

**ENVIRONMENTAL AND SOCIAL ASSESSMENT FOR EBRD
GREENFIELD: CATEGORY “A” PROJECT**

JORDAN: THE NORTH SUBSTATION AND OHTL PROJECT

NON-TECHNICAL SUMMARY (NTS)

September 2024

FINAL

REV. 03



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ABBREVIATIONS

AAAC	All Aluminium Alloy Conductors
AC	Alternating Current
CAP	Corrective Action Plan
CESMMP	Construction Environmental and Social Management and Monitoring Plan
CLO	Community Liaison Officer
DC	Direct Current
DCT	Double-Circuit Transmission Towers
DEMs	Digital Elevation Models
DLS	Department of Land and Survey
DoA	Department of Antiquities
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health, and Safety
EHSS	Environmental, Health, Safety and Social
EMRC	Energy & Minerals Regulatory Commission
EPC	Engineering, Procurement, and Construction
EPRP	Emergency Preparedness and Response Plan
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
GIIP	Good International Industry Practice
GoJ	Government of Jordan
GRM	Grievance Redress Mechanism
HV	High Voltage
IFC	International Finance Corporation
KV	Kilovolt
LV	Low Voltage
MoA	Ministry of Agriculture
MoEnv	Ministry of environment
MoF	Ministry of Finance
MoH	Ministry of Health
MoL	Ministry of Labour
MoLA	Ministry of Local Administration
MS	Management System
MV	Medium Voltage
MW	Megawatt
MWI	Ministry of Water and Irrigation
NEPCO	National Electric Power Company
NTS	Non-Technical Summary
OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
OPGW	Optical Ground Wire

PR	Performance Requirement
PCBs	Polychlorinated Biphenyls
PSD	Project Summary Document
PV	PhotoVoltaic
RF	Resettlement Framework
ROW	Right of Way
SCADA	Supervisory Control and Data Acquisition
SEP	Stakeholder Engagement Plan
SDS	Safety Data Sheet
SLD	Single Line Diagram
STATCOM	Static Synchronous Compensator
TMP	Traffic Management Plan
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

1.1 Background

The European Bank for Reconstruction and Development (the “EBRD” or the “Bank”) is considering providing a sovereign-guaranteed loan to the National Electric Power Company (“NEPCO”), a company wholly owned by the Government of Jordan (GoJ), with a tenor of up to 18 years and a grace period of up to 3 years. The loan agreement between EBRD and NEPCO is anticipated to be signed by December 2024.

The proceeds will be used to build an overhead transmission line (OHTL) and a greenfield substation (North Substation). The OHTL being developed by NEPCO with different new route connections with the following lengths: 31 km double line (two lines each 31 km), 3 km, and 9 km and replacement for an 11 km existing line.

The North Substation is a new 400/132/33 kV transmission substation, and related equipment in the Rihab area, located around 61km northeast of Amman, Jordan.

Together, the North Substation and the OHTL are referred to as (the “Project”).

The Project is categorised “A” in accordance with the EBRD Environmental and Social Policy (ESP) (2019). An Environmental and Social Impact Assessment (ESIA) is being carried out for the Project to identify and assess any potentially significant future adverse E&S impacts associated with the proposed Project, assess compliance with applicable national laws and the EBRD ESP 2019, 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 ESIA of the Project.

The ESIA is not prepared to be submitted to the MoEnv to obtain the permit. The Report provides most of the details required by the MoEnv but does not follow the process required by the MoEnv, particularly the “Environmental Classification & License Regulation and its Amendments No. 69/2020”.

NEPCO will be required to assign an accredited EIA consulting company to update the EIA for the Project as requested by the MoEnv to obtain the environmental permit for the Project. This will be one of the conditions of the loan agreement to be signed for the Project.

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 and OHTL 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 northeast part of Jordan under Phase II, thus allowing for additional renewable energy capacity to be connected to the grid (See Figure 1).

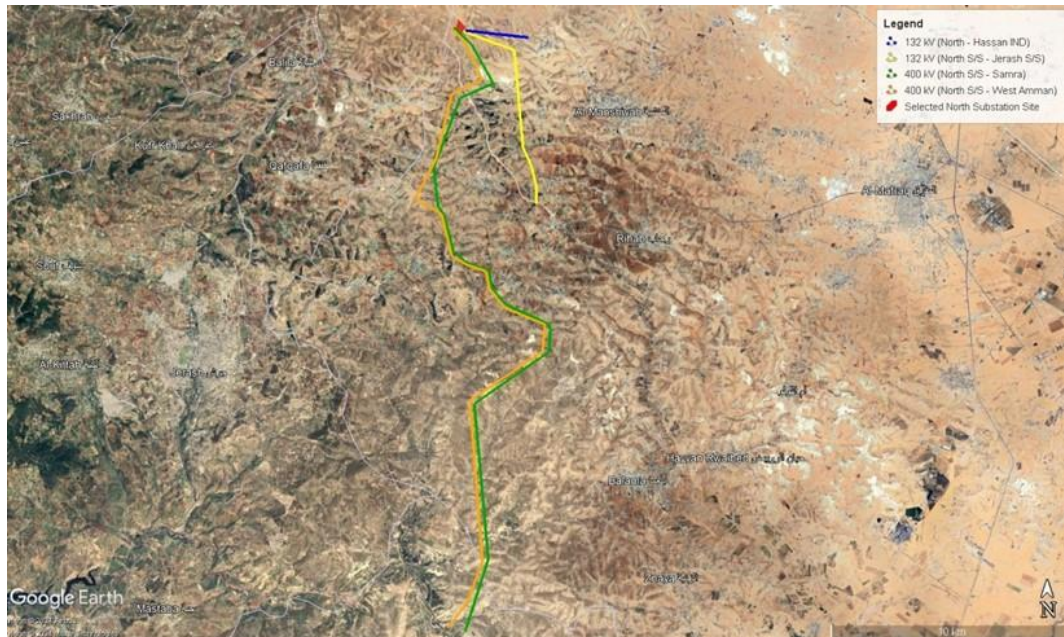


Figure 1: Map Showing Proposed Location of the North Substation and OHTL

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

Entity	Involvement and Relevance to the Project
NEPCO	<ul style="list-style-type: none"> ▪ “Borrower” of the loan provided by EBRD. ▪ The owner and operator of the Project. ▪ Providing a preliminary design of the substation and the OHTL. ▪ Selecting the Engineering, Procurement, and Construction Contractors for the substation and the OHTL through an open procurement process. ▪ Undertaking the site selection and land acquisition for the substation location including related compensation. ▪ Reviewing and approving the detailed design and the OHTL route prepared by the Engineering, Procurement, and Construction (EPC) Contractor and undertaking compensation procedures for the Right of Way (ROW) of the OHTL. ▪ Preparing and submitting reports to the Lender (EBRD) in relation to E&S compliance and implementation of the Environmental and Social Action Plan (ESAP) commitments integrated in the loan agreement. ▪ Installing the electrical components for the Substation. ▪ Undertaking operation and maintenance of the substation and the OHTL.
EBRD	<ul style="list-style-type: none"> ▪ The Project financier and responsible for the monitoring of E&S safeguard compliance.
Contractors and Subcontractors	<ul style="list-style-type: none"> ▪ Providing the final design of the Substation and the OHTL. ▪ Undertaking the construction activities of the substation and the OHTL.
Ministry of Environment (MoEnv)	<ul style="list-style-type: none"> ▪ The official governmental entity responsible for the conservation and improvement of the environment in Jordan. MoEnv is also responsible for reviewal and approval of the ESIA and granting the environmental clearance and permit for the project.
ECO Consult	<ul style="list-style-type: none"> ▪ Is the Consultant assigned by the EBRD to prepare the ESIA for the Project.
Project Implementation Unit (PIU) Consultant	<ul style="list-style-type: none"> ▪ Is the PIU Consultant assigned by EBRD through an open procurement process to provide organisational and technical assistance to NEPCO to ensure the successful planning and implementation of the Project in accordance with the Project Implementation Plan (PIP) and with all EBRD requirements stipulated in the Loan Agreement including E&S requirements and the ESAP implementation.

Entity		Involvement and Relevance to the Project
E&S Implementation Consultant (IC)	ESAP	<ul style="list-style-type: none"> Is the E&S Consultant to be assigned by EBRD to work with NEPCO over a 24-month period to implement the E&S requirements of the EBRD and the ESAP measures. This contract will be financed by EBRD.

2. DEFINITION OF THE PROJECT

2.1 The Substation

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 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 visit and audit undertaken by the E&S Team and another undertaken independently by NEPCO, the following is decided in relation to the proposed substation location:

- Both lands are vacant, infertile, and privately owned. Both lands do not have significant existing current land use or productive use by the legal landowner or other informal land users such as farmers or herders other than sporadic seasonal planting of barely.

- There are residents near alternative 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 alternative 2 land.
- Alternative 1 land has a larger land area, is not within proximity to communities and localities, and there are no significant existing land uses in the surrounding areas. There are no residential settlements, or obvious sensitive receptors nearby. In 2022 the area was completely vacant. However, the visit in 2024 indicated some land use activities taking place in the area but still dispersed with no residential land use.

In addition, Tamirah site meets several of the substation site selection requirements such as:

- Rectangular or square in shape for ease of proper orientation of bus– bars and feeders.
- Far away from obstructions, to permit easy and safe approach / termination of high voltage overhead transmission lines.
- Easily accessible to the public road to facilitate transport of material.
- Preferably levelled ground. This facilitates reduction in levelling expenditure.

As such, the E&S Team recommended the selection of Alternative 1 land “Tamirah”.

