

**ENVIRONMENTAL AND SOCIAL ASSESSMENT FOR EBRD
GREENFIELD: CATEGORY B PROJECT**

JORDAN: NEPCO EASTERN GREEN CORRIDOR SUBSTATIONS

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NON-TECHNICAL SUMMARY (NTS)

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ABBREVIATIONS

DLS	Department of Land and Survey
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
ESA	Environmental and Social Assessment
ESP	Environmental and Social Policy
GIIP	Good International Industry Practice
NEPCO	National Electric Power Company

NTS	Non-Technical Summary
OHTL	Over Head Transmission Line
PV	PhotoVoltaic

1. INTRODUCTION

1.1 Background

The European Bank for Reconstruction and Development (the “EBRD” or the “Bank”) is considering providing up to USD 45 million sovereign-guaranteed loan to the National Electric Power Company (“NEPCO”, the “Company” or the “Borrower”), a company wholly owned by the government of Jordan, with a tenor of up to 18 years and a grace period of up to 3 years. The Bank is also working on mobilizing an investment grant of up to USD 5 million or 10% of Project costs from the EU Neighbourhood Investment Platform (EU NIP).

The proceeds will be used to *build a new 400/132/33 kV transmission substation and related equipment in the Rihab area* located around 61 km North-East of Amman, Jordan – referred to as the North Substation by NEPCO (the “Project”).

In addition, the Project involves “associated facilities”, which include an overhead transmission line (OHTL) of around 35 km length, that will be constructed by NEPCO.

The Project is categorised “B” in accordance with the EBRD Environmental and Social Policy (ESP) (2019). An Environmental and Social Assessment (ESA) has been carried out for the Project to identify and assess any potentially significant future adverse environmental and social (E&S) impacts associated with the proposed Project and the associated facilities, assess compliance with applicable national laws and the EBRD ESP and PRs, determine the measures needed to prevent or minimise and mitigate the adverse impacts, and identify potential environmental and social opportunities, including those that would improve the environmental and social sustainability of the Project.

The Bank therefore commissioned ECO Consult (the “Consultant”) to carry out the ESA of the Project and the associated facilities (the “Assignment”).

This document is the Non-Technical Summary (NTS), which provides a summary in non-technical language of the main findings of the E&S assessment undertaken for the Project. In addition, a Stakeholder Engagement Plan (SEP) has also been developed for the Project, which describes the planned stakeholder consultation activities and engagement process as well as a grievance mechanism to ensure that it is responsive to any concerns and complaints particularly from affected stakeholders and communities.

1.2 Project Rationale

The construction of the new substation will strengthen the reliability and stability of the transmission network and improve capacity of the electricity system to absorb existing renewable energy generation in the Northern area, as well as allow for the development of up to 600 MW of additional solar PV generation capacity in the Rihab-Mafraq area.

The new 400 kV substation is considered as Phase I of the Eastern Corridor Project which will ultimately develop additional switching stations and high voltage transmission lines in the north east part of Jordan under Phase II, thus allowing for additional renewable energy capacity to be connected to the grid (See Figure 1).

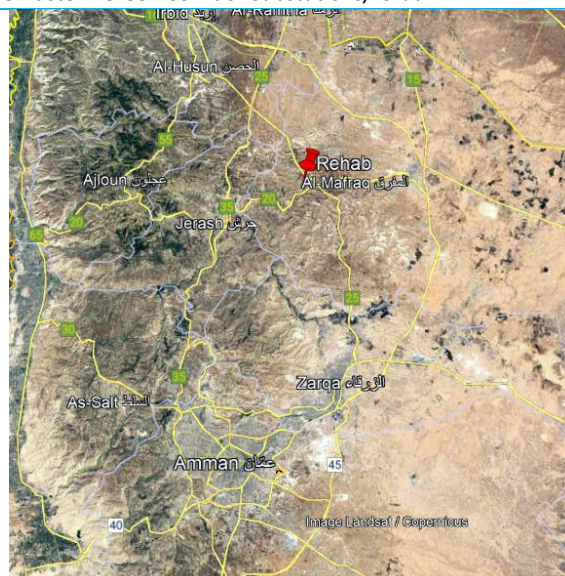


Figure 1: Map Showing Proposed Location of the North Substation

Furthermore, this Project aims to further advance the Bank's policy engagement in the power sector and builds on the two previous transactions with NEPCO which included significant policy work focused on corporate governance and compliance, and equal opportunities for women and youth.

1.3 Key Terms and Definitions

Table 1: Key Terms and Definitions

The Project	The development of a new North 400/132/33 kV transmission substation and related equipment in the Rehab area located in Mafrqa Governorate around 61 km North-East of Amman, Jordan
The Associated Facilities	<p>Associated facilities are not financed by EBRD as part of the Project but in the view of EBRD are significant in determining the success of the Project or in producing agreed project outcomes. These are NEW facilities or activities: (i) without which the project would not be viable, and (ii) would not be constructed, expanded, carried out or planned to be constructed or carried out if the project did not exist.</p> <p>Associated facilities in this case include the Overhead Transmission Line (OHTL) connecting from Al Hashimeyeh area to the North substation. The OHTL will be financed by NEPCO own budget or through other financing sources, but not through EBRD financing.</p>
European Bank for Reconstruction and Development (EBRD)	Is the Bank considering providing up to USD 45 million sovereign-guaranteed loan to implement the Project
National Electric Power Company (NEPCO)	<p>It is a 100% state-owned public shareholding company established in accordance with the General Electricity Law No. 10 (1996) on the 1st of September 1996 and is licensed by the Energy & Minerals Regulatory Commission (EMRC) to undertake the following:</p> <ul style="list-style-type: none"> ▪ Operation of power system and demand / supply control (System Operator); ▪ Construction, operation and maintenance of system equipment such as transmission lines and substations (Transmission Network Owner); ▪ Planning of power system development; ▪ Purchase of electric power from power producers as single buyer and supply of the power to distribution companies and bulk consumers via the National Control Centre (at Amman South). At the moment, the dispatch is done based on a manual system; ▪ Procurement of fuel for thermal power generation; and ▪ Import/export of electric power through interconnection with Egypt and Syria. <p>For this Project, NEPCO will be:</p> <ol style="list-style-type: none"> 1. "Borrower" of the loan provided by EBRD

	<p>2. Project: studies, site selection, land provision and acquisition including related compensation, design, procurement of equipment supply to an external contractor, construction and commissioning of the substation, and operation and maintenance of the substation.</p> <p>3. Associated Facilities: studies, concept planning, preparing the provisional route of the OHTL, providing financing to the construction of the OHTL whether through own internal resources or other external resources, procurement and assigning of the Engineering, Procurement, and Construction (EPC) Contractor, review and approve the detailed design and the OHTL route prepared by the EPC Contractor, implementing compensation procedures for the Right of Way of the OHTL, review documents submitted by the EPC Contractor in relation to the Project and provide approval, supervision of construction works, energising the OHTL, and operation and maintenance of the OHTL.</p> <p>4. Preparing and submitting reports to the Lender (EBRD) in relation to Environmental and Social (E&S) compliance and implementation of the Environmental and Social Action Plan (ESAP)</p>
Contractor (Substation)	Is the Contractor assigned by NEPCO following an official procurement process. This contractor will be responsible for the provision and supply of equipment for the substation based on tender and bill of quantities provided by NEPCO in the tender documents.
EPC Contractor (OHTL)	Is the Contractor assigned by NEPCO following an official procurement process. This contractor will be responsible for the design, procurement and equipment supply, and construction of the OHTL.

2. DEFINITION OF THE PROJECT AND ASSOCIATED FACILITIES

2.1 The Project

2.1.1 Substation Location

As mentioned above, the Project involves the building of a new 400/132/33 kV transmission substation and related equipment in the Rihab area located in Mafraq Governorate around 61 km North-East of Amman, Jordan. NEPCO has provided two options being considered for the location of the substation. These potential locations are as follows and is shown in Figure 2:

- Option 1: land “Tamirah” which is around 120 dunums (0.12 km²)
- Option 2: land “Albarakeh” which is around 18 dunums (0.018 km²)



Option 1 for substation location - Land “Tamirah”



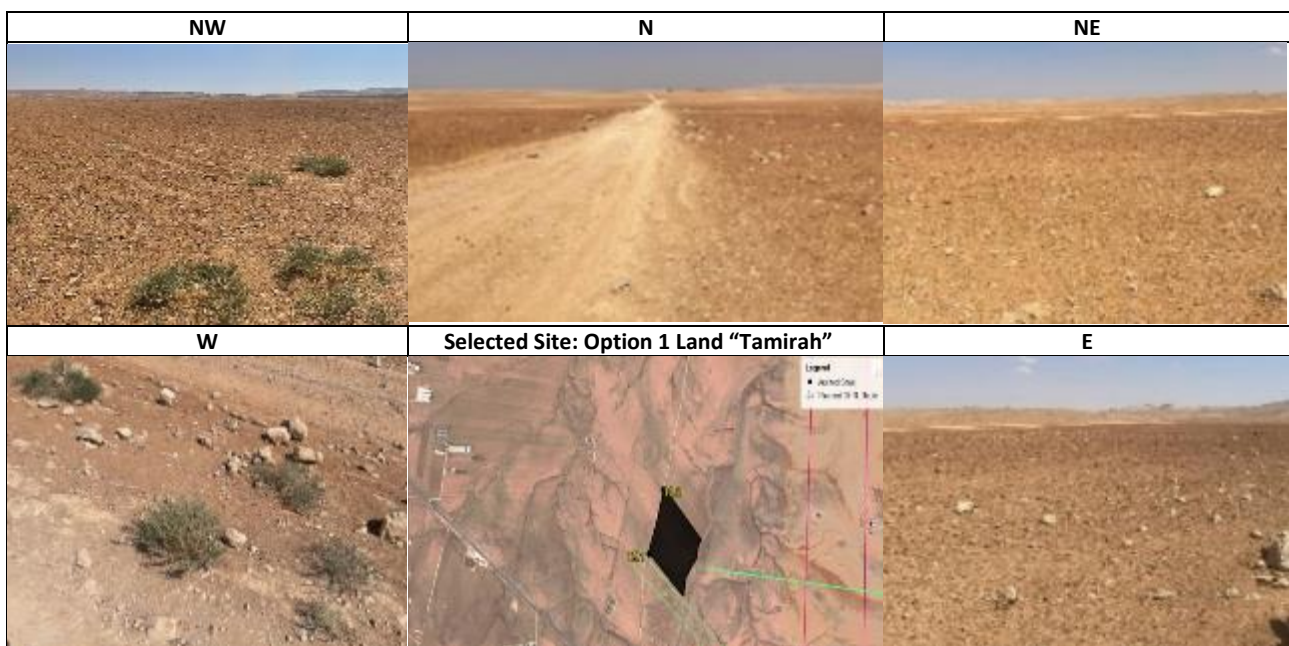
Option 2 for substation location - Land "Albarakeh"

Figure 2: Map Showing the Two Proposed Alternative Land Locations for the North Substation

Following a site assessment undertaken by the Consultant and another undertaken independently by NEPCO, the following is decided in relation to the **Project (the substation)**:

- Both lands are vacant, infertile, privately owned, and both with no existing current land use or productive use by the legal land owner or other informal land users such as farmers or herders.
- There are residents near option 2 land "Albarakeh" and it has no access (no entrance/exit) except through community localities and the land area is very small for the substation needs
- There are several agricultural activities taking place around option 2 land.
- Option 1 land has a larger land area, is not within proximity to communities and localities, and there are no existing land uses in the surrounding areas. There are no settlements, or obvious sensitive receptors nearby. As such, the Consultant and NEPCO has decided to go ahead with option 1 land "Tamirah".
- The option 1 land consists of 10 independent adjacent land plots which are collectively owned by 172 persons. NEPCO will acquire three (3) land plots completely, and parts of the other seven (7) land plots.

Photos taken from option 1 land are included below in Figure 3.



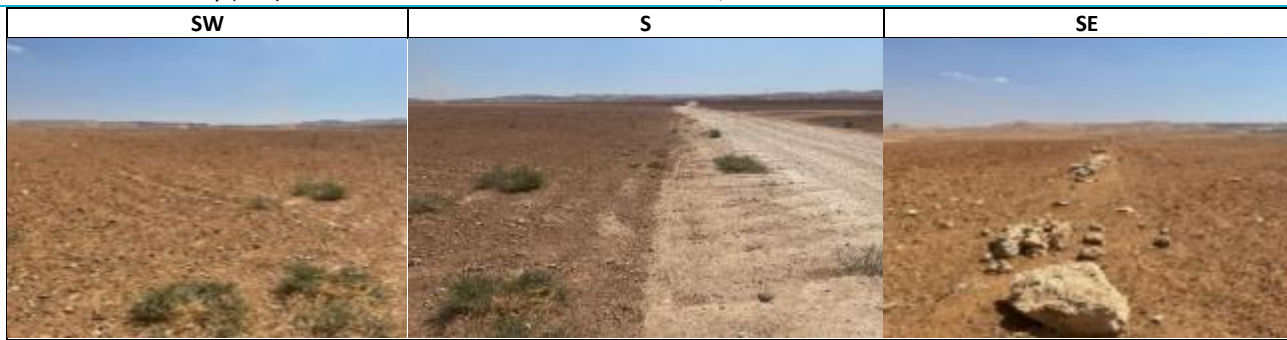


Figure 3: Photos of the Selected Site for the North Substation - Option 1 Land “Tamirah”

The selected location for the substation is privately owned and thus NEPCO could decide to undertake a direct negotiation and purchase the land plots from their owners. However, given the large number of land owners, according to NEPCO, this would be a difficult and time-consuming process. According to article No. 180 within the Real Estate Law No. 13 of 2019 issued by the Ministry of Finance, land acquisition without negotiation with the land owners for a public benefit project is permitted by law, if the negotiation process for the project was found difficult.

According to NEPCO, they will move forward with land acquisition directly without any direct negotiation with the owner(s) because the project is considered a public benefit project, and, due to the huge numbers of owners and the need to implement the project on a fast-track basis, it will be difficult to reach all owners to negotiate price. According to NEPCO, they are authorised by the law to acquire the land plots directly without negotiations with the owners due to these reasons.

This involuntary land acquisition process would trigger EBRD PR5 which is related to “Land Acquisition, Involuntary Resettlement and Economic Displacement”. This is investigated and assessed by the Consultant in a separate “Resettlement Framework” (RF) report. While NEPCO will carry out the land acquisition and compensation process in accordance with the local/national relevant legislations in Jordan (the Real Estate Law No. 13 of 2019), some additional measures will be required to be implemented by NEPCO in accordance with EBRD PR5, which are outlined in the RF Report.

2.1.2 Substation Components

A substation is an installation that interconnects elements of an electric utility’s system. These elements can include generators, transmission lines, distribution lines, and even neighbouring utility systems. An electrical substation is a part of an electricity generation, transmission and distribution system where voltage is transformed from high to low or in reverse using transformers. It also serves as a point of connection between various power system elements such as transmission lines, transformers, generators and loads. To allow for flexibility in connecting the elements, circuit breakers are used as high-power switches. Electric power may flow through several substations between generating plant and consumer, and may be changed in voltage in several steps. There are different kinds of substation such as Transmission substation, distribution substation, collector substation, switching substation and some other types of substations. The North Substation is a transmission substation. The general functions of a substation may include:

- voltage transformation
- connection point for transmission lines
- switchyard for network configuration
- monitoring point for control centre
- protection of power lines and apparatus
- Communication with other substations and regional control centre

The key components of the substation are the following: Power transformer, Current transformer, Voltage Transformer, Supervisory Control and Data Acquisition (SCADA) panels, Alternating Current (AC) panels, Direct Current (DC) system, Reactive power system (Static Synchronous Compensator (STATCOM)) - depends on the project, Surge Arrestor, Low Voltage (LV), Medium Voltage (MV) and High Voltage (HV) cables, SCADA Parts and sensors, Servers, Isolators, Gantries, MV Switch gears, Earthing system, Metering panels, billing system, control and protection panels, lighting system, capacitor bank, reactor, and Disconnectors.

NEPCO develops the basic design to include layouts, Single Line Diagram (SLD), structures, etc. for the substation. However, the final design should be provided by the contractor, it shall be developed according to NEPCO requirements and keeping according to international standards in view the functional requirement of the line and substation facilities to meet the major technical parameters and project parameters.

The substation is connected to the network through overhead lines.

Figure 4 below shows a typical view of a substation.



Figure 4: Typical View of a Substation

2.1.3 Substation Development Timeline, Phases, and Activities

- Construction and operation requirements for the substation:
 - Substation construction and operation requirements is determined by the NEPCO's Planning Department and provided to the Design Department. The layout of the substation is developed by the Design Department. The Civil Works Department is responsible for developing the layout of the associated infrastructure and utilities such as access roads, offices, etc.
 - The Execution Department and Civil Works Department are responsible for the construction works internally by NPECO staff. A Contractor is assigned through a tendering process to supply the equipment only and NEPCO does not require a Contractor to undertake the construction of the substation.
- Provisional Timeline:
 - Substation Commercial Operation Date (COD) targeted date is quarter 4 of 2026.
 - The planning decision is expected to take six months from the approval of the Council of Ministers to the land acquisition.
 - Total duration of the project phases is approximately 24 – 26 months as outlined below:

- ✓ Tender phase to assign EPC Contractor is expected to take 5 – 6 months.
- ✓ Design phase from letter of award (LOA) to supply of goods is expected to be 12 – 14 months.
- ✓ Construction phase is around 6 – 7 months.
- After the design, tender and procurement, the key activities during the construction phase are anticipated to include the following:
 - Establishing the work zone, fencing it off and using signs to ensure the safety of the access points.
 - Preparing the substation site which involves ground levelling and earthwork.
 - Excavating and laying foundations such as building the formwork, installing the reinforcements and pouring concrete.
 - Installing the grounding grid for the safety of people and the equipment.
 - Building the command building for the equipment.
 - Backfilling the foundations and substation yard.
 - Assembling the steel structures.
 - Installing the electrical equipment and connecting them to the control room.
 - Carrying out the final inspection.

2.2 The Associated Facilities

Associated facilities are not financed by EBRD as part of the Project but in the view of EBRD are significant in determining the success of the Project or in producing agreed project outcomes. These are NEW facilities or activities: (i) without which the project would not be viable, and (ii) would not be constructed, expanded, carried out or planned to be constructed or carried out if the project did not exist.

Associated facilities in this case include the Overhead Transmission Line (OHTL) connecting from Al Hashimeyeh area to the North substation. The OHTL will be financed by NEPCO own budget or through other financing sources, but not through EBRD financing.

The EBRD will be financing the implementation of the 400 kV substation in the Rihab area, but not of the OHTL from Al Hashimeyeh area to the North substation. Though the OHTL is considered as associated facilities to the Project, the EBRD's ESP 2019 and its PRs require that the environmental and social appraisal of the project to include the assessment of the environmental and social risks and impacts of associated facilities as well as their management in accordance with the applicable laws, EBRD PRs, and Good International Industry Practice (GIIP).

2.2.1 OHTL Route

NEPCO provided a provisional route for the OHTL. The Consultant undertook a drive through and assessed all the accessible parts of the alignment. Figure 5 below shows the provisional OHTL route provided by NEPCO.



Figure 5: Provisional Route Provided by NEPCO for the OHTL Connecting from Al Hashimeyeh Area to the North Substation

The OHTL alignment generally passes through private land with some existing land use activities, agricultural areas with trees and crops, forest (haraj) areas, houses and buildings, and others. According to discussion with NEPCO, this alignment is only a provisional route that will be finalised after a Contractor is assigned through an open tendering process and NEPCO will require the Contractor to undertake a site survey and review of land documents from the Department of Land and Survey (DLS) and from relevant municipalities to avoid (to the extent possible) existing and future land use activities and users. According to NEPCO, the final design of the OHTL will not overlap with any residential buildings/houses.

NEPCO does not acquire the land for the Right of Way (ROW) for the OHTL and only compensates the land owners for potential losses and land use limitations that may arise due to the OHTL passing through their land. This is done in accordance with the General Electricity Law No. 64 of 2002. This compensation process will also be covered in the RF report prepared separately and will provide measures to bridge gaps identified between the process carried by NEPCO and the EBRD PR5 requirements.

2.2.2 OHTL Components

The key OHTL components include:

- **Transmission Towers:** The main component of the OHTL is the transmission towers. The transmission tower will be a Lattice Steel Structure designed to be three (3) Phases, Double-Circuit Transmission Towers (DCT), which will be the carrier of the conductors that will transport the electrical power between both ends of the transmission line and connect the substation with the High Voltage National Grid. The typical structure of the DCT tower is presented in Figure 6 below. The number of towers that will be distributed throughout the routes is still unknown. Generally, for such projects, NEPCO adopts a maximum tower height of 49.65 m and a minimum height of 30.00 m for 132kV transmission line towers, and a maximum tower height of 70.70 m and a minimum height of 49.00 m for 400kV transmission line towers. The number of towers, tower spotting, the height of each tower, and towers' final location, and the final route with its buffer will be determined at a later stage as part of the detailed design studies to be undertaken by the EPC Contractor which will be assigned by NEPCO at a later stage.

Each transmission tower will consist of the following:

- **Foundations:** each tower will be fixed to the ground through reinforced concrete foundations (Pad and Chimney). The exact area for each foundation was not provided by NEPCO but it will be determined at

a later stage as part of the detailed design, since the area of each foundation and the tower area between legs depend on many variables including tower type, soil type, and tower extension.

- Basic Tower Body: this is the second part of the transmission tower, it is connected to the foundation chimney by stubs (embedded steel member in the foundation – connected to main tower leg), and carries the cross arms and all other tower accessories.
- Cross-Arms: each tower will have six (6) steel beam cross arms (3 on each side) which carries the conductors and their insulators strings (discussed below) with the towers (refer to Figure 6 below).
- **Conductors**: The conductor is the conductive part of the line used to carry electrical energy from one tower to the next until its connection with the High Voltage National Grid. Number of conductors in each line depends on the lines characteristics which was mentioned earlier. Conductors to be used for the lines are AAAC Yew for 32kV lines, ACSR/ACS 560/50 for 400kV lines, and ACCC for the upgradation part of 132kV as HTLS conductors.
- **Insulators Strings**: Components that are used to connect the conductors to the cross arms of the towers, and keeping them insulated and away from any nearby grounded structure. These strings are generally of two (2) types; Suspension, and Tension insulator strings.
- **Earth wire/ OPGW**: Optical Ground Wire (OPGW), same as conductors, the OPGW is a conductive part of the line but it is not used for the electrical power transmission. The conductive part of the cable serves to bond adjacent towers to earth ground, and shields the high-voltage conductors from lightning strikes. The OPGW cable is run between the tops of high-voltage transmission towers and pylons.

The optical fibers within the cable can be used for high-speed transmission of data, either for the electrical utility's own purposes of protection and control of the transmission line, for the utility's own voice and data communication, or may be leased or sold to third parties to serve as a high-speed fiber interconnection between cities.
- **Infrastructure Elements**: Based on discussions with NEPCO, the only infrastructure requirements for the Project will be access roads, which might be required in areas where the towers are inaccessible based on existing site conditions. Such access roads are required for access of construction vehicles and machinery during construction and for maintenance activities during operation. The layout of the access roads within the Project site will be determined at a later stage as part of the detailed design to be prepared by the EPC Contractor.

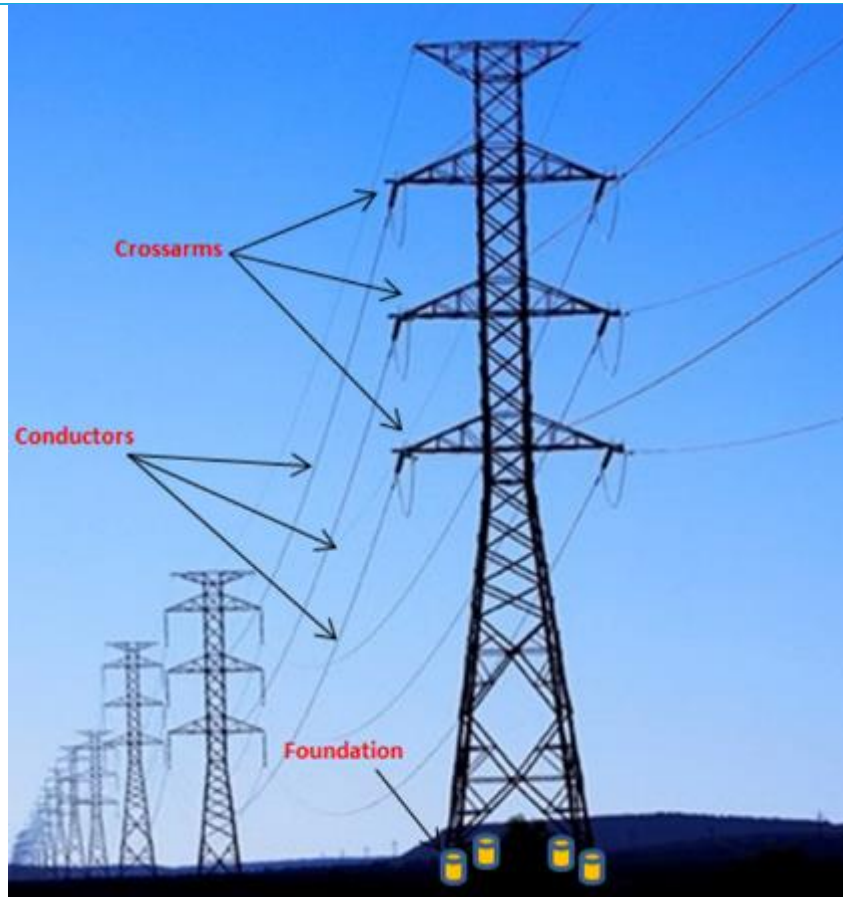


Figure 6: Typical Structural Components of DCT towers



Figure 7: Typical View of an OHTL

2.2.3 OHTL Development Timeline, Phases, and Activities

- Timeline for the OHTL development:
 - Total duration of the project phases is approximately 26 months as outlined below:
 - ✓ Total duration for tender document preparation is 2 months in addition to tender evaluation for a period of 2-3 months. The Contractor assigned requires 2 months for the site surveys. Total period is around 6 months.

- ✓ The review period of the detailed site survey report by NEPCO takes around 21 days during which NEPCO will announce in the newspapers regarding the planned OHTL and giving land owners a period to submit grievances or objection (15 days period – included within the 21-day period). The final approval for the contractor to start the construction works is issued after 15 days of making the announcement. The contractor submits the OHTL towers spotting during the review period (21 days) or the announcement period (15 days), or afterwards.
- ✓ The final approval for the contractor to start the construction works is issued after 15 days of making the announcement if the OHTL towers spotting was submitted.
- Construction phase is around 20 months.
- After the design, tender and procurement, the key activities during the construction phase are anticipated to include preliminary and construction works as follows:
 - Preliminary works will relate to the route selection, reconnaissance and preliminary surveys, as well as approvals and clearances.
 - Construction activities will involve:
 - ✓ Detailed survey and plotting of profile
 - ✓ Tower spotting and tower schedule
 - ✓ Check survey and location marking
 - ✓ Stub setting
 - ✓ Erection of towers and fixing of accessories
 - ✓ Stringing of conductors and earth wire
 - ✓ Earthing
 - ✓ Protection of tower footings
 - ✓ Clearing of Right of Way
 - ✓ Final checking, testing and commissioning
 - Energising of the OHTL by NEPCO

3. PROJECT OWNERSHIP AND LEGAL COMPLIANCE

3.1 Project Ownership

As mentioned before, the Project is funded by EBRD through a sovereign-guaranteed loan to NEPCO which is considered to be the owner and operator of the Project.

3.2 Legislative Compliance and Local Environmental Permitting for the Project and the Associated Facilities

The E&S Assessment is carried out in accordance with:

- Applicable local legislations and requirements;
- The EBRD's ESP (2019); and
- Relevant international conventions and protocols relating to environmental and social issues.

In accordance with the EBRD Environmental and Social Policy (ESP) (2019), the Project is categorised "B", which implies that its potential adverse future environmental and/or social impacts are typically site-specific, and/or readily identified and addressed through mitigation measures.

With respect to national environmental permitting requirements, the Ministry of Environment (MoEnv) is the governmental institution responsible for 1) environmental permitting processes and environmental clearance, and 2) preventing and reduce pollution-based negative environmental impacts.

MoEnv screens and categorizes projects for environmental permitting based on the Jordanian Environmental Classification and Licensing Regulation No. 69 of 2020 and its amended Regulation No. 97 of 2020 and based on their environmental impacts and as per Annex 1 of the regulation. The MoEnv categories are:

- **Category 1 (High Risk):** includes projects that may be associated with high risk to environment and human health and require special mitigative measures. Such projects are presented in Table 1 of the regulation and require a full environmental impact assessment.
- **Category 2 (Medium Risk):** includes projects that may be associated with medium risk to the environment and environmental services, or to human health. Such projects are presented in Table 2 of the regulation and require a preliminary environmental impact assessment.
- **Category 3 (Limited Risk):** includes projects that are associated with limited potential risks to the environment, environmental services, or project location. Such projects are listed in Table 3 of the regulation and require only an environmental approval from the MoEnv.
- **Category 4 (Low Risk):** includes projects have low risk to the environment. Thus, these projects listed in Table 4 do not require any further approvals from the MoEnv, but require commitment to environmental management measures.

Under the regulation No. 69 of 2020, Table 1 lists projects considered as Category 1 (High Risk) and this list includes power production projects and high voltage power transmission lines which are +15 km long. Thus, overhead transmission lines are Category 1 projects (High Risk) and would require a comprehensive EIA study to obtain the environmental permit. In addition, based on discussions with the MoEnv in relation to identifying what are the MoEnv requirements for the substation, the process would include submitting an application to the MoEnv and identifying the project with clear description of components and scale which would then be studied by the Central Licensing Committee to decide if the location is approved and whether a comprehensive or preliminary EIA is required.

The permitting process would involve an application to MoEnv, site approval by MoEnv, and screening by MoEnv followed by a comprehensive EIA for the OHTL and comprehensive/preliminary EIA for the substation to obtain an environmental permit by an accredited local EIA Practitioner. The list of accredited consultants is available on the MoEnv website.

It should be noted that Regulation No. 69 of 2020 does not indicate separation or setback distances for substation from residential areas or sensitive receptors. This will be decided by the Central Licensing Committee once the application is submitted to the MoEnv.

For the substation and any energy transmission project, the MoEnv would check the location and ensure it meets the following criteria: it is not within regularised land use boundaries, it is within a suitable setback distance from sensitive receptors (between 500 and 1000 metres depending on the scale of the substation), and not within forest areas. They will also assess its proximity to Key Biodiversity Areas (KBAs) as identified by the Royal Society for the Conservation of Nature (RSCN). If the site is close to or located within a KBA, it does not necessarily mean that the location will be rejected but this shall be assessed by the committee and specific requirements may apply.

The EIA would also require a public scoping hearing to set the TOR. The project and environmental baseline shall be described, impacts assessed, and mitigation measures developed. This licensing regulation is broadly in line with the process required by the EU Directives, with the exception of elements related to social assessment, and on consultation and information disclosure. Crucially, it falls short on implementation and follow up, especially in relation to follow up on the Environmental and Social Management Plan (ESMP).

Based on the above and as part of the continued Project development and detailed engineering design, the substation and its associated facilities (if any) will be subject to an EIA in line with the Jordanian legislations.

4. ENVIRONMENTAL AND SOCIAL BENEFITS, ADVERSE IMPACTS AND MITIGATION MEASURES

4.1 Key E&S Benefits

The development of a substation and OHTL are generally associated with concerns over land use, health and safety aspects, and risks to biodiversity. However, with the adoption of E&S management plans with Stakeholder engagement and grievance redress mechanisms such impacts are considered manageable. For the case of this project, the OHTL required for the substation will entail a route requirement with a right of way (ROW) which could result in physical resettlement for the purpose of construction of associated facilities. Cases may arise where farmers will lose part of their grazing or farmland areas due to the location of the towers or tower access road. In these cases, there will be a provision of sufficient compensation based on the relevant national legislations. Thus, such impacts are considered also manageable with proper E&S management measures.

However, as discussed before, the new substation will strengthen the reliability and stability of the transmission network and improve capacity of the electricity system to absorb existing renewable energy generation in the Northern area, as well as allow for the development of up to 600 MW of additional solar PV generation capacity in the Rihab-Mafraq area. This will enhance the socio-economic situation of the area when utilities and power supply are provided. Moreover, this will support the power evacuation of renewable energy projects which is a clean power generation that would help reduce greenhouse gas emissions and be part of climate change adaptation measures.

4.2 Key Issues and Impacts

There are some adverse E&S impacts that are easily managed with proper management systems and monitoring on the ground. These are summarised in Table 2 below.

Table 2. E&S Impacts Associated with the Substation and Associated Facilities

Impact	Phase	Description	Additional Mitigation Measures
Air Quality and Noise impacts	Construction	Air pollution concern is limited to the dust that will be generated due to movement of vehicles across the dirt road to haul project materials and electrical poles as well as due to the excavations needed for the substation foundations and the stub setting for the OHTL. However, these are anticipated to be limited in area and to extend over a short duration and accordingly to be of low consequence. Noise or vibration are anticipated to be minimal since the project construction works will not be adjacent to any residential communities or other sensitive receptors.	Construction team (NEPCO and EPC Contractor) to prepare and implement a dust and pollution control procedure which identifies sources of dust and air pollution, mitigation measures to prevent nuisance dust and other air emissions
	Operation	Dust would be generated due to movement of machinery across dirt access roads to reach the Substation and OHTL for maintenance activities.	None.
GHG emissions	Construction	The operation and movement of vehicles and machinery is associated with emission of gases that contribute to GHG emission. However, this is considered to be a negligible and temporary source and hence not a significant impact. It is recommended to ensure that vehicles and machinery are turned off when not in use.	Ensure that vehicles and machinery are turned off when not in use and undertake regular maintenance of construction equipment.
	Operation	The project will support the power evacuation of renewable energy projects which is a clean power generation. This is a positive impact that would help reduce greenhouse gas emissions and be part of climate change adaptation measures.	None.
Geology, topography and soil impacts	Construction	Modifications related to topographical features or subsidence will not be significant as excavations will be limited in surface area to the foundations of the substation and to the stubs of the OHTL. Consequently, no impacts are anticipated on geology and topography. Leakage of small amounts of oil may occur from moving vehicles causing soil pollution. This accidental leak is likely to happen. However, given the limited number of vehicles and with spill response measures, the impact significance is anticipated to be low.	Need for an emergency response spill plan.
	Operation	Leakage of small amounts of oil may occur during maintenance works.	Need for an emergency response spill plan.
Hydrology and Water Resources	Construction	The construction works will not include any modifications related to hydrology nor water consumption. Water demand is limited to the workers municipal water demand. Consequently, no impacts are anticipated. Moreover, there are no surface water bodies close to the construction works sites. However, the overall project and its associated facilities are located within the Azraq groundwater basin and any spills may pose a threat to the groundwater quality. Accordingly, proper handling of any chemicals/oils during construction works is needed along with having an emergency spill management plan in place.	Need for an emergency response spill plan.
	Operation	None.	None.

Non-Technical Summary (NTS) – NEPCO Eastern Green Corridor Substations/Jordan

Impact	Phase	Description	Additional Mitigation Measures
Waste Management	Construction	A small amount of solid waste is expected to result from activities such as excavation and packaging used for construction material. However, if properly collected and disposed of at specified disposal sites, then no impacts would occur. Hazardous waste will be limited to the used machinery oils from the operation and maintenance of machinery and can be managed by adopting proper waste management procedures. With respect to domestic wastewater from employees on construction site, the number of workers is anticipated to be limited and they can use portable toilets connected to septic tanks, whose septage is emptied and disposed of at an approved wastewater treatment plant.	Solid waste and wastewater disposal at approved locations.
	Operation	The solid and liquid wastes anticipated from project operation and maintenance include: - used oil and empty oil cans from changing oil for standby generators. - wastes that may result from maintenance works. The unsafe disposal of the oils and their containers constitute a threat of pollution to soil and eventually to groundwater resources. The project needs to ensure having a proper storage, transport and disposal of these solid wastes. These are to be transported to an approved disposal site in line with national Jordanian legislation.	Solid waste management plan for maintenance works and spill response emergency plan is in place.
Climate change impacts	Construction	Climate change impacts are mainly caused by increase in temperature and change in precipitation and surface runoff patterns. The potential impact that may affect the Project and its associated facilities are the flood events. However, the designated areas within Mafraq Governorate is considered to be a low flood risk region.	None.
	Operation	As discussed for the construction phase, there is not risk of floods due to climate change impacts.	None.
Landscape and visual impacts	Construction	Some visual disturbance may occur during construction works. However, these are temporary and short-term visual intrusions and, hence, no significant impact is anticipated on this component.	Limit area of construction activities by delineating the substation construction site using a fence.
	Operation	Visual intrusion of the substation building is not anticipated. Only visual intrusion of the OHTL.	<ul style="list-style-type: none"> - Ensure substation building design blends with surrounding environment. - Ensure the OHTL reconnaissance and preliminary surveys chose routes of minimal visual intrusion.
Biodiversity impacts	Construction	<p>The construction of the OHTL will result in vegetation removal depending on the vegetation or agricultural activities available along the OHTL route.</p> <p>Modifications related to ecosystem are not anticipated. Moreover, the project site is not close to any protected areas and is at least 2 km from any important bird areas (IBA), and only the OHTL may pass through rangeland reserves. Accordingly, no impacts related to habitat modification. Some concerns may arise regarding i) animal hunting, and ii) vegetation clearing in case the OHTL pass through a rangeland.</p> <p>Moreover, there is an expected use of access roads, which might be required in areas where the towers are inaccessible based on existing site conditions. Such access roads are required for access of construction vehicles and machinery. The layout of the access roads within the Project site to be determined at a later stage as part of the detailed design needs to minimize the development of new access roads.</p>	<ul style="list-style-type: none"> - Optimize the selection of the OHTL route to reduce vegetation or agricultural crops removal. - Minimize the development of new access roads. - Workers are trained to avoid animal hunting and vegetation clearing. - Adopting good international practice for reducing bird mortality resulting from transmission lines and use of bird diverters and deflectors.

Impact	Phase	Description	Additional Mitigation Measures
		Also, any new OHTL also has the potential to impact bird migration corridors. This will require confirmation through a bird survey to be undertaken at a later stage. Therefore, potentially sensitive areas will be avoided, and adoption of various biodiversity mitigation measures are expected to be implemented as part of the project, such as a horizontal profile for the wires and use of bird diverters and deflectors, hanging conductors which are widely used and accepted as good international practice for reducing bird mortality resulting from transmission lines.	
	Operation	Access roads required in areas where the towers are inaccessible based on existing site conditions. Such access roads are required for access of vehicles for maintenance activities. The layout of the access roads within the Project site to be determined at a later stage as part of the detailed design needs to minimize the development of new access roads. Ensure the biodiversity mitigation measures planned during construction phase are implemented and followed.	Minimize the development of new access roads.
Income generation	Construction	During the construction phase, labour will be skilled workers. Also, work periods are expected to be short with a limited workforce number. Thus, no impacts are anticipated on economy for local community members.	None.
	Operation	Improving the performance of the national power grid and securing reliable power supply is a positive impact that would enhance economic performance. However, besides reliable power supply, no direct economic benefit is anticipated to local community from project operation.	None.
Water Quality / Water Consumption	Construction	Water use for construction phase is expected to be limited to workers domestic needs and will be supplied by water tankers. Accordingly, no impacts on water use are anticipated. However, any accidental or unsafe disposal of oils/chemicals during maintenance works constitute a source of pollution to underlying groundwater resources. Therefore, a plan for proper handling and disposal of oils/chemicals is needed along with a spill response plan.	Ensure a spill response emergency plan is in place.
	Operation	No water consumption is anticipated during operation phase. No impacts on water quality will arise as a result of consumption of water quantities. However, any accidental or unsafe disposal of oils during maintenance works constitute a source of pollution to underlying groundwater resources. Therefore, a plan for proper handling and disposal of oils during maintenance works is needed along with a spill response plan.	Ensure a spill response emergency plan is in place.
Community acceptance	Construction	Given that in general expert workers are hired to work on power projects, there is a concern that local community will protest and require having job opportunities. This needs to be handled through the Stakeholder Engagement Plan (SEP). Also, complaints by local community members may arise regarding impact to their lands during the OHTL construction. So, a Grievance Redress Mechanism needs to be in place for the Project and its associated facilities.	<ul style="list-style-type: none"> - Ensure that SEP has a focal point for outreach with local community. - Ensure that a Grievance Redress Mechanism is in place.
	Operation	During operation, concern may arise if local community members had concerns regarding health impacts of having an OHTL close to their residences. However, the final design of the OHTL alignment will not overlap with any residential buildings/houses and hence there will be no concern of community rejection due to health concerns. Still, community rejection may arise when due to the OHTL right of way (ROW) and disagreement over compensation. Therefore, a Grievance Redress Mechanism is needed.	Implement the Stakeholder Engagement Plan and Ensure that a Grievance Redress Mechanism is in place.

Impact	Phase	Description	Additional Mitigation Measures
Resettlement, land acquisition, and compensation	Construction	<p>The substation chosen location is a privately owned land with a large number of land owners. However, NEPCO, following the national Real Estate Law No. 13 of 2019, intends to move forward with land acquisition directly without any direct negotiation with the owner(s) because the project is considered a public benefit project. On the other hand, this will be considered as involuntary land acquisition process and would thus trigger EBRD PR5 on “Land Acquisition, Involuntary Resettlement and Economic Displacement”.</p> <p>With respect to the associated facilities, the final design of the OHTL alignment will not overlap with any residential buildings/houses. However, the OHTL alignment generally passes through private land with some existing land use activities, agricultural areas with trees and crops, forest (haraj) areas, and others. NEPCO, in accordance with the General Electricity Law No. 64 of 2002, does not acquire the land for the Right of Way (ROW) for the OHTL and only compensates the land owners for potential losses and land use limitations that may arise due to the OHTL passing through their land. Though this is only a provisional route that will be finalised after a Contractor is assigned and though efforts will be exerted to avoid (to the extent possible) existing and future land use activities and users, the OHTL may still trigger resettlement. So, there will be compensation process that needs to be covered in the RF report prepared separately and will provide measures to bridge gaps identified between the process carried by NEPCO and the EBRD PR5 requirements.</p>	Preparation and implementation of a Resettlement Plan in line with EBRD PR5 and that will bridge gaps identified between the process carried by NEPCO and the EBRD PR5 requirements.
	Operation	Any unresolved land acquisition cases that may trigger grievances.	Ensure that a Grievance Redress Mechanism is available.
Land use planning and changes	Construction	Temporary changes to land use during construction phase may arise due to having lay down material sites. However, these are temporary land use changes.	None.
	Operation	OHTL towers have EMF that affect health. Though the OHTL route alignment will avoid residences and will have ROW, future land use activities need also to ensure avoiding the siting of residences close to OHTL.	<p>Limit public exposure to electric and magnetic fields (EMF), including:</p> <ul style="list-style-type: none"> - NEPCO to ensure substation facilities, towers and corridor are beyond the ESIA-required buffer zones/clearances for houses/properties and in accordance with NEPCO regulations - NEPCO to measure EMF at houses/buildings within 150m of substation and OHL and apply appropriate mitigation if needed to reduce potential exposure
Vulnerable group and gender considerations	Construction	Though during construction phase the majority of workers are anticipated to be male workers, no negative impact on gender is expected. This is anticipated because the majority of construction workers in the country are usually men.	None.
	Operation	None.	None.
Child Labour	Construction	The project will abide by local regulations, ILO core labour standards (with the minimum age for work at 18 years) and accordingly no child employment is anticipated and no negative impact on the rights of the child is expected.	Abide by local regulations and ILO core labour standards for minimum age for work.
	Operation	Similarly, the project will abide by local regulations, ILO core labour standards (with the minimum age for work at 18 years) and accordingly no child employment is anticipated and no negative impact on the rights of the child is expected.	Abide by local regulations and ILO core labour standards for minimum age for work.

Impact	Phase	Description	Additional Mitigation Measures
Public health and safety impacts	Construction	Potential sources of impact are traffic accidents due to moving vehicles to and within the project site as well as public access to construction locations. These risks requires that the vehicle drivers abide by speed limits and that construction locations be closed to public access. No residential units are available at small distances to the substation and the OHTL is expected to follow safe distance from residences. Hence, health concerns associated with exposure to electromagnetic field (EMF) from OHTL will not arise. Still, future land use activities need to ensure avoiding the siting of residences close to OHTL.	- Ensure work sites are inaccessible to public and construction staff to follow Road Safety Management Plan with safe driving training/instructions. - Ensure future land use avoids residences close to the OHTL.
	Operation	Public health and safety issues that may arise include electrocution from direct contact with high-voltage electricity or from contact with tools, vehicles, ladders, or other devices that are in contact with high-voltage electricity. To maintain safe conditions for the general public, appropriate signage must also be posted that alert to the danger of electrocution.	Ensure that signs are properly installed at components/locations posing risks of electrocution.
Occupational health and safety impacts	Construction	Several occupational health and safety risks would arise on the construction site including: - Safety risks such as tripping, falling, work injuries, lifting of heavy equipment, exposure to heat stress, working at heights, and accidental electric shocks are possible to occur. - Workers may be exposed to occupational hazards from contact with live power lines during construction. - There could also be a risk of fire accidents on site during construction works due to welding activities, workers smoking on site, etc. Accordingly, fire extinguishers of appropriate capacity need to be available on site. These risks require adoption of occupational health and safety measures.	- OHS Plan is in place with considerations to the workforce has access to primary healthcare on site with Available plan for transport of workers to the nearest medical centre. - Ensure maintenance workers are provided with Personal Protective Equipment (PPE) for workers (masks, safety glasses, safety boots etc.). - Ensure minimum legal labour standards as per ILO regulations and national regulations.
	Operation	Occupational health and safety issues that may arise include: - Potential exposure of workers to occupational hazards from contact with live power lines during operation and maintenance activities. - Safety risks such as tripping, falling, work injuries, lifting of heavy boxes, exposure to heat stress, working at heights, and accidental electric shocks are possible to occur. - There could also be a risk of fire accidents. Accordingly, CO ₂ fire extinguishers recommended for use on live electrical equipment need to be available during maintenance works.	- Ensure that chemicals/oils are safely stored and spill response measures are in place and workers are trained. - Ensure maintenance workers are provided with Personal Protective Equipment (PPE). - Ensure availability of Health and Safety Plan for maintenance works.
Existing utilities and infrastructure	Construction	No negative impact on existing infrastructure is anticipated. The movement of vehicles transporting materials and the workers to and from the work sites are anticipated to have minimal impact on road conditions especially that the vehicles movement will be limited in number and duration.	None.
	Operation	Positive impact by enhancing the performance of the national electrical grid.	None.
Traffic and Road Safety	Construction	No traffic jams are anticipated due to the limited number of vehicles that will be moving to and from the work sites. Though traffic accidents may occur, the limited number of moving vehicles makes the probability low. However, any accident is considered of high consequence and thus the impact is of high significance.	Follow Road Safety Management Plan with safe driving training / instructions.
	Operation	Traffic movement to and from the site will be limited and accordingly risks of traffic accidents will be very low.	Safe driving training/instructions for maintenance workers moving to and from the site.

Non-Technical Summary (NTS) – NEPCO Eastern Green Corridor Substations/Jordan

Impact	Phase	Description	Additional Mitigation Measures
Archaeology and cultural heritage impacts:	Construction	There are no known archaeological sites within the substation location or close to it. Moreover, since any needed excavations will be limited in area, no chance find incidents for archaeological sites are anticipated.	Follow Chance Find Procedures.
	Operation	None.	None.

With respect to cumulative impacts, at this stage the known developments projects in the area only include this Project, in addition to additional switching stations and high voltage transmission lines in the north east part of Jordan under Phase II. Also, solar power projects may arise given that the objective is to enhance the capacity of the system to allow for the development of up to 600 MW of additional solar PV generation capacity in the Rihab-Mafraq area. These projects are considered important for the socioeconomic development of the region and the country and no significant cumulative impacts have been identified so far.

5. THE KEY ACTION AREAS AND MEASURES FOR THE PROJECT

An Environmental and Social Action Plan (ESAP) has been developed and adopted in 2018 for the NEPCO Restructuring Loan – Jordan financed by EBRD. The ESAP prepared for this project covers the new substation project and the associated facilities, however, it does not replace or override the 2018 ESAP. This ESAP will be considered complimentary to the 2018 ESAP for the “NEPCO Restructuring Loan – Jordan” and NEPCO will be required to implement both ESAPs and report updates to EBRD.

The ESAP sets out the programme, identifies those responsible and defines success criteria, and as such provides a framework for monitoring the implementation of the measures. These measures revolve around:

- Ensuring that OHTL reconnaissance and preliminary surveys chose routes that does not cross residences, and that will lead to minimal resettlement and visual intrusion.
- Ensuring the substation building design blends with surrounding environment.
- Ensuring future land use avoids residences close to the OHTL.
- Adopting good international practice for reducing bird mortality resulting from transmission lines and use of bird diverters and deflectors.
- Minimizing the opening of new dirt access roads.
- Ensuring legal labour standards as per ILO regulations and national regulations.
- Ensuring availability of an OHS Plan for maintenance works with the workers provided with PPEs and trained to health and safety issues including driving instructions. Also, that the OHS plan accounts for workforce access to primary healthcare on site and transportation to the nearest medical centre.
- Ensuring availability of an emergency spill response plan.
- Training workers to avoid animal hunting and vegetation clearing.
- Limiting site accessibility by fencing and installing signs at components/locations posing risks of electrocution.
- Having a solid waste and wastewater disposal management plans that ensure disposal at approved locations.
- Following Chance Find Procedures in case of coming across archaeological or cultural heritage artefacts.
- Having the Resettlement Plan in line with EBRD PR5 and bridging any gaps between the process carried by NEPCO and the EBRD PR5 requirements.
- Ensuring a Grievance Redress Mechanism is in place.
- Ensuring a SEP is in place and has a focal point for outreach with local community.

6. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING

NEPCO will be establishing a comprehensive Environment, Health, Safety, and Social (EHSS) Management System (MS) including procedures specific for the Project and the associated facilities. NEPCO shall implement this EHSS MS during their construction works of the substations and shall also require the same from the EPC Contractor responsible for the construction of the OHTL. The objective of such systems is to manage EHSS risks

from project's construction and operation and ensure compliance with relevant EHSS national legislations and international best practice.

NEPCO will be monitoring the implementation of EHSS requirements by the EPC contractor during the construction and by NEPCO own staff during operation phase. In addition, the Project will be subject to periodic independent monitoring as per the requirements of the lenders.

7. STAKEHOLDER IDENTIFICATION, ENGAGEMENT PLAN AND GRIEVANCE REDRESS MECHANISM

A Stakeholder Engagement Plan (SEP) is developed for the Project with the objective of identifying key stakeholders and ensuring that they are informed in a timely manner of the project development. The key stakeholder groups that have been identified include:

- NEPCO as the owner and operator of the Project.
- EBRD as the Project financier and entity responsible for the monitoring of safeguard compliance.
- National Authorities such as Ministry of Labour (MoL), Directorate of Civil Defence, Ministry of Health (MoH), Ministry of Environment (MoEnv), Ministry of Finance (MoF), Ministry of Agriculture (MoA), Department of Antiquities (DoA), Ministry of Local Administration (MoLA), Ministry of Water and Irrigation (MWI) / Yarmouk Water Company, and Municipalities.
- Local Communities who are residents of the nearby community settlements which may be affected by the project.
- Vulnerable groups which usually include households below the poverty line, physically challenged persons with disability, elderly people, as well as local women groups.
- Contractors and Subcontractors for the construction activities.
- NEPCO workers responsible for the construction of the substation and for the operation and maintenance of the substation and the OHTL.
- Private Suppliers.

The consultation with the identified stakeholders is to be carried out in a structured and culturally appropriate manner and the main stakeholder engagement activities include:

- During Planning Phase: consultation session, focus group meetings, and disclosure of project information.
- Pre-Construction: i) informing all project employees/workers of the Grievance Redress Mechanism at the time of recruitment; and ii) assigning a Community Liaison Office (CLO) to communicate with stakeholders and construction workers prior to construction.
- During Construction: ii) NEPCO and the EPC contractor to maintain an open communication channel with local community and workers, and ii) Grievance Redress Mechanism which NEPCO is responsible for.
- During Operation: Grievance Redress Mechanism which NEPCO is responsible for.

For the disclosure, all interested and affected parties will be able to find the following documents regarding the Project on the NEPCO website (<http://www.nepco.com.jo>):

These documents will remain in the public domain for the duration of the Project. The Stakeholder Engagement Plan will be updated periodically. Hard copies of these documents will be deposited at the NEPCO central offices in Amman at the following address:

National Electric Power Company (NEPCO)
 Telephone: 5858615 6 00962
 Fax: 5818336 6 00962
 Address: P.O. Box 2310 Amman 11181 Jordan

Hard copies will also be available at NEPCO's office. To contact the centre, dial NEPCO central offices in Amman (contact details above) and request your call to be transferred the NEPCO North East office.

The SEP also identifies an additional grievance mechanism to be used by stakeholders for dealing with complaints, concerns, queries, suggestions etc. All comments and complaints will be responded to either verbally or in writing, in accordance with the preferred method of communication specified by the complainant, if contact details of the complainant are provided.

NEPCO will produce Annual Environmental & Social Reports for the Bank, which will include a summary of the Project's performance in relation to the management and monitoring of ESHS issues and a clear update on progress of implementation of ESAP actions. Any relevant updates will also be posted on the NEPCO website.

The SEP will be reviewed and updated on a regular basis. The SEP will be updated if activities change or new activities relating to stakeholder engagement commence. The SEP will also be reviewed periodically during project implementation and updated as necessary.

The HSE Department will be the focal point for the SEP and will be responsible for the implementation, monitoring and updating of the SEP during all phases of the Project development. Throughout the project lifecycle, they will ensure that the SEP is implemented adequately by the EPC Contractor as well as be responsible to implement the SEP during the operation phase. NEPCO higher management shall undertake quarterly reviews of the Stakeholder Engagement Plan implementation to ensure that the related NEPCO staff is implementing the Stakeholder Engagement Plan obligations (e.g. checking responses and logging of complaints and grievances).

8. COMMUNICATIONS

For NEPCO to fill

Entity: National Electric Power Company (NEPCO)

Attention: xxxxxxxx

Address: xxxxxxxxxxxxxxxxx

Telephone: +962-06-xxxxxxxxxxxxx

Fax: +962-06-xxxxxxxxxxxxx

E-mail: xxxxxxxxxxxxxxxxx

Website: xxxxxxxxxxxxxxxxx