analysis, 2020; NWRD, 2012

4.10 Detailed Design and Construction Works

Construction activities to be undertaken include the indicative steps listed in the following sections with the contractor responsible for developing the construction method statement.

Note: all construction activities, including the identification and provision of temporary storage areas and other construction facilities, such as construction camps, sanitary and welfare facilities, will be the responsibility of the contractor who will be contractually bound to meet the requirements of the EMP in siting such related facilities. In cases where sufficient land is not available within the substation sites for related facilities the contractor will need to find and privately negotiate for the land required. Central stores will be used for cable reels etc. with required materials transported to site as needed. It is anticipated that the labor will likely return to their own accommodation at night. For any construction camps these will make use of existing buildings within the urban area. Construction camps to contain all basic requirements (beds and beddings, lockers, mosquito nets, artificial lights, natural lights, windows and ventilation, fans, emergency exits, firefighting equipment, kitchen and dining halls, mobile charging points, toilets and washing facilities connected to the sewerage system or septic tanks with soak ways, potable drinking water, recreational space) per ILO's guidance on worker accommodation and GoB requirements. The contractor will bring their own construction

equipment and machineries including transport vehicles for workers and equipment, heavy materials handling facilities like mobile cranes, pile drivers, forklift, HDD machine, temporary diesel generator etc.

Materials such as cement, sand, brick will be sourced direct from authorized suppliers. The contractor will determine if they source piped or canned drinking water from an existing supplier (as the preferred option) or provide treated water for workers; all drinking water provided will be regularly tested and confirmed to meet GoB drinking water standards. If the contractor provides their own construction water supply permissions for use of surface water or wells shall be obtained along with the agreement of local communities using the water source. The exact size of the workforce including the number of unskilled, semiskilled, and skilled shall be determined by the contractor based on the project scheduling.

4.10.1 Detailed Design and Construction Works for Substations and Bay Extensions

- Contractor and construction worker recruitment (it is anticipated about 40-60 skilled and unskilled construction workers will be needed to build each substation or bay extension)
- Survey work
- Detailed design, including provision of seismic design, climate risk and adaptation,¹² pollution control (e.g., 110% bunding of transformers, impermeable bunded oil and waste storage areas), safety (e.g., fire management) requirements
- Establishment of construction camps for the workers
- Establishment of temporary access routes (no new access roads, provision of signage etc.)
- Establishment of material storage areas and work sites
- Infilling (Tongi Substation)
- Site clearance
- Demolition works, where necessary (collection and removal of demolition waste)
- Earthworks to create development platform
- Sourcing and transport of materials and equipment to site
- Civil works (e.g., piling of building foundations, cable trenches etc.)
- Structural works (e.g., gantries, control buildings etc.)
- Electrical equipment installation
- First aid and firefighting arrangements
- Testing and commissioning of electrical equipment

¹² Climate risk assessment was undertaken for the project by ADB TA Consultants (2023). Based on the characterization of projected climate change risks in the CRA the design incorporates adaptation measures to improve resilience to heavy rainfall, cyclones, temperature, and floods. Climate based risk is dependent on: (i) the likelihood of an adverse climate event; and (ii) the effect of that event which depends among other factors on the sensitivity of the infrastructure and its location and thereby its level of exposure to a given adverse climate hazard. Measures incorporated include using XLPE conductors which are weather and heat resistant in place of bare conductors, adding stays to major and minor angle points, temperature devises on transformers, etc. Full details of measures required are detailed in the climate risk assessment.

4.10.2 Detailed Design and Construction Works for Transmission and Distribution Lines

- Contractor and construction worker recruitment (it is anticipated about 15-20 skilled and unskilled workers will be needed to install a 1km stretch of transmission and distribution line)
- Routing plans for construction of 132 kV, 33 kV, 11kV and 0.4kV distribution lines including maintaining safety clearances
- Siting of distribution transformers and RMU
- Detailed design pole foundations, including seismic and wind loading requirements, climate risk and adaptation measures
- Establishment of construction camps for the workers
- Establishment of temporary access routes (no new access roads, provision of signage etc.)
- Establishment of material storage areas and work sites
- Clearing of RoW
- Sourcing and transport of materials and equipment to the sites
- Trench for underground cables
- Underground cable laying
- Backfill and reinstatement of the cable trenching site (road surface)
- Pole foundation and installation (for overhead 11 kV and 0.4kV distribution lines)
- Conductor stringing and earthing
- Connection at the start and end points to distribution transformers
- Testing and commissioning of transmission and distribution lines

4.11 Phase-wise Activities of Construction Works and Work Schedule

The phase-wise major activities of construction work in substations and transmission and distribution lines are illustrated in Table 4.14.

Table 4.14: Phase-wise Construction Activities

Components	Activities		
	Pre-construction	During Construction	Operation period
Substations	Tender documents preparation	Infilling at Tongi and demolition work at Airport and Bashundhara (separate to main contractor)	Operation and maintenance (O&M)
	Contractor and construction worker recruitment	Establishment of construction camps for workers	Implementation of Operational Health & Safety (H&S) and other Plans throughout
	Topographical survey	Establishment of temporary access routes	
	Soil investigation, including land contamination survey	Establishment of material storage areas and work sites	
	Asbestos survey (for demolition)	Demolition at Mirpur Ceramics and Kalachandpur (by EPC contractor)	

Components	Activities		
	Pre-construction	During Construction	Operation period
	Detailed design	Clearing site	
		Sourcing and transport of materials and equipment to site	
		Civil and structural work (piling work for building foundation, RCC work, control building installation)	
		Equipment installation	
		Testing and commissioning	
		Implementation of Construction Health & Safety (H&S) and other Plans throughout	
Underground Cable line	Tender documents preparation	Establishment of construction camps for workers	Operation and maintenance (O&M)
	Contractor and construction worker recruitment	Establishment of temporary access routes	Implementation of Operational Health & Safety (H&S) and other Plans throughout
	Route survey	Establishment of material storage areas and work sites	
	Detailed design	Clearing of RoW	
		Transport of materials and equipment (cable) to the trenching site	
		Civil works (trench cutting, RC trench side installation, concrete casting)	
		Laying of underground cable	
		Backfill and reinstatement of the cable trenching site (road surface)	
		Testing and commissioning	
		Implementation of Construction Health & Safety (H&S) and other Plans throughout	
Overhead lines	Tender documents preparation	Establishment of construction camps for workers	Operation and maintenance (O&M)
	Contractor and construction worker recruitment	Establishment of temporary access routes	Implementation of Operational Health & Safety (H&S) and other Plans
	Route survey and siting	Establishment of material storage areas and work sites	
	Detailed design	Clearing of RoW	
		Transport of materials and equipment (poles and conductors)	
		Pole foundation and installation	

Components	Activities		
	Pre-construction	During Construction	Operation period
		Conductor stringing	
		Testing and commissioning	
		Implementation of Construction Health & Safety (H&S) and other Plans throughout	

Source: CEGIS, EIA Study, 2021

4.12 Work Schedule

The detailed work program will be prepared by the contractor. Time estimates delivered by DESCO are as follows. The entire construction period for all elements of the project will be approximately 2.5 years. Within this project period, installation of overhead lines will take 10-12 months. The underground cables will be laid in 500m sections. Each 500m section will take approximately two weeks to complete. For the special crossings, such as the main roads, railways and water ways, Horizontal Directional Drilling (HDD) will be used to pull the cables beneath these obstacles. An exception are Balu River and Turag River/Tongi Khal where cable bridges will most likely be used for the crossing. For HDD a length of approximately 100 metres can be prepared within 3-5 days. For overhead line installation the construction works will take 20 days for each 1km section with 50% of the time for cable stringing.)

Table 4.15: Summary of the Works Schedule of Major Construction Works of the Project¹³

SI	Package	Duration
1	Design, Supply, Installation, Testing and Commissioning of 08 nos. of substation on turnkey basis (DG1) (each substation may take up to one year to be constructed)	2.5 years
2	Design, Supply, Installation, Testing and Commissioning of 132 kV underground transmission line on turnkey basis (DG2) (the underground cable installation will be undertaken in sections of 500m open-cut. The construction works of each 500m section will take 15 days. For HDD a section of 100m will take 3-5 days.)	2.5 years
3	Installation, Testing and Commissioning of 33 kV, 11 kV, 0.4 kV distribution lines (as DESCO contracts) (the underground cable installation will be undertaken in sections of 500m open-cut. The construction works of each 500m section will take 15 days. For HDD a section of 100m will take 3-5 days. For overhead line installation the construction works will take 20 days for each 1km section with 50% of the time for cable stringing.)	1 year

Source: DPP, May 2022.

¹³ The lifetime of the substations will be 40 years and it will be 35+ years for transmission and distribution lines

4.13 Site Surveys

For substation site preparation, topographic survey along with soil investigation needs to be conducted. DESCO has already conducted soil investigation of the proposed Kalshi, Purbachal, Kalachadpur, Bashundhara and Mirpur Ceramics SS locations. For existing buildings to be demolished asbestos survey will additionally be required during the site preparation phase with an asbestos management plan prepared if found. Although no asbestos was observed during site visits the EIA team are not trained asbestos surveyors and such a survey needs to be conducted by a competent person.

Route surveys have to be conducted to define suitable cable/overhead line routes and site distribution transformers and RMUs. Where possible, the cable routes will follow existing roads and be laid within them. During the preconstruction stage, the route survey results will be checked and pre-condition surveys and an underground/overhead utilities survey will be conducted before construction can commence. Existing underground utilities need to be identified and marked prior to the start of construction. The contractor will make every effort to prevent impacts to existing utilities such as making minor adjustments to the alignment, relocating the existing utilities, or putting the cables below the existing infrastructure.

4.14 Materials/Equipment

Most of the equipment to be installed will be procured from abroad for this Project. Procurement of domestic materials for this Project will be restricted to local materials such as bricks, sand, cement and poles from existing licensed facilities (e.g., quarries) which will be utilized for construction works. No new quarries or borrow area sources will need to be opened up for this Project. Major items of equipment are listed in Table 4.16.

Table 4.16: Major Electrical Equipment

Transformers (Power transformers, Auxiliary transformers, distribution transformers)
Substation Control, Protection, Automation and Metering Equipment
132 kV indoor GIS switchgear with local control panel
33 kV indoor GIS switchgear with relay control panel
11 kV switchgear
Ring main units
Steel Structures, Conductors, Insulators, Connectors of 132kV, 33 kV and 11 kV
Underground cables with terminations
Pole, Pole Fittings, Line Hardware etc.
Earthing and Lightning Protection
Communication Equipment

4.14.1 Construction Transport

Twenty-seven (27) transformers will be needed in total to equip the eight substations. The transformers are likely to be supplied from overseas and arrive at Chattogram Port. From there they will be offloaded onto trailers, one transformer per trailer. The transformers will then be transported by road network. Transport through Dhaka City will be done at night. The cable rolls will be transported by road, too. A maximum of approximately one hundred and forty (140) trailers will be required to transport all the cables to where they are needed. Here again, nighttime transport will be undertaken. In summary a total of around 350 trailer movements will be required during the

construction period, on top of the general construction traffic to bring the workers and other materials and equipment on site.

4.14.2 Hazardous Materials and Construction Waste

Hazardous materials and inert, solid and hazardous waste produced during construction works needs environmentally safe and sound storage, handling, transportation and disposal in accordance with national regulations and the EMP. Non-hazardous waste (inert and solid) includes all domestic and kitchen waste, packaging wastes including plastics, paper, cardboard, wood, etc. construction waste such as concrete, brick, rubble, iron scrap etc. Hazardous waste includes used transformer oil, empty metal or plastic fuel/oil/chemical containers, transformer oil or solvent-soaked rags, used batteries, defunct solar PV panels, broken or used electrical equipment (e-waste) etc. All wastes will be stored onsite prior to offsite transport, ideally close to the site entrance for ease of loading. If off-site storage is used due to size restrictions of the site not allowing for temporary waste storage the location to be selected based on the EMP and with approval of the appropriate authority. The on-site or offsite storage area should have an impermeable bunded surface with enclosed containers etc. For the reuse, recycling or disposal of solid and hazardous waste, licensed contractors will be used. DESCO has its own facility to recycle transformer oil. Disposal will only be to suitably engineered and licensed waste management facilities.

4.15 Construction Activities

The main activities to be undertaken include:

- Construction of substations and bay extensions
- Construction works for underground cables
- Construction works for overhead cables including setting up poles.

4.15.1 Construction of Substations and Bay Extensions

Infilling (Tongi Substation)

At the proposed Tongi substation site, the land is currently part of the waterbody and needs to be raised 3m above the highest flood level to avoid waterlogging during operation. This will require 15,300m² of sand from authorized suppliers. It will be piped in by the landowner's contractor using the existing pipeline. This will reduce the need for vehicle movements and the associated impacts. Wooden shutters will be installed around the site and the pumped sand left to settle with the water in the sand matrix draining to the ground.

Demolition of Existing Buildings

Any existing buildings which will no longer be used will be demolished prior to construction. In Airport SS and Bashundhara SS sites the existing buildings will be demolished prior to handover to DESCO. In Kalachandpur SS and Mirpur Ceramics SS sites, existing buildings will be demolished by the contractor. Wherever possible the inside of the buildings will be soft-stripped and walls and windows will be left in place until last to reduce the emission of dust. Further, water will be used for dust suppression. The demolition waste will be sorted into types of waste, including inert waste, solid waste and hazardous waste and transported offsite for reuse, recycling or disposal. Demolition activities will only be undertaken during the day time with noisy demolition limited in duration to limit disturbance to adjacent properties and prior warning will be issued before demolition activities commence.

Site Clearance and Development Platform

The sites will be cleared of waste and vegetation which will be removed off site for disposal. Tree felling will be kept to the minimum required as described in Section 4.7. At most of the substation sites some earthworks to create a development platform is proposed. This is to reduce the risk of flooding namely at Bashundara SS, Purbachal SS, Airport SS, Mirpur Ceramics SS and Kalshi SS. Land raising and soil compaction shall create a final development platform 3 m above the Highest Flood Level (HFL). Though none of the sites fall in flood prone zone (Figure 5.12) as rain induced waterlogging is a common scenario in Dhaka and Tongi (Gazipur) so this HFL will be considered. The contractor will create the development platform by levelling soil on site, as far as is available, and then importing sand from authorized suppliers by road.

Foundations

Following site clearance, the foundations of the substations will be installed. Geo-technical investigations during site survey will be conducted to assist in designing the foundations of the control buildings and other structures and to help decide on the type of foundation treatment. The depth of excavation will be defined by design requirements. The excavated soil will be stored for backfilling purposes. The type of treatment like pre-cast RCC piling or in-situ concrete piling will be suggested as per the results of geo-technical investigation but also to reduce the noise and vibration levels that will be experienced at the adjacent properties. The use of an auger/screw being similar to the noise level generated by other construction activities generate much less noise than impact and vibratory hammers which can generate up to 120 dB(A). The number and depth of piling will vary with soil type. DESCO's previous experience is that about 100 nos. of piles will be needed to about 20m depth. Bentonite slurry may be used as a piling lubricant. Back filling of the excavated area of the foundation and floor of the building will be carried out using local sand from authorized suppliers and compacted excavated soil.

Control Building Construction

A two-four storied RCC building will be constructed in each substation with RC used for columns, beams, floors, etc. The ground floor of the building is for switchgear. Brickwork will be done for the construction of substation buildings with first class bricks, coarse sand and cement up to roof level. Plastering of walls inside and outside as well as the roof of the building will be done in accordance with proper curing for at least three weeks. Following that, distemper or plastic painting will be applied on the walls and roof of the buildings. Wood/Thai aluminum works are to be done on door shutters and windows of the building along with glass fittings.



Figure 4.20: Sand Filling



Figure 4.21: Piling Work

Sanitary Works and Water Supply System

Sanitary works such as laying of sewerage line of either polyvinyl chloride (PVC) or RCC, installations, fittings and fixtures of toilet accessories will be done in the buildings. Sanitary waste will be managed through the existing municipalities sewerage network. The water supply system, where available, will be activated for the staff and the workers of the substation site during and after the construction. Water will be supplied by Dhaka WASA/Gazipur City Corporation. If they unable to supply water at any site, a groundwater pump will be installed after water quality testing and getting approval from the authority (WASA/Gazipur City corporation).

Boundary Fencing with Concrete Pillar and Barbed Wire

The substation areas will be protected from any unauthorized entrance of the public by fencing the boundary using six feet high walls with concrete pillars three meters apart with barbed wire fitted on top.

4.15.2 Construction Work for Underground Cable Trenching

There are three types of methods for underground cable laying: direct line, draw in system and solid system. Among them direct system (e.g., open trenching) is commonly used as it is cost effective. Horizontal directional drilling (HDD), a draw in system, is the method of choice for placing cables underground where environmental and social constraints exist. It is a steerable, trenchless method with less above ground impact than open trench. HDD is ideal for situations when open trenches or full excavations are not feasible such as when roads and waterways need to be crossed. HDD will be the preferred method for special crossings. The underground cable along the road way is usually done by open trench method which will be applied for this project. The process below is applicable for two circuits.

Temporary Partial Road Closures and Diversions

As the underground lines will be constructed within roadways, road or lane closures will be required and traffic control signage installed. Construction activities, including the transport of materials and equipment to site and their storage, will disrupt traffic flow as well as the actual construction works. The maximum construction area will be required for open trenching and will typically be 3-4 m wide with an additional 1 to 1.5 m directly disturbed for open trench construction. The construction area will need to be barricaded off to keep the public away from the works. Building construction will be prohibited above the underground cables, since they would interfere with maintenance and repair work.

Trench Cutting

The open trench will be 1.2m wide and 1.7m deep. As practiced normally, the wearing surface of the road will be cut along the trench line by diamond cutter. After removing the wearing layer, an excavator will be used to dig up soil to the required depth. No retaining wall is anticipated to be required for this process. Digging and refilling would be carried out at 50m intervals as standard practice.

Open trenching will generate spoil that may not be suitable for use in backfilling the trench. While most of the spoil will be reused in backfilling, any remaining spoil will be transported to a suitable waste management facility for the disposal of inert soils.



Figure 4.22: 132 kV Cable Trenching Work

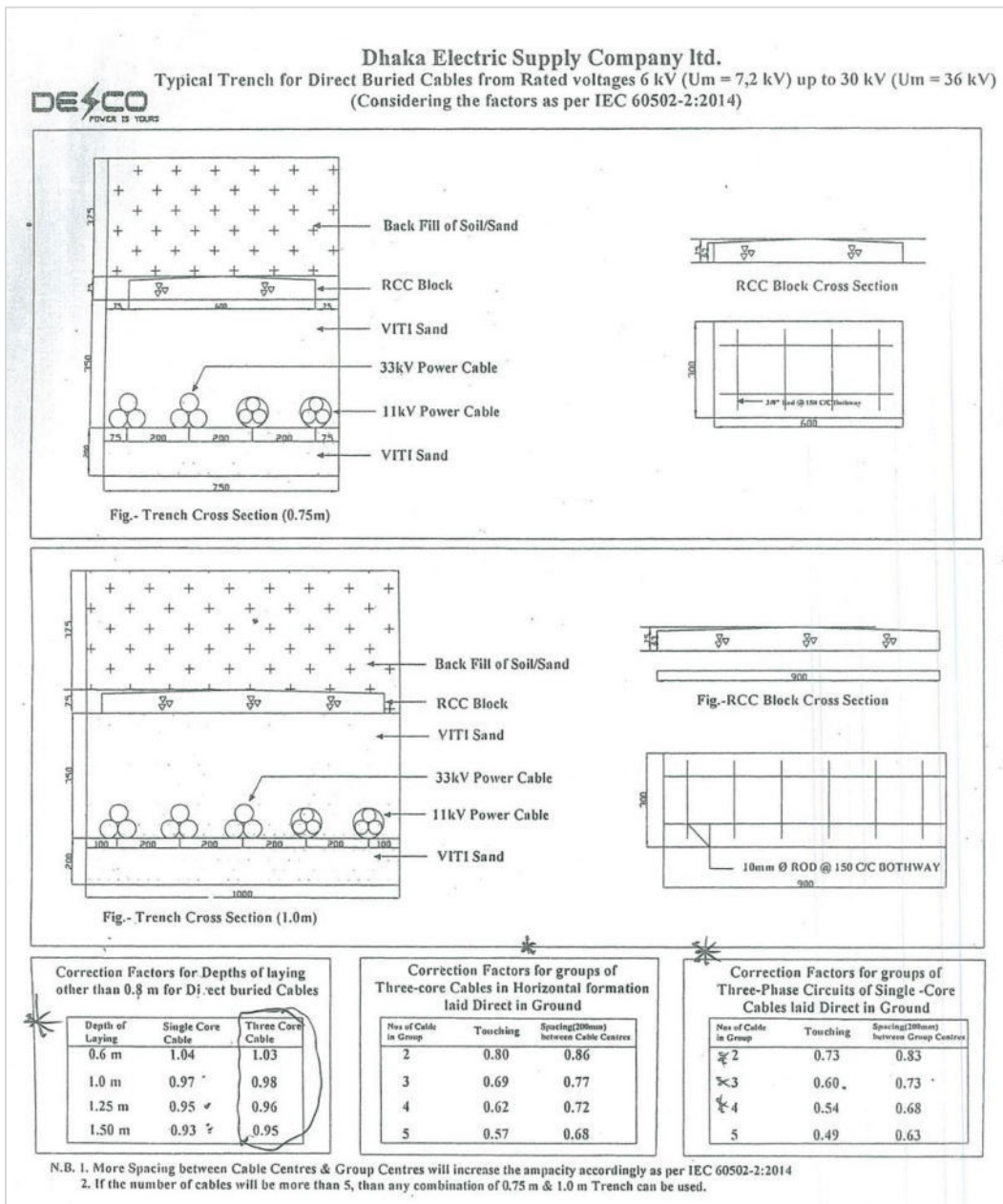


Figure 4.23: Typical Trench for Underground Cable

Laying of Cables

Interlocking reinforced cement (RC) trench blocks will be placed at the bottom of the trench vertically. The height of the trench blocks will be about 350mm. Fine graded soil will be placed on the trench bed.

Two circuits of power cables will be placed over the sand bed. These are normally trefoil. The parallel distance between the circuits is 700mm. Optical fiber cables will be placed along the centerline of the trench.

A sand layer will be placed with clearance height of 200mm of the cables. RC covers will be placed over the sand layer. A layer of 300mm of soil is placed over it. A yellow marker tape is placed over this soil layer. Finally, the rest of the space is backfilled.

Site Restoration.

Once construction is completed, all roadways, landscaped areas, and undeveloped areas will be restored to their original condition with roadways restored to take running traffic again and landscaped and undeveloped areas restored with topsoil that was previously stripped and stockpiled or with new topsoil.

Any infrastructure impacted by the construction such as driveways, curbs, and other utilities are restored to their previous function.

HDD

HDD machines for trenchless technology use a drill and winch to install the underground cables without causing disturbance to the ground above except for at the entry and exit pits which are about one meter square. Conduit pipes and cables are normally laid at about 1 m depth and are inserted and pulled through a small hole drilled between the entry and exit pits. Water is normally used as a drilling fluid to reduce noise and vibration.

4.15.3 Construction Works for Overhead Lines

Installation of Distribution Pole

For the overhead distribution lines the single poles are usually erected along the side of the road. The number of poles will depend on the voltage of the distribution line being installed. Depending on their size distribution transformers are installed (with switchgear and an enclosed control panel) either on single pole, double pole or four pole structures (no ground mounted transformers are currently proposed). Foundation pits for these poles are very small and dug manually. Concrete mixture for the foundation is prepared using a manual mixing machine and cast manually using ply-boards and/or wood casts (foundations for RMUs will be similarly installed). The poles are unloaded manually at the erection point using a chain and pulleys blocks. Once the erection is done, the cross arms and insulators are mounted.

Stringing of Distribution Line

The distribution line will be strung keeping suitable horizontal and vertical (sag) safety clearances (as per regulations) at all locations. The stringing of wires is done manually using pulleys and ropes to provide the correct sag prescribed for the conductor. Scaffold and safety net below the distribution lines should be used whenever works are in the settlement areas, across roads, railways or waterways. Following stringing associated equipment will be installed at the pole following which grounding of the distribution line and all equipment will be done.

4.15.4 Testing and Commissioning of Equipment

After installation of all the equipment, each and every piece of equipment will be tested as per specification and standard. The substations, transmission and distribution lines will be commissioned accordingly if all the tests are successful.

4.15.5 Reinstating the Site

Following construction of the substations and the laying and stringing of the cables and lines, site reinstatement will be undertaken including embankments and other areas around the boundary fence lines.

4.16 Operation and maintenance of substations, transmission and distribution lines

The contractor will hand over the assets to DESCO once the commissioning is done. However, they will be required to rectify, repair, or replace any defect/s in the design, engineering, materials, or workmanship found and notified during the defect liability period. DESCO has its own staff who will be posted to the substations to look after the O&M of the assets, undertake inspections, and any maintenance works.

DESCO undertakes operation and maintenance as per its annual plan which is prepared every year. This plan covers all substations, cables and lines. Operation and maintenance is carried out as per DESCO's Standard Operating Procedures (SOPs) which form part of DESCO's Integrated Management System (IMS) which is ISO certified for quality management to 9001. SOPs will be updated with support from the project under the capacity development output.

4.17 Estimated Cost of the Project

The estimated cost of the Project is stated below in **Table 4.17**.

Table 4.17: Estimated Project Cost

Funding	Lac BDT	Million USD ¹⁴
Government of Bangladesh (GoB)	44650.49	52.04
DESCO	59442.77	69.28
ADB	123154.47	143.54
Total	227247.73	264.86

Source: DPP, DESCO, December, 2021

¹⁴ 1 \$ = 85.80 BDT, Date : 08 Dec 2021