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

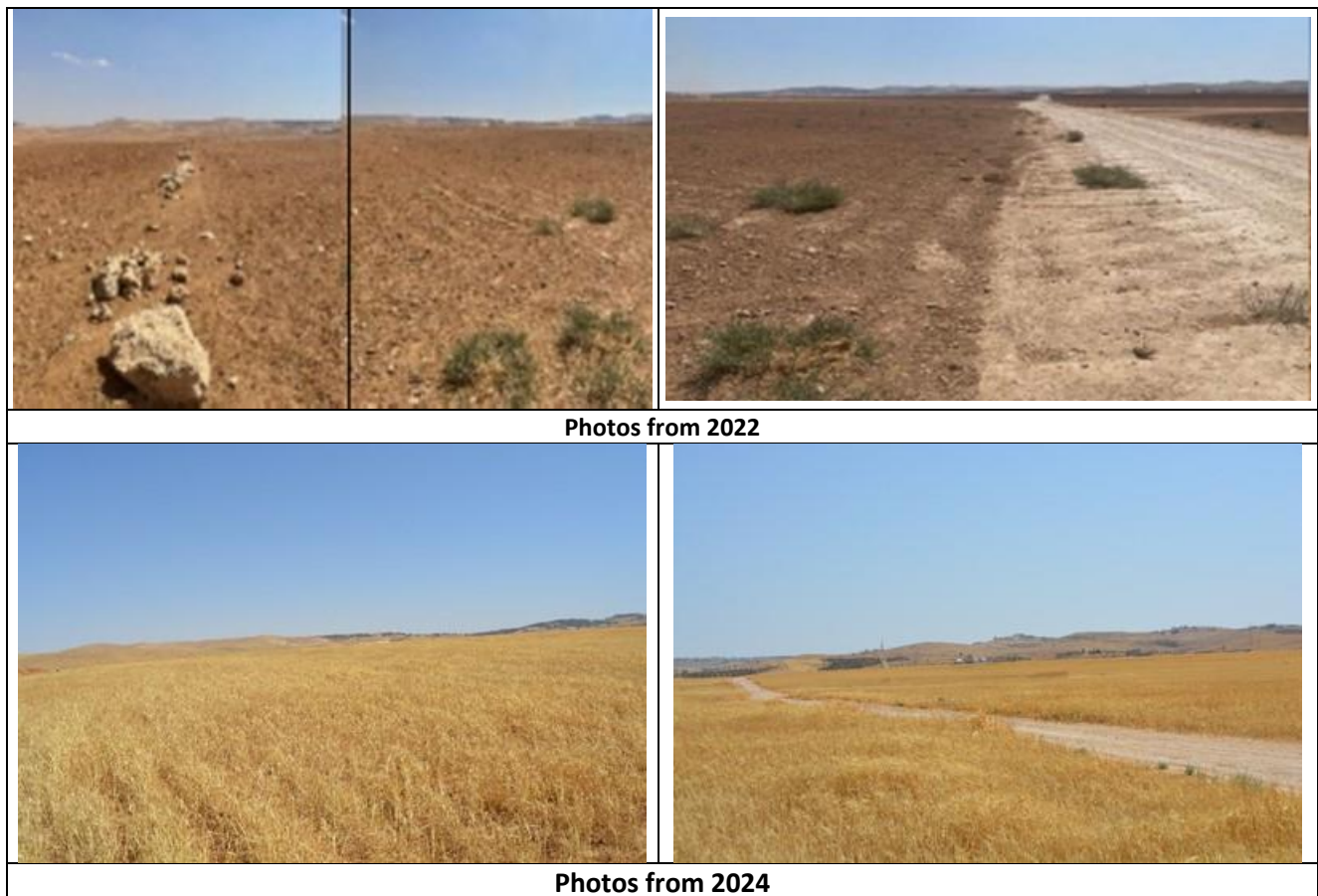


Figure 3: Photos of the Selected Site for the North Substation - Option 1 Land “Tamirah”

The selected land for the substation is vacant with no existing current land use other than sporadic seasonal ploughing and planting of barley and is not within proximity of communities and localities. There are no residential settlements, or obvious sensitive receptors nearby. In 2022 the area was completely vacant and roads leading to the general area of the substation land and the substation land itself were still under construction. However, the visit in 2024 indicated some land use activities taking place in the area but still dispersed with no residential land use. The new land uses have been attracted by the wide and paved road network leading to the general area.

The land is composed of 10 adjacent plots, collectively owned by 172 individuals. NEPCO will fully acquire 3 of these plots and portions of the remaining 7 plots.

NEPCO was advised to undertake a direct negotiation and purchase the land plots from their owners. However, given the large number of landowners, according to NEPCO, they already carried out land acquisition for land plots of a total of around 120 dunums to establish the substation and the land acquisition has already been approved.

According to article No. 180 within the Real Estate Law No. 13 of 2019 issued by the Ministry of Finance (MoF), land acquisition without negotiation with the landowners for a public benefit project is permitted by law, if the negotiation process for the project was found difficult. This is not in compliance with the EBRD ESP 2019 and associated PRs.

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 E&S Team in a separate “Resettlement Framework” (RF) report and a land acquisition and resettlement audit report.

While NEPCO is carrying 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 are required to be implemented by NEPCO to bridge gaps identified between the process carried by NEPCO and the EBRD PR5 requirements which are outlined in the RF Report and a land acquisition and resettlement audit report and in the Environmental and Social Action Plan (ESAP) prepared by the E&S Team to be included as part of the loan agreement and which are disclosed in the public domain

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 Arrester, 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 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.
 - Generally, the Execution Department and Civil Works Department are responsible for the construction works internally by NEPCO 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. However, in the case of this Project, it is expected that EBRD will require NEPCO to assign an EPC Contractor through an open tendering process to undertake the design, procurement, and construction of the Substation. NEPCO related staff may undertake the electrical and mechanical installations for the substation.
- After the design, tender and procurement, the key activities to be undertaken by the Contractor during the construction phase are anticipated to include the following:
 - Design, bill of quantities, and procurement and supply of material.
 - 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.
 - Preparing the laydown and storage areas and transport of material and equipment to the site.
 - 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.
- Undertaking the commissioning works for the substation.

2.2 The OHTL

2.2.1 OHTL Route

The OHTL starts from Al-Hashimeyeh area in Zarqa Governorate and passes through several districts and localities and ends at the selected location for the North Substation in Rihab locality within Al-Mafraq governorate. Figure 5 below shows the provisional OHTL route provided by NEPCO.

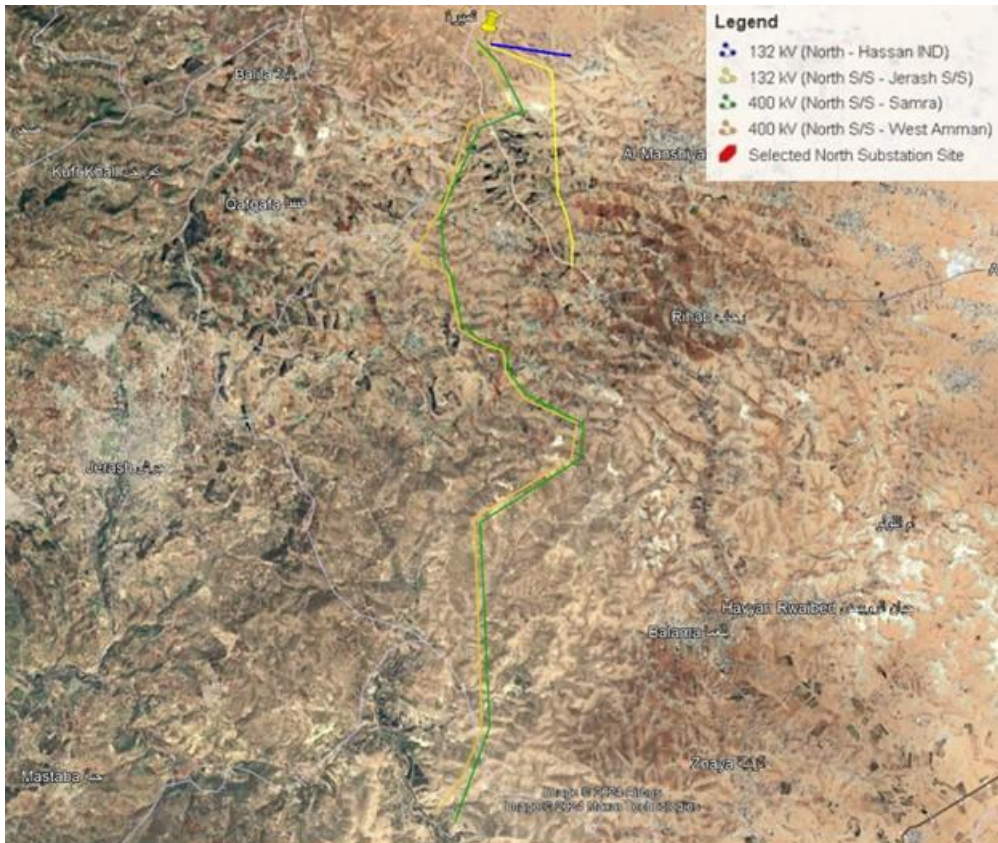


Figure 5: Provisional Route Provided by NEPCO for the OHTL

The proposed OHTL route passes through various private lands with existing land uses including agricultural areas with trees and crops and forest (Haraj) areas, as well as residential and others. Parts of the OHTL route is currently used by existing households, farms, and limited number of nomads – such areas should be avoided by the EPC contractor during the detailed design.

NEPCO indicated that this route is only a preliminary route and will be finalised after site specific surveys to be undertaken by an EPC Contractor selected through an open tendering process for the OHTL design, procurement, and construction works. The Contractor will also be required to review land documents and cadastral maps 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 and other important land use areas. According to NEPCO, the final design of the OHTL will not overlap with any residential buildings/houses.

To determine the optimal preliminary route for the OHTL, NEPCO has officially coordinated with all related government authorities to gather all data related to the OHTL route. Once the EPC Contractor is assigned, NEPCO will issue supporting letters to these authorities to facilitate and obtain no-objection and conditions for the EPC contractor to execute the OHTL.

NEPCO does not acquire the land for the Right of Way (ROW) for the OHTL and only compensates the landowners 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.

The proposed project does not penetrate any protected areas or particular conservation areas according to Jordan's network of protected areas, nor does it directly intersect with Key Biodiversity Areas (KBAs). Nearest KBAs to the Project site are Irbid-Mafraq Plains, Highlands of Ajloun and Dibbin Forest KBA as shown in Figure 6, which are located at around 8km, 15km, 20km, respectively from the Project location. According to Birdlife International, the following provides more details on each KBA (available online at [BirdLife Data Zone](#)).

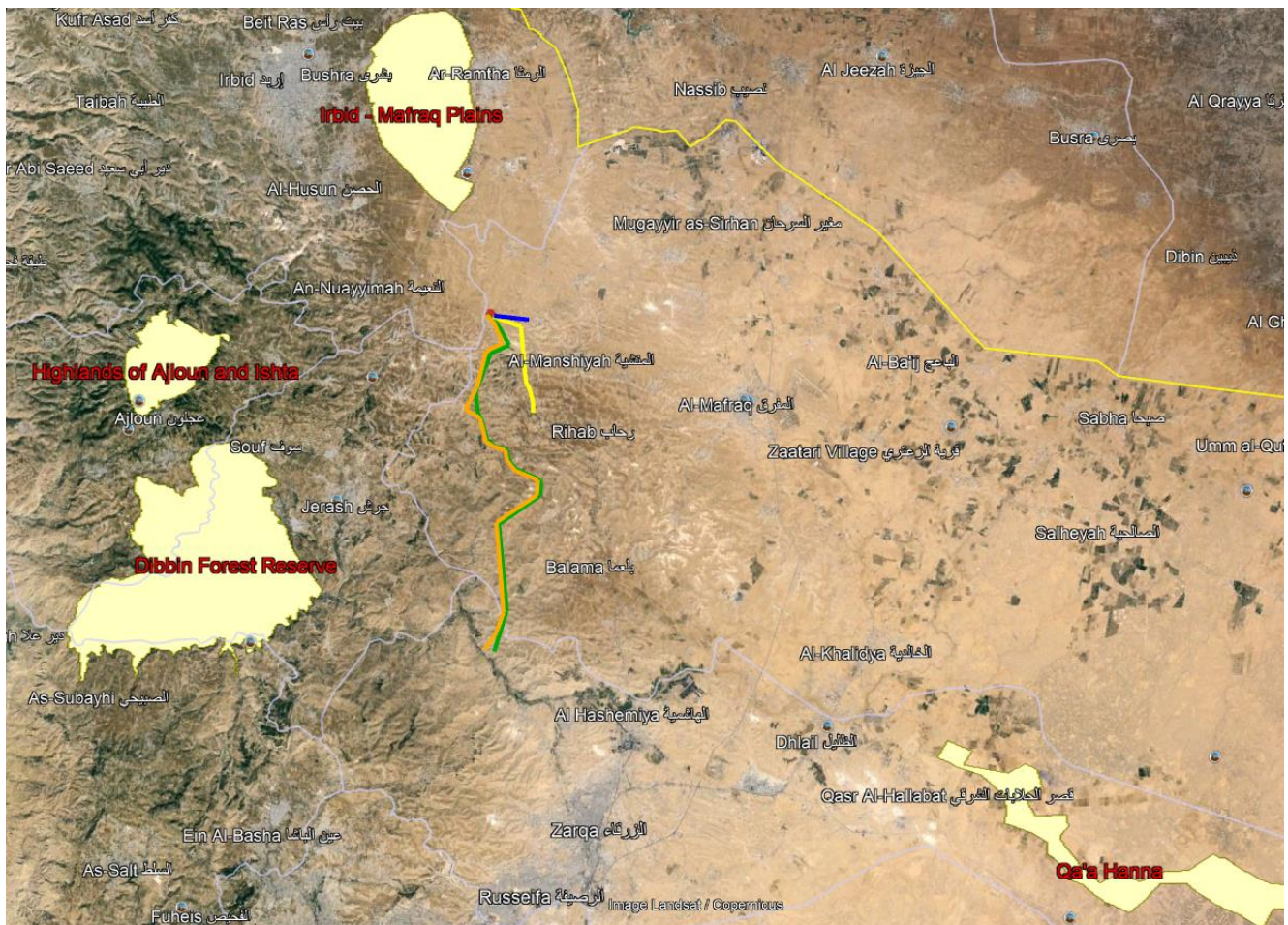


Figure 6: The Project Location in Relation to the Irbid-Mafraq Plains, Highlands of Ajloun and Dibbin Forest KBAs

2.2.2 OHTL Components

The connections are as follows:

- 400 kV OHTL (north s/s – Al Samra s/s) Length: 31 km
- 400 kV OHTL (north s/s -West Amman s/s) Length: 31 km
- 132 kV Super-Heated OHTL (North – Al Hassan Industrial Estate) Length: 11 km, as replacement of existing OHTL conductor + new 3 km OHTL to connect the said OHTL
- 132 kV conventional conductor OHTL (norths/s- Jerash s/s) Length: 9 km

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 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 7 below.
- Each transmission tower will consist of the following:
 - Foundations: each tower will be fixed and bolted to the ground through reinforced concrete foundations. There will be 4 foundations for each tower. The area of each foundation and the tower area between legs depend on many variables including tower type, soil type, and tower extension.
 - Steel structure: the foundations will support the steel structure that will carry the conductors, cross-arms, insulators and shield wire.
 - 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. The conductors will connect through the cross-arms.
 - Cross-Arms: each tower will have two 6 steel cross arms (3 on each side) which connect the conductors with the towers.
 - Shield Wire (also known as earth wire): positioned above the phase conductors, the shield wire is grounded at each tower to facilitate the safe and rapid dissipation of voltage surges caused by technical issues or external factors (e.g. lightning).
 - 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 2 types, Suspension, and Tension insulator strings. Insulators isolate the towers from the live wires that carry the electricity.
 - Earth wire/ 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 fibres in the cable enable high-speed data transmission for the utility's protection, control, communication, or can be leased/sold for city interconnections.
 - Based on discussions with NEPCO, the only infrastructure requirement for the project is access roads in areas where towers are inaccessible. These roads are necessary for construction and maintenance but will not be permanent. Vehicle access will be via existing tracks or dirt roads leading directly to each tower location. This will be confirmed in the detailed design stage by the EPC Contractor, who has yet to be contracted. The need for additional roads or expansions is unknown but will be addressed through the Resettlement Plan (RP) once the design is available.
- 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.

Based on information available at this stage from NEPCO, the basic span for towers for 400 kV lines is around 450 m and for 132 kV lines 335 but this defers based on the design, detailed site survey, and crossings with other OHTLs in the area (current and future).

The total number of towers for the OHTL connections is provided in Table 2. Final tower locations and numbers will be determined as part of the detailed design to be undertaken by the EPC Contractor.

Table 2: Number of Towers for the OHTL Connections

OHTL Connection	Number of Towers
400 kV OHTL (north s/s – Al Samra s/s) Length: 31 km	84-86
400 kV OHTL (north s/s -West Amman s/s) Length: 31 km	84-86

132 kV Super-Heated OHTL (North – Al Hassan Industrial Estate) Length: 11 km, as replacement of existing OHTL conductor + new 3 km OHTL to connect the said OHTL	10
132 kV conventional conductor OHTL (norths/s- Jerash s/s) Length: 9 km	28-30

There are different types of towers to be used for 400kV and 132 kV OHTLs. The type of tower that will be used is unknown at this point. The total footprint of the tower is unknown at this point as well. Based on discussions with NEPCO, the minimum and maximum tower footprint is provided below:

- For 400 kV OHTL: 180-900 m²
- For 132 kV OHTL: 80-324 m²

The footprint includes the 4 foundation locations, the area in between, as well as a 1.5m strip to be taken from centre of each foundation based on GIIP.

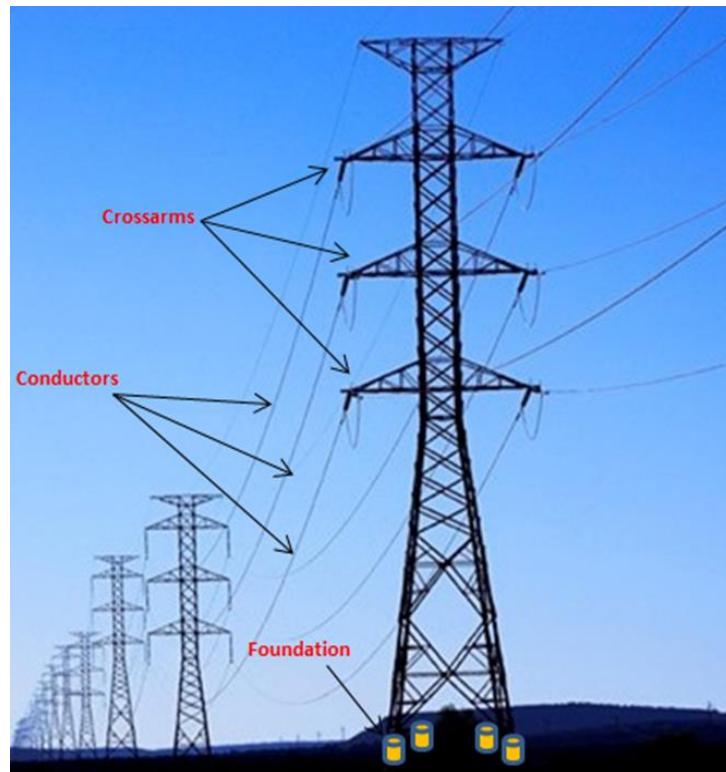


Figure 7: Typical Structural Components of DCT towers

2.2.3 OHTL Development Phases, and Activities

After the design, tender and procurement, the key activities during the construction phase to be implemented by the EPC Contractor 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:
 - Conduct a comprehensive survey of the proposed transmission line route to gather precise topographical data.
 - Plot the profile of the land to determine elevation changes and potential obstacles along the route.
 - Tower spotting and tower schedule.
 - Identifying the optimal locations for tower placement along the transmission line route, considering factors such as terrain, accessibility, and structural integrity.
 - Develop a tower schedule outlining the specifications and placement of each tower along the route.

- Check survey and location marking.
 - Verify the accuracy of the survey data and ensure alignment with project specifications
 - Mark the precise locations for tower foundations and conductor supports along the route.
- Installation of foundation anchors.
 - Excavate pits or trenches for tower foundations according to the design specifications.
 - Set the anchor bolts securely in the foundation pits to provide a stable base for tower erection.
- Erection of towers and fixing of accessories.
 - Assemble tower components and erect the towers according to the predetermined schedule.
 - Install accessories such as cross arms, insulators, and lightning arresters on the towers.
- Stringing of conductors and earth wire.
 - Pull the electrical conductors and earth wire along the route using specialised equipment
 - Ensure proper tensioning and spacing of the conductors to meet design requirements and minimize sag.
- Earthing.
 - Install grounding systems at tower locations and along the transmission line route to protect against lightning strikes and fault currents.
 - Ensure effective bonding between tower structures and grounding electrodes to maintain electrical safety.
- Protection of tower footings.
 - Implement measures to protect tower footings from erosion, soil movement, or other environmental factors.
 - Install protective barriers or erosion control measures around tower foundations as needed.
- Clearing of Right of Way.
 - Clear vegetation and obstacles within right-of-way corridor to ensure safe and unobstructed passage for transmission line.
 - Dispose of cleared vegetation and debris in accordance with environmental regulations.
- Final checking, testing, and commissioning.
 - Conduct final inspections and checks to verify the integrity and functionality of the completed transmission line.
 - Perform testing procedures, including insulation resistance tests, conductor continuity tests, and line energization tests.
 - Commission the transmission line for operation, ensuring compliance with regulatory standards and safety requirements.
- Energising of the OHTL by NEPCO.

2.3 The Project Timeline

- The Project is planned to be operational and the OHTL energised within 36 months from the signature of the loan agreement between the EBRD and NEPCO.
- Nov/Dec 2024: The loan agreement is expected to be signed.
- Q2 and Q3 2025: Tender phase to assign Contractor is expected to take 6-9 months
- Q4 2025: EPC Contractor to be assigned.

- Q1 and Q2 2026: Site specific survey and assessment of alternatives.
- Surveys and studies as part of the resettlement action plan shall be undertaken in parallel to the site-specific survey and assessment of alternatives for the OHTL alignment and the tower spotting. Required “Organisational Arrangements, Responsibilities and Key Actions for the Resettlement Action Plan” are included in the standalone resettlement framework disclosed along with this ESIA.
- The final approval for the EPC contractor to start the construction works is issued after 15 days of making the announcement if the OHTL towers spotting was submitted.
- Q3 2026 (June): Commence construction
- Construction and commissioning period 24 months.
- Q3 2028 (June): The Project shall be operational and OHTL energised.

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 “A”, which means that a comprehensive Environmental and Social Impact Assessment (ESIA) must be carried out.

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.

4. SUMMARY OF E&S BASELINE CONDITIONS

The ESIA comprised environmental and social baseline studies. The key baseline findings are shown below:

Table 3: Summary of Key E&S Baseline Findings

Attribute	Baseline Condition
Climate	The project site, situated in the western part of the Mafraq Governorate, experiences a Mediterranean climate, which is characterised by mild, wet winters and hot, dry summers. The climate in this semi-arid region shows distinct seasonal variations. Summers are typically hot and dry, while winters are cool and wet, reflecting the broader Mediterranean climate prevalent in the area.

Landscape and Visual	<p>The substation area, where the project culminates, is characterised by a gentle slope that extends from the southwest to the northeast. This gradual incline is advantageous for the installation and operation of the substation, as it ensures effective drainage and stability.</p> <p>The terrain through which the OHTL is delineated is predominantly mountainous and hilly, offering a unique topographical setting that presents both opportunities and challenges. The region is marked by steep slopes, making the engineering and construction processes more complex and requiring specialised techniques to ensure stability and safety.</p> <p>In general, the landscape across the proposed OHTL passes through several vacant land areas. Most of the land areas can be characterised as arid or semi-arid, with some areas having land uses, communities, as well as farmhouses</p>
Land use, Land Ownership, and Resettlement	<p>Land Use: <u>Substation:</u> The current actual land use at the Substation site, observed during visits by the ESIA team in June and July 2024, reveals occasional seasonal cultivation of barley. Historical aerial images indicated occasional ploughing and barley planting, primarily for fodder production. Based on discussions with one of the owners, it was understood that in some years, he ploughs the land and plants it with barley. They only rely on rainfall for irrigation so not all years are successful such as in 2024 the rainfall season was not sufficient in the area and as such the barley crops were not harvested and only left in place to dry. No other land use activities were observed during the site visits. <u>OHTL:</u> The current land use along the OHTL varies, reflect a mix of agricultural, residential, and vacant areas</p> <p>Land Ownership: <u>Substation:</u> The substation land has a history of ownership that spans across 172 individuals. <u>OHTL:</u> Since the OHTL is still in concept design phase and the OHTL route may change within a 500 m buffer from each side, NEPCO did not obtain the cadastral land details and ownership land deeds for the land within which the OHTL is aligned. These details are obtained by the EPC Contractor during the detailed design phase.</p>
Geology, Hydrology and Hydrogeology	<p>Geology: The site incorporates good exposures of sedimentary rocks of Upper Cretaceous and lower Tertiary including limestone, chert, chalk and marl. The sequence of the exposed geological formations in the area substation and the surrounding area is characterised by the following main formations:</p> <ul style="list-style-type: none"> ▪ Recent deposits. ▪ Umm Rijam formation ▪ Muwaqqar formation. <p>Hydrology: The project site crosses five (5) catchment areas, with the substation located in one (1) of the major catchment areas.</p> <p>Hydrogeology: the Project area is located within two (2) major Yarmouk basin and Zarqa basin; three (3) OHTLs are extended between these basins while the substation located in Yarmouk basin</p>
Archaeology and Cultural Heritage	<p>The Department of Archaeology assessment concluded that there are multiple archaeological sites within both the substation area and along the OHTL route. Although the DoA has no objections to continuing the ESIA study, they require the final layout of the substation and the exact locations of the transmission towers as well as any access routes to conduct a more detailed evaluation.</p>
Air Quality and Noise	<p>The substation site is vacant with no existing current land use other than sporadic seasonal ploughing and planting of barley and is not within proximity of communities and localities. There are no residential settlements, or obvious sensitive receptors nearby. Due to the nature of the area and its open landscape, the primary emissions will mainly be dust, including PM10, PM2.5, and Total Suspended Particulates (TSP).</p> <p>The route for the OHTL is characterised by its expansive and generally sparse landscape. The route is largely open and undeveloped in many of the sections, featuring vast stretches of land with minimal infrastructure and low population density and mostly house farms nature. Traffic movement on the existing road network is low with limited accessibility to some parts of the route</p>
Biodiversity	<p>The proposed project does not penetrate any protected areas or particular conservation areas according to Jordan's network of protected areas, nor does it directly intersect with Important</p>

	Birds Areas (IBAs). Despite this, the project will be in the middle of four IBAs: Al-Mafraq, Samra treatment water pool, Zubia, and Dibeen, which contains the Dibeen Forest Reserve.
Infrastructure and Utilities	Water Resources: Based on information available from 2015, the project is not in proximity to existing water networks. However, this information is outdated and it most probable that water supply networks have been extended further within the area to supply existing water users.
	Wastewater Services: The nearest WWTP to the project site is the Wadi Hasan WWTP, situated about 5km northwest of the Project. In the Mafraq Governorate, the only WWTP is the Mafraq WWTP, located roughly 17km east of the project. Additionally, within the Zarqa Governorate, the As Samra WWTP is the only treatment plant, positioned approximately 15km southeast of the Project
	Solid Waste Services: The nearest landfill to the project is the 'Al Ekaider dumpsite' as shown in Figure 81, located approximately 15 km northeast of the Project.
	Hazardous Waste Services: In Jordan, there is currently one landfill for disposal of hazardous waste – the Swaqa Hazardous Waste Treatment Facility. The facility is operated and managed by the MoEnv. The facility is in Al-Karak Governorate, around 70km south of the capital city of Amman and approximately 110 km to the south-east of the Project.
	Road Network: Access to the substation site is primarily via highway #25. From this main road, the site can be reached by a secondary unpaved road. This unpaved road is frequently used by employees of the chicken broiler houses, as well as by other landowners with properties adjacent to the Substation site. The proposed OHTL route shall intersect with existing main roads at multiple points. The proposed route for the majority of the OHTL traverses various types of land, including agricultural fields, undeveloped land and some residential properties
Socioeconomics	<p>Al Mafraq governorate, where the substation site is located, has a diverse population with a mix of urban and rural communities. Agriculture is a key activity of the local economy, with residents engaging in farming activities such as crop cultivation and livestock rearing, benefiting from the region's semi-arid climate and fertile lands. The area is known for producing wheat, barely, olives, and various fruits and vegetables.</p> <p>The OHTL route is characterised by its expansive and generally sparse landscape, the route has been largely open and undeveloped when the ESIA team undertook a site visit in 2022, with vast stretches of land featuring minimal infrastructure and low population density. It was notably empty, with few roads and limited accessibility, reflecting its rural and agricultural nature.</p> <p>However, over the past couple of years, there has been a noticeable increase in road construction and infrastructure improvements, enhancing connectivity to neighbouring areas. During a more recent site visit in July 2024, the ESIA team observed these new roads facilitating access to previously remote locations, making them more attractive for various land uses. This was evidenced by the number of active residential construction sites.</p>

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

5.1 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 proposed OHTL route passes through various private lands with existing land uses including agricultural areas with trees and crops and forest (Haraj) areas, as well as residential and others. Parts of the OHTL route is currently used by existing households, farms, and limited number of nomads – such areas should be avoided by the EPC contractor during the detailed design.

NEPCO indicated that this route is only a preliminary route and will be finalised after site specific surveys to be undertaken by an EPC Contractor selected through an open tendering process for the OHTL design, procurement, and construction works. The Contractor will also be required to review land documents and cadastral maps 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 and other important land use areas. According to NEPCO, the final design of the OHTL will not overlap with any residential buildings/houses.

To determine the optimal preliminary route for the OHTL, NEPCO has officially coordinated with all related government authorities to gather all data related to the OHTL route. Once the EPC Contractor is assigned, NEPCO will issue supporting letters to these authorities to facilitate and obtain no-objection and conditions for the EPC contractor to execute the OHTL.

NEPCO does not acquire the land for the ROW for the OHTL and only compensates the landowners for potential losses, damages, and land use limitations that may arise due to the OHTL passing through their land.

This land easement and compensation process will also be covered in the Resettlement Framework (RF) report and a land acquisition and resettlement audit report prepared separately and will provide measures to bridge gaps identified between the process carried by NEPCO and the EBRD PR5 requirements.

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.

5.2 Key Issues and Impacts

The E&S impacts during the construction and operation phases of the project, along with their mitigation measures, are summarized in Table 4 and Table 5, respectively.

Table 4. E&S Impacts Associated with Project during the Planning and Construction Phase

E&S Attribute	Potential Impact		Management Action
Landscape and Visual	Substation	Construction of the substation will temporarily affect the site's visual quality.	<ul style="list-style-type: none"> ▪ Ensure the site is tidy and organized by the end of each day. ▪ Relocate and store construction machinery, equipment, and vehicles that are not in use. ▪ Ensure that waste streams generated are properly stored, collected, and disposed of.
	OHTL	Site preparation for OHTL transmission towers will temporarily impact the site's visual quality.	<ul style="list-style-type: none"> ▪ Ensure the site is tidy and organized by the end of each day. ▪ Relocate and store construction machinery, equipment, and vehicles that are not in use. ▪ Ensure that waste streams generated are properly stored, collected, and disposed of. ▪ Implement restoration measures to enhance site visual quality, including reinstating and removing temporary structures.
Land Use, Land Ownership, and Resettlement	Substation	<p>Physical Displacement Impacts:</p> <ul style="list-style-type: none"> ▪ The land allocated for the substation consists of 10 land plots which are collectively privately owned by 172 persons. NEPCO will acquire 3 land plots completely, and parts of the other 7 land plots. The land is currently vacant with no existing buildings or physical assets erected by the owners or other land users. <u>As such, there are no anticipated temporary and permanent physical displacement impacts and land acquisition and restrictions on land use will not result in project-related physical displacement (relocation or loss of shelter). There are no full/partial permanent loss of residential and non-residential structures.</u> <p>Economic Displacement Impacts:</p> <ul style="list-style-type: none"> ▪ During a June 2024 field visit, it was observed that the land was sporadically used for barley cultivation by one landowner who relies on rainfall for success, not selling the fodder but using it to feed livestock offsite. Land acquisition for a substation development will restrict this agricultural use, leading to permanent economic displacement and loss of livelihood sources associated with agriculture. 	<ul style="list-style-type: none"> ▪ For the substation, since land acquisition has already been completed, land audit for substation land to be carried out by the ESIA Team (to be prepared and issued following the ESIA) and <u>corrective action plan (CAP) agreed with NEPCO before tendering for the Contractor and required measures implemented before contractor can mobilise to the site.</u> ▪ Develop and implement a Resettlement Plan (RP). ▪ Develop and implement RP, updated SEP and Grievance Redress Mechanism (GRM). ▪ NEPCO will engage directly with affected persons through a process of stakeholder engagement, including grievance mechanism as included in the RF and the updated SEP, throughout the resettlement process. This shall also cover identification of and targeted engagement with vulnerable groups and women. ▪ Ensure engagement activities are conducted with women to understand and respond to their concerns and the ways in which they are specifically or differentially impacted by the Project. ▪ Critical to the above requirements is the recognition of Project Affected Persons (PAPs) with different land tenures. Displaced persons in this case only include persons who have formal legal rights to the land or assets they occupy or use. ▪ Update the SEP to incorporate measures from the RP, including engagement plans for PAPs in compensation, livelihood restoration, and resettlement phases. ▪ The displaced persons shall be engaged with to discuss their resettlement choices for compensation for the loss of assets, and the types of resettlement assistance measures to be provided to them. ▪ NEPCO will compensate displaced landowners fully for their assets, offering resettlement assistance to improve their standard of living or livelihoods. ▪ Displaced persons will be prioritized for Project benefits, such as employment and training

E&S Attribute	Potential Impact	Management Action
	<ul style="list-style-type: none"> ▪ NEPCO acquires land following local laws. It has acquired plots using the 'immediate possession' procedure but hasn't compensated owners yet. Initial valuations suggest the land is vacant with barley, valued at 5 JD per sq meter, based on DLS website. Owners haven't been officially notified for compensation negotiation. ▪ Given that NEPCO has already carried out an immediate possession and land acquisition process for the substation land, the Consultant will undertake an audit of this process in accordance with the related national legislations and the EBRD PRs. The results will be presented in a standalone report. ▪ The design for the OHTL is still a provisional route and could be changed within a 500 m buffer from each side based on site specific surveys to be undertaken by an EPC Contractor. As such, the Consultant will prepare an RF for the OHTL. A full RP will be prepared once the EPC Contractor is assigned to work and a design is being prepared. 	<ul style="list-style-type: none"> opportunities during construction. ▪ Economically displaced persons who face loss of assets or access to assets will be compensated for such loss at full replacement cost, as well as assistance to improve, or at least restore, their means of income-earning capacity, production levels, and standards of living. ▪ Compensation for lost land and assets to be provided at replacement cost, calculated as the market value plus related transaction costs (registration and transfer fees/taxes, labour, transport). A Market Valuation Study shall be performed based on the market value approach/ methods for determining replacement cost. ▪ The displaced persons shall only be required to vacate the land after they have received compensation and the provision of resettlement assistance measures. ▪ NEPCO to allocate RP budget and budget schedule (as may be required) to meet PR5. ▪ NEPCO to establish an RP Committee as well as of a monitoring, evaluation program and reporting database for the RP. ▪ Delivery of resettlement compensation, transitional support, and vulnerability assistance (as required) to PAPs identified over the course of the RP development, Prepare RP compensation report confirming completed payment of compensation to all PAPs, transition and assistance allowances to eligible PAPs. ▪ Implement livelihood restoration measures as per the timelines outlined in the RP. ▪ Implementation and compliance shall be monitored and inspected by the NEPCO and the E&S and ESAP Implementation Consultant commissioned by EBRD.
OHTL	<ul style="list-style-type: none"> ▪ Main categories of potentially impacted land use identified according to land use: <ul style="list-style-type: none"> - Agricultural: all lands used for farming purposes, whether owned by the state, or private landowners, and used for economic purposes (generating cash income) and/or for subsistence activities (such as livestock farming, beekeeping, etc.). - Residential: all areas on which structures have been identified. (residential areas include buildings used for commercial activities and tourism/recreational activities). - Roads and utilities: this category concerns the main asphalted roads, and utilities in the alignment. - Forest: areas with forest trees - Other: this category includes any kind of land 	<ul style="list-style-type: none"> ▪ Ensure thorough assessment of alternatives for the OHTL design to minimize resettlement and livelihood impacts. This will be detailed in the ESIA. ▪ Use optioneering to examine alternative OHTL routes, as well as alternative construction schedules and sequencing during the construction phase, to compare the effect of changes to these parameters with the aim to avoid, and where avoidance is not possible, minimise resettlement impacts ▪ NEPCO to measure existing EMF levels at the applicable distances according to instructions from 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC and at 30m according to IFC standards. Based on these findings, NEPCO will determine the most suitable safety distance to be applied for the new OHTL to reach EMF levels that does not cause public health impacts based on International Standards. This shall be reflected in the tender for the EPC contractor. Landowners, farmers, and land users will be able to continue to use this land and will not be impacted by the construction however they will no longer be able to grow trees over 6 meters or build structures in this area. ▪ When undertaking works such as micro-siting of the tower bases, the landowner/user/occupier should be consulted to get input on optimal siting from their

E&S Attribute	Potential Impact	Management Action
	<p>which does not fall under the categories previously cited. It includes informal communal resources such as open grazing land, vacant undeveloped land.</p> <ul style="list-style-type: none"> ▪ Initial identification of Stakeholders & PAPs in the OHTL route: <ul style="list-style-type: none"> - Registered owners of land, buildings, and assets - Renters / Leaseholders of land and/or buildings, and assets - Formal/Informal land users - Agricultural tenants and Sharecroppers - Community/Government - Business owner - Workers/employees - All PAPs to be economically impacted by the Project regardless of their land rights (including registered owners, informal land users, formal land users, tenants, etc.) - Vulnerable people ▪ According to NEPCO, during the detailed design, the EPC Contractor avoids any existing buildings and considers the instructions for 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC. The horizontal safety buffer from buildings and assets range between 4.6 and 6 m while the vertical safety buffer ranges between 3 and 8 m. This is much less than the IFC EHS Guidelines for Electric Power Transmission and Distribution (2007) which requires right of way width that ranges from 15 to 100m depending on voltage and proximity to other servitudes with a typical range acceptable between 15 and 30m. ▪ There is no avoidance undertaken by NEPCO other than the above point. However, towers shall avoid archaeological sites as included in related legislations. ▪ The construction of OHTL may have resettlement impacts on various stakeholders and PAPs located 	<p>point of view. The Contractor shall take all reasonable and feasible steps to avoid or, at least, minimise impacts of OHTL on the land</p> <ul style="list-style-type: none"> ▪ Avoid the need to build new access roads whenever possible and use existing roads and access roads whenever possible. The locations of existing roads and unpaved tracks will be mapped, and then where possible reused/upgraded to provide access to the powerline routes and tower locations. The reuse of tracks will significantly reduce the social impacts which would be caused by opening new tracks. ▪ Select OHTL route that avoids densely utilised areas to minimise loss impacts. ▪ To minimize disruption to local economies and agriculture along the OHTL route, the Project will prioritize unused lands for construction needs. Agricultural or grazing lands crucial to local livelihoods will be avoided whenever feasible. Unused lands will be preferred for tower placement and temporary project needs. ▪ Worker accommodation will not be located at the project site and so will not require any land take. ▪ Choose a route that avoids high-value agricultural land to protect valuable farming areas. ▪ If it is not possible to select unused land for the towers or any other land needs, the selection of the land to be used by the OHTL will be done in close coordination with the affected communities. ▪ To reduce economic displacement, avoid routing through prime agricultural land and areas with high-value crops. ▪ Prioritise the route with the least overall resettlement impacts. ▪ Use areas with seasonal uses to minimise disruption to year-round activities. ▪ If the OHTL passes through lands utilised by farmers for seasonal cultivation or crop planting, avoid constructing during the growing season. ▪ The clearance of the ROW and construction sites will be announced to the local communities in advance, so that the affected persons have enough time to harvest their crops or salvage their structures located in the ROW. ▪ If avoidance is not possible, a RP must be developed to address physical and economic displacement impacts, including livelihood effects. The RP will include stakeholder engagement, grievance management, asset inventory, valuation study, socio-economic baseline census, and drafting measures for displacement and livelihood restoration. NEPCO and EBRD will finalize and implement the RP following approval, with detailed requirements provided in the accompanying RF document disclosed with the ESIA. ▪ An E&S ESAP Implementation Consultant will be commissioned by EBRD to work with NEPCO over a 24-month period to implement the E&S requirements of the EBRD and the ESAP measures. This contract will be financed by EBRD. The E&S ESAP Implementation Consultant will support NEPCO in the implementation of PR5 commitments and the RP. ▪ NEPCO will provide necessary information for RP preparation and implementation,

E&S Attribute	Potential Impact	Management Action
	<p>within the OHTL route.</p> <ul style="list-style-type: none"> ▪ Physical Displacement Impacts: <ul style="list-style-type: none"> - Loss of assets for buildings and structures: houses, barns, and other structures may need to be demolished if they fall within the right-of-way. ▪ Economic Displacement Impacts: <ul style="list-style-type: none"> - Economic Displacement – Agriculture - Economic Displacement - land fragmentation and land access - Economic Displacement: Grazing & Livestock Herders - Loss of agricultural land: farmers may lose access to land used for cultivation, leading to a loss of income and livelihoods, - Loss of assets in addition to crops and livestock: farmers may lose standing crops and livestock, affecting their immediate and future income. - Permanent land take impacts of landowners and land users in the safety buffer applied by NEPCO for the OHTL. - Temporary land take to provide for temporary access to land in order to construct the OHTL, including Temporary access roads to each tower in order for heavy machinery to access each site, an additional assembly area will be required for each tower, A ROW will be required for a tractor to suspend the OHTL between the towers. - Impact of Electromagnetic fields (EMF) from the OHTL on bees; it affects their behaviour, primarily navigation. Bees rely on the Earth’s magnetic field for navigation. EMF can interfere with this ability, causing disorientation and affecting their foraging patterns. - Impact on property values: proximity to power lines can reduce property values, affecting the economic stability of affected households. 	<p>including: land deeds, lists of affected landowners/users with contact details, cadastral information for impacted properties, final designs of substations and OHTL routes, locations of pylons with base dimensions, and mapping of temporary construction components with cadastral details.</p> <ul style="list-style-type: none"> ▪ Append a copy of PR 5 to the contract with the Contractors for the Project and AFs along with tender package. ▪ Contractor to identify locations for temporary works such as laydown areas, access roads, work force and project site office accommodation. Where possible and feasible, avoid private land that is being actively used especially where this is for residential purposes and livelihoods purposes. ▪ Contractor, prior to any construction works and as part of design of the works, when undertaking design works such as micro-siting of the pylon bases, the landowner/user/occupier should be consulted to get input on optimal siting from their point of view. The Contractor shall take all reasonable and feasible steps to avoid or, at least, minimise impacts of the project on the land and associated assets ▪ Contractor where possible, use existing roads for accessing the sites of the project components. ▪ Conduct proper census and inventory surveys prior to construction ▪ Conduct land valuation through a third party in line with market rates prior to construction ▪ Provide photographs of all land plots that are not vacant showing the use of the land and assets on the land. This shall be done prior to construction and could be part of the design. ▪ The Contractor must produce GIS maps of project sites, detailing OHTL areas with cadastral descriptions and plot boundaries. This includes temporary impact areas (e.g., laydown areas) and permanent impacts (e.g., pylon bases), all dimensioned and based on final designs. ▪ Conduct engagements with landowners, land users or occupiers of land that may be impacted by the construction and operation phase of the project works. This should be to both inform as well as consult. This shall be prior to and during construction. ▪ Conduct consultation with landowners explaining the land valuation and land acquisition process for the OHTL and negotiations with landowners, including the timing of the compensation prior to construction. ▪ If an agreement is reached with the landowner (prior to construction), NEPCO will be required to formalise the agreement and sign an undertaking to pay the agreed compensation once the transmission line is energised. ▪ NEPCO or its contractor should sign land entry protocol and proposing compensation in line with the compensation methodology agreed with the Bank prior to land entry. ▪ Prior to land entry, the Contractor shall follow the “Entry onto land protocol.” A copy of this protocol should be attached to the contract with the Contractor as an appendix. If

E&S Attribute	Potential Impact		Management Action
			<p>that was not completely possible, then NEPCO must duly document that.</p> <ul style="list-style-type: none"> ▪ Prior notice to the landowner/ user/occupier should be given. They are entitled to be informed about what activities are proposed on their land. ▪ NEPCO to put in place the resource to do a detailed inventory immediately upon installation of the line. (This is to see if there is any difference compared to baseline) ▪ Once the RF is prepared and agreed, NEPCO will be required to provide a letter confirming that a land acquisition budget has been allocated to make the settlements once the line is energised with a clear timeline for payments ▪ NEPCO shall pay compensation once installation and energisation are complete ▪ If a landowner chooses to contest the proposed compensation through legal means, NEPCO would be required to pay the compensation once a court ruling is issued ▪ Review of documents ex post fact (retroactive) submitted to the Bank, with lists of PAPs, evidence of payment, etc. ▪ Compensate for any temporary loss of income during construction. Provide fair and timely compensation for loss of crops, land, and other assets based on current market value. ▪ Offer interim assistance to affected individuals during the transition period to help bridge the gap until compensation and livelihood restoration measures are effective ▪ Ensure that temporary access roads and construction activities do not impede access to fields and farming areas. ▪ For vulnerable households, where affected land is larger than 5% of the total land area, compensation for lost crops must be paid in instalments as a safeguard to ensure food security. ▪ Restore any temporary access routes and construction areas to their original condition after the work is completed. ▪ Conduct regular consultations with affected persons to address their concerns. ▪ Inform affected persons about the grievance mechanism and ensure prompt and fair resolution of any issues or complaints received. ▪ No permanent access roads will be established for the Project. Construction and maintenance vehicle access will be limited to tower locations via existing tracks or dirt roads leading directly to each footprint location. ▪ Livestock grazing will be able to continue in the servitude, and unused parts of the temporary construction corridor. Livestock will be able to cross the servitude and temporary construction corridor during construction ▪ Appoint a person to be the primary point of contact within NEPCO regarding the land acquisition and compensation programme.
Geology, Hydrology and	Substation and OHTL	<ul style="list-style-type: none"> ▪ Floods and soil erosion impacts: <ul style="list-style-type: none"> - The topography within the catchment area, specifically in the western region of Mafraq, 	<ul style="list-style-type: none"> ▪ Strategic Siting: <ul style="list-style-type: none"> - Avoid constructing any structures, including power towers, within the natural wadi. ▪ Setback Zones:

E&S Attribute	Potential Impact	Management Action
Hydrogeology	<p>exhibits significant elevation variability. For CAT-5 regions and substation area, this change in elevation can precipitate a marked increase in flood flow velocities, posing considerable destructive potential. The geomorphological characteristics of the terrain, combined with the hydrological response, necessitate a comprehensive hydrodynamic analysis.</p> <ul style="list-style-type: none"> - The western Mafrq region's lithological composition and slope gradients amplify the risk of rapid surface runoff, particularly during intense precipitation events. The frequent occurrence of flash flood scenarios in this area further exacerbates the risk. Therefore, it is essential to conduct a detailed assessment employing high-resolution topographic data and advanced hydrological modelling techniques such as the use of HEC-RAS or 2D hydrodynamic models to simulate flood behaviour and predict flow velocities accurately. - Taking the above into account, it is evident that the Project site is subject to potential risk of local flood hazards during the rainy season and especially during flash flood events. Such risks must be taken into consideration throughout the planning phase of the Project as they could inflict damage to the Project and its various components. 	<ul style="list-style-type: none"> - The EPC Contractor to establish buffer zones around wadis and other high-risk flood areas. - No towers within 10 meters of water bodies. ▪ EPC Contractor to undertake a hydrodynamic analysis during the design phase. ▪ The EPC Contractor to conduct a detailed assessment employing high-resolution topographic data and advanced hydrological modelling techniques such as the use of HEC-RAS or 2D hydrodynamic models to simulate flood behaviour and predict flow velocities accurately. ▪ The EPC Contractor to utilise advanced hydrological modelling tools like HEC-RAS or 2D hydrodynamic models to simulate flood behaviour, predict flow velocities, and identify potential flood impact zones. ▪ EPC Contractor to employ Digital Elevation Models (DEMs) to conduct detailed 2D hydraulic analyses, particularly for the substation area, to accurately evaluate flood depths and flow velocities. ▪ The EPC Contractor shall assess the infrastructure within the catchment area, including structural vulnerability of hydraulic structures like culverts, bridges, and drainage systems. Implement erosion control and design flood mitigation structures, such as retention basins or levees, tailored to the area's topography and hydrology. ▪ The EPC Contractor shall conduct a detailed risk assessment using GIS for spatial analysis to improve predictions and inform robust flood management strategies. This ensures the project's facilities are protected against the region's flood risks due to its topographical and hydrological dynamics. ▪ The EPC Contractor shall implement slope stabilisation techniques at substation and other vulnerable areas to stabilise soil and reduce erosion. ▪ Timely site restoration/ revegetation after construction completed ▪ Where construction near wadis is unavoidable, EPC Contractor shall ensure structures are built on elevated foundations. ▪ The EPC Contractor as part of the detailed design, will build on the outcomes of the studies listed above to determine the most appropriate method for mitigating flood risks and provide details on the hydraulic and engineering design structures that will be implemented to mitigate flood risks at the Project site. ▪ Avoid executing excavation works under aggressive weather conditions. ▪ Place clear markers indicating stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soils in adjacent areas. ▪ Erect erosion control barriers around work site during site preparation and construction to prevent silt runoff where applicable. ▪ Return surfaces disturbed during construction to their original (or better) condition to the

E&S Attribute	Potential Impact		Management Action
			<p>greatest extent possible.</p> <ul style="list-style-type: none"> ▪ Additional measures to be determined at a later stage, upon completion of the hydrological study.
Archaeology and Cultural Heritage	Substation	The land is located within an area that was surveyed by DoA in 2022, known as the "Bureiqa Survey" which might include several archaeological sites that might be affected by the construction activities.	<ul style="list-style-type: none"> ▪ Coordinate with Department of Antiquities (DoA) to provide the exact locations of the proposed OHTL tower, and determine any additional requirements needed (such as an archaeology survey). Based on the response from the DoA, avoidance and mitigation measures will be incorporated in the detailed design.
		Construction activities could damage underground archaeological remains.	<ul style="list-style-type: none"> ▪ Implement chance find procedures.
	OHTL	Several archaeological sites were identified along the OHTL route which might be impacted by the construction of the OHTL towers.	<ul style="list-style-type: none"> ▪ Coordinate with DoA to provide the exact locations of the proposed OHTL tower, and determine any additional requirements needed (such as an archaeology survey). Based on the response from the DoA, avoidance measures will be identified and incorporated in the detailed design.
		Construction activities for the OHTL towers could damage potential archaeological remains which could be buried in the ground (if any).	<ul style="list-style-type: none"> ▪ Implement chance find procedures for potential unearthing of any archaeological sites during construction.
Air Quality and Noise	Substation	Construction activities like excavation, grading, and machinery operation can produce dust, air pollutants (e.g., sulphur dioxide, nitrogen dioxide, carbon monoxide), and increased noise levels.	<ul style="list-style-type: none"> ▪ Implement basic dust control and suppression measures. ▪ If excessive noise levels are identified through inspections and visual monitoring, pinpoint the source and implement appropriate control measures. ▪ Employ general noise suppression measures, such as using well-maintained mufflers and noise suppressants for high-noise-generating equipment and machinery, and establishing a regular maintenance schedule for all vehicles, machinery, and equipment. ▪ Undertake consultation activities with surrounding land users to inform them of construction schedule, nature of construction activities, timeline for which dust generation is expected onsite, mitigations implemented and availability of a grievance mechanism. ▪ Implementation of a grievance mechanism (provided in detail in the standalone SEP) which should be available for the neighbouring land users to submit any grievances including those related to dust generation. ▪ High noise level construction activities should not be carried out between 8pm - 6am.
	OHTL	Site preparation for OHTL towers will temporarily increase dust and particulate emissions, impacting air quality. Additionally, machinery operation will generate noise and vibrations affecting the site and surroundings.	<ul style="list-style-type: none"> ▪ Same management measures and monitoring requirement as those identified for the substation.
Biodiversity	Substation	<ul style="list-style-type: none"> ▪ Excavation, levelling, and land clearing during site preparation may disturb existing habitats. However, the substation site is arid with low ecological 	<ul style="list-style-type: none"> ▪ The ESIA must comply with the RSCN's "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" (October 2022). This includes bird surveys, mainly for the OHTL, and suitable methodologies for mitigation and management

E&S Attribute	Potential Impact	Management Action
	<p>importance and no endangered species, except for a few strips of Anabasis vegetation which are not deemed highly significant.</p> <ul style="list-style-type: none"> ▪ Construction activities can cause soil compaction and erosion, adversely affecting plant growth and survival. ▪ Construction activities generate various types of waste, including solid and liquid waste, necessitating proper waste management practices to mitigate environmental impact. ▪ Construction disturbances can create opportunities for invasive species to establish and outcompete native flora, leading to long-term ecological imbalances. ▪ Construction and maintenance activities can disrupt terrestrial animal habitats, leading to displacement and fragmentation, which can adversely affect wildlife populations. ▪ Construction poses a risk of direct mortality to less mobile species unable to escape the area during active construction phases. ▪ Noise and human activity during construction and maintenance can disturb bird populations and other wildlife. ▪ Furthermore, the land is situated away from critical environmental areas, including protected zones and important bird and biodiversity habitats. ▪ Improper management of the site which could include improper practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.). 	<p>measures. Preconstruction bird surveys may be required and must be verified with the MoEnv and RSCN to obtain the environmental permit. Mitigation measures from the ESIA shall be incorporated into the design, tender documents, management plans, and other procedures as applicable.</p> <ul style="list-style-type: none"> ▪ Preserve existing vegetation as much as possible. ▪ Use existing roads and tracks and do not establish new roads. ▪ Any planning for new roads must avoid sensitive habitats. ▪ No construction camps allowed onsite. ▪ Avoid scheduling construction activities during critical breeding, nesting, and migration periods. ▪ Implement proper housekeeping practices on the construction site at all times ▪ Worker code of conduct and induction training for contractor construction team to cover biodiversity management measures such as prohibiting hunting, restricting movement to allocated areas, prohibiting off-roading (especially to wadi areas), proper disposal of waste streams. ▪ Employ noise and dust suppression measures to minimise disturbance to wildlife and local communities. ▪ Establish and train workers on an appropriate code of conduct including no hunting at any time and under any condition. ▪ Use low-impact construction techniques to reduce soil compaction, such as avoiding heavy machinery in sensitive areas. ▪ Limit construction activities to daylight hours to minimise disturbance to nocturnal wildlife.
	<p>OHTL</p> <ul style="list-style-type: none"> ▪ Site preparation activities for the OHTL towers include land clearing, levelling, excavation, grading, etc. These activities will be confined to the relatively small footprints of the powerline towers and associated facilities, resulting in minimal disturbance overall. However, such activities are likely to alter the habitat of the site and could 	<ul style="list-style-type: none"> ▪ The ESIA for the substation and the OHTL shall comply with the “General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure” dated October 2022 issued by the RSCN and for the required mitigation and management measures to be integrated in the designs. ▪ Moreover, mitigation measures included in the ESIA shall be transposed into the design, tender documents, management plans, and other procedures as applicable. ▪ Preserve existing vegetation as much as possible during site preparation.

E&S Attribute	Potential Impact		Management Action
		<p>potentially disturb existing habitats and on haraj areas and forest trees as explained in this ESIA.</p> <ul style="list-style-type: none"> ▪ Construction disturbances can create opportunities for invasive species to establish and outcompete native flora, leading to long-term ecological imbalances. ▪ Construction and maintenance activities can disrupt terrestrial animal habitats, leading to displacement and fragmentation, which can adversely affect wildlife populations. ▪ Construction poses a risk of direct mortality to less mobile species unable to escape the area during active construction phases. ▪ Noise and human activity during construction and maintenance can disturb bird populations and other wildlife, potentially leading to behavioural changes and displacement ▪ Birds at risk of colliding with OHTL structures or being electrocuted when perching on power lines can lead to significant mortality rates among avian populations. ▪ Direct habitat loss will only impact those areas subject to construction activities with a minimal loss of habitat ▪ Improper management of the site which could include improper conduct and housekeeping practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.). 	<ul style="list-style-type: none"> ▪ The final OHTL alignment shall take into consideration the following design factors to avoid impacts on biodiversity: <ul style="list-style-type: none"> - Place transmission line towers at high points in the terrain so that conductors can be chained over valleys, thus eliminating the need to remove trees - Minimise the need to build new access roads whenever possible and use existing roads and access roads whenever possible - Select final locations of project components and alignment for associated facilities to avoid cutting trees to the extent possible. ▪ Implement proper housekeeping practices on the construction site at all times. ▪ Worker code of conduct and induction training for contractor construction team to cover biodiversity management measures such as prohibiting hunting, restricting movement to allocated areas, prohibiting off-roading (especially to wadi areas), proper disposal of waste streams. ▪ Noise Reduction Measures for OHTLs ▪ Additional measures such as those required from MoEnv and RSCN in relation to measures to prevent impacts on birds and avi-fauna such as the installation of bird diverters and insulators. ▪ Develop a Biodiversity Management Plan ▪ Establish and train workers on an appropriate code of conduct including no hunting at any time and under any condition.
Infrastructure and Utilities	Substation and OHTL	<p>The construction activities are anticipated to raise water demand and produce waste and wastewater, potentially adding pressure on existing utilities. Additionally, transportation activities necessary for the construction phase might impact current road networks, traffic flows, and existing users.</p>	<ul style="list-style-type: none"> ▪ EPC Contractor to coordinate with MPWH to identify road crossing and ROW alignment requirements and conditions. ▪ Avoid damage to existing infrastructure and utilities during the construction of the substation and the extension of the OHTL from inappropriate construction activities (e.g. driving of machinery). Should any damage occur, restoration and/or compensation activities will be undertaken by the EPC Contractor ▪ As part of the detailed design, the EPC Contractor will be required to consult / engage with the relevant entity/utility managing each infrastructure and utility elements to provide detailed design and obtain technical requirements or conditions for the OHTL intersections / crossings as well as overall construction management requirements. All

E&S Attribute	Potential Impact		Management Action
			<p>consultations will include formal communications.</p> <ul style="list-style-type: none"> ▪ Coordinate with relevant water utility company for securing additional water requirements of the Project. ▪ Contractors develop and implement a water management plan to identify sources of water for the Project for potable and non-potable use, estimation of quantities required, impact on other water users, measures to minimise water usage, and measures to ensure quality is suitable for project requirements. To be included as part of Construction Environmental and Social Management and Monitoring Plan (CESMMP). ▪ Coordinate with the relevant water utility company for disposal of wastewater at the nearest WWTP. ▪ Coordinate with the relevant municipality or hire a qualified private contractor to collect solid waste from the site and transport it to the nearest authorised landfill. ▪ Coordinate with the MoEnv and hire a private contractor for the collection of hazardous waste from the site to the Swaqa Hazardous Waste Treatment Facility. ▪ Ensure that waste generated on-site is sorted into categories such as recyclables (metals, plastics, paper) and non-recyclables to facilitate proper disposal and recycling. ▪ Coordinate with certified recycling companies to manage and process recyclable materials. ▪ The EPC Contractor is required to develop a Traffic and Transport Plan before commencement of any transportation activities to ensure that the transportation process is properly and adequately managed. ▪ As part of induction training, it must be emphasised to all workers the presence of such infrastructure elements within the Project site. It must also be emphasised that all activities should be restricted to designated areas and that it is strictly prohibited to approach such elements or its buffer area
Occupational Health and Safety	Substation	During construction, workers face various occupational health and safety risks, including potential injuries from handling heavy equipment, electrical shocks, working in confined spaces, exposure to hazardous chemicals, prolonged noise, heat-related illnesses, slips and falls, vehicle accidents, fire and explosion hazards, and exposure to dust and gases.	<ul style="list-style-type: none"> ▪ Develop an Occupational Health and Safety (OHS) Plan prior to commencement of work. ▪ Allocate specific personnel responsible for health & Safety. ▪ Provide adequate and appropriate training of all workers on the contractor’s OHS policies and procedures. ▪ Ensure fire extinguishers are provided and maintained. ▪ Ensure all workers are equipped with proper PPE. ▪ Prepare an Emergency Preparedness and Response Plan (EPRP). ▪ Establish a GRM for workers.
	OHTL	During the construction of OHTLs, workers face various occupational health and safety risks, including potential injuries from heavy equipment, electrical shocks, exposure to hazardous chemicals, prolonged noise, heat-related illnesses, slips and falls, vehicle accidents,	<ul style="list-style-type: none"> ▪ Same management measures and monitoring requirement as those identified for the substation. However, additional safety measures for workers performing tasks at elevated heights include the mandatory use of full-body harnesses and the provision of lanyards or lifelines.

E&S Attribute	Potential Impact		Management Action
		and exposure to dust and gases.	
Public Health and Safety	Substation	<ul style="list-style-type: none"> ▪ Risk of exposure of community members to construction-related health risks. ▪ Risks from the movement of heavy machinery and vehicles to and from the site. ▪ Elevated dust and noise emissions, potentially affecting air quality in the surrounding area. ▪ Construction activities, can create excessive noise levels. 	<ul style="list-style-type: none"> ▪ Develop security measures to prevent unauthorized access to the construction site. Such measures could include installing a fence around the construction site. ▪ Develop and implement a TMP. ▪ Ensure that all trucks and vehicles accessing the facility are operated by licensed operators. ▪ Presence of flagman at the entrance and exit of the project site in order to control vehicles and truck movement. ▪ Ensure that the number of traffic signs and their characteristics is placed according to local legal requirements. ▪ Ensure that vehicles adhere to a speed limit of 15km/h. ▪ Implement basic dust control measures. ▪ High noise level construction activities should not be carried out between 8pm - 6am. ▪ Employ noise suppression measures. ▪ Implement a GRM for community members to receive and facilitate resolution of affected communities' grievances. ▪ If excessive noise levels are identified through inspections and, pinpoint the source and implement appropriate measures.
	OHTL	<ul style="list-style-type: none"> ▪ Risk of exposure of community members to construction-related health risks. ▪ Risks from the movement of heavy machinery and vehicles to and from the construction sites. ▪ Elevated dust and noise emissions, potentially affecting air quality in the surrounding area. 	Same management measures and monitoring requirement as those identified for the substation.
		The construction of the OHTL will involve accommodation camps, leading to an influx of workers who may exhibit inappropriate behaviour towards local communities, potentially causing hostilities and resentment.	Establish and educate workers on a suitable Code of Conduct for interacting with local community members.
Socio-economic	Substation and OHTL	<ul style="list-style-type: none"> ▪ The Project is anticipated to create temporary employment opportunities for local communities. ▪ The above could also entail other indirect positive benefits to the local community from increase in demand for local services, supplies, and businesses. This could include for example possible engagements for supplies and service providers (accommodation services, food, etc.). Such demands could improve the existing local economic 	<ul style="list-style-type: none"> ▪ Ensure to hire labour from host communities if their qualifications meet the work requirements. ▪ EPC Contractor to implement and update the SEP and GRM as required during construction ▪ EPC Contractor to prepare a Recruitment Plan for working with the local community members. The Plan must include the key requirements listed below. <ul style="list-style-type: none"> - Project Updates Procedure - Local Recruitment Procedure - Local Procurement Procedure

E&S Attribute	Potential Impact	Management Action
	activities and impact certain sectors, such as wholesale/retail trade.	

Table 5: E&S Impacts Associated with Project during the Operation Phase

Environmental Attribute	Potential Impact	Management Action	
Landscape and Visual	Substation	The substation is expected to be visible in the nearby area of the Project site, which may result in visual impacts.	<ul style="list-style-type: none"> ▪ Construct a high concrete perimeter wall around the Substation. ▪ Plant native trees and shrubs around the substation to shield it from nearby receptors. ▪ A SEP along with a grievance mechanism will be implemented by NEPCO.
	OHTL	Visual impacts typically relate to OHTL towers themselves, including considerations of their colour, height, and number, as well as their interaction with the surrounding landscape and visual receptors. However, these structures are generally not considered to be massive or imposing enough to significantly alter the landscape or visual character of the area.	<ul style="list-style-type: none"> ▪ A SEP along with a grievance mechanism will be implemented by NEPCO. Please refer to the standalone SEP for additional details. In the case grievances are received from any of the nearby sensitive receptors in relation to tower visibility, NEPCO shall consider planting native vegetation or trees around the tower locations to enhance the view of the tower base.
Geology, Hydrology, and Hydrogeology	Substation and OHTL	<ul style="list-style-type: none"> ▪ Potential impacts from improper housekeeping practices (e.g. improper management of waste streams, improper storage of hazardous material, etc.). ▪ Improper housekeeping practices during (such as illegal disposal of waste to land) could contaminate and pollute soil which in turn could pollute groundwater resources. This could also indirectly affect flora/fauna and the general health and safety of workers (from being exposed to such waste streams). ▪ Solid Waste: <ul style="list-style-type: none"> - Solid waste generated will likely include municipal solid waste such as cardboard, plastic, food waste, etc. ▪ Wastewater Generation <ul style="list-style-type: none"> - Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, 	<ul style="list-style-type: none"> ▪ Utilise non-hazardous materials and substances wherever possible to eliminate the risk of hazardous waste generation and chemical spills. ▪ Avoid water protection/management zones as defined in ESIA. ▪ Any new transformers at the substation should use PCB free oil ▪ Develop and implement a Waste Management Plan (WMP). ▪ Coordinate with relevant municipality and/or hire a competent private contractor for the collection of solid waste from the site to the municipal approved dumpsite or for recycling ▪ Prohibit fly-dumping of any solid waste to the land ▪ Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste" ▪ Coordinate with certified recycling companies to manage and process recyclable materials ▪ Implement proper housekeeping practices on the construction site at all times. ▪ Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the records are to be consistent to ensure no illegal dumping at the site or other areas. ▪ Coordinate with relevant water utility company to hire a private contractor for the collection of wastewater from the site to the closest WWTP. ▪ Prohibit illegal disposal of wastewater to the land.

Environmental Attribute	Potential Impact	Management Action
	<p>showers, etc.) generated from workers. Wastewater quantities are expected to be minimal.</p> <ul style="list-style-type: none"> ▪ Hazardous Waste Generation <ul style="list-style-type: none"> - Hazardous waste generated throughout the operation phase could include consumed oil, chemicals, paint cans, etc. - Routine tasks at the substation like maintenance, equipment servicing, and cleaning generate various waste materials, such as used oils, lubricants, etc. Improper disposal of these wastes and accidental leaks of oils or chemicals could potentially endanger soil and groundwater. - For the OHTL, it is expected that there will be no significant impacts during the operational phase. Any potential impacts from the operation of the OHTL on soil and groundwater are primarily associated with the maintenance activities which involves the generation of various waste streams and accidental spillage of chemicals. ▪ Hazardous Material <ul style="list-style-type: none"> - The nature of the operational activities entails the use of various hazardous materials such as oil, chemicals, and fuel. Improper management of hazardous material entails a risk of leakage into the surrounding environment either from storage areas or throughout the use of equipment and machinery. <p>Substations often utilise oil-filled transformers and other equipment that may leak insulating oils containing hazardous substances such as polychlorinated biphenyls (PCBs). If these substances seep into the ground, they can contaminate groundwater sources, posing significant environmental and health risks. Furthermore, accidental spills of chemicals, fuels, or other hazardous materials used in maintenance and operations can lead to groundwater contamination if</p>	<ul style="list-style-type: none"> ▪ Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and disposed of at the WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas. ▪ Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing. ▪ Continuous training for personnel on best practices and emergency response procedures further enhances the effectiveness of these mitigation measures, ensuring that all staff are prepared to handle potential incidents efficiently and effectively. ▪ Coordinate with the MoEnv and hire a private contractor for the collection of hazardous waste from the site to the Swaqa Hazardous Waste Treatment Facility ▪ Follow the requirements for management and storage as per the ‘Instructions for Hazardous Waste Management and Handling of the Year 2003’ of the MoEnv. ▪ Prohibit illegal disposal of hazardous waste to the land ▪ Possibly contaminated water (e.g. runoff from paved areas) must be drained into appropriate facilities (such as sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste ▪ Ensure that hazardous waste containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing ▪ Maintain records and manifests that indicate volume of hazardous waste generated onsite, collected by contractor, and disposed of at the Swaqa Facility. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas. ▪ Minimise works near wadis in wet weather. ▪ Ensure that hazardous materials are stored in proper areas and in a location where they cannot reach the land in case of accidental spillage. This includes storage facilities that are of hard impermeable surface, flame-proof, accessible to authorised personnel only, locked when not in use, and prevents incompatible materials from coming in contact with one another. The provisions of the Jordanian Standard 431/1985 – General Precautionary Requirements for Storage of Hazardous Materials must be adhered to. ▪ Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS) must present at all times. Spilled material should be tracked and accounted for ▪ Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials. ▪ Any transformers at the substation should use polychlorinated biphenyls (PCB) free oil. ▪ Regular maintenance of all equipment and machinery used onsite. ▪ Ensure that a minimum of 1,000 liters of general-purpose spill absorbent is available at hazardous material storage facility. Appropriate absorbents include zeolite, clay, peat and other products manufactured for this purpose

Environmental Attribute	Potential Impact	Management Action
	<p>not properly managed. Effective spill response plans and regular maintenance checks are essential to mitigate these risks.</p>	<ul style="list-style-type: none"> ▪ If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste. ▪ Continuous training for personnel on best practices and emergency response procedures further enhances the effectiveness of these mitigation measures, ensuring that all staff are prepared to handle potential incidents efficiently and effectively.
<p>Air Quality and Noise</p>	<p>Substation</p> <ul style="list-style-type: none"> ▪ Air quality impacts from substations are very minimal, primarily stemming from occasional emissions from backup generators or maintenance equipment. Therefore, the overall impact on air quality is considered negligible. ▪ Sulphur hexafluoride (SF6) emission is a concern in substations because it is a potent greenhouse gas used as an electrical insulator. SF6 is a colourless, odourless gas with excellent insulating properties. It effectively insulates high voltage equipment within substations, preventing short circuits and electrical arcing. SF6 also allows for a more compact substation design compared to air-insulated alternatives, saving space and resources. The Problem with SF6 Emissions is the following: 1. SF6 is one of the most potent greenhouse gases, with a global warming potential thousands of times higher than carbon dioxide (CO₂) over a 100-year period; 2. Substations are not completely sealed systems, and SF6 can leak out due to equipment wear and tear, maintenance procedures, or accidental releases. SF6 emissions result in climate change impacts and can cause significant negative impacts on the environment. ▪ The primary noise source in a high voltage substation is the transformer, which produces a consistent hum due to electric and magnetic forces within it. ▪ Additionally, occasional noise may occur from voltage changes (tap changers) and the operation of cooling fans during high load conditions. 	<ul style="list-style-type: none"> ▪ Install sound barriers or enclosures around transformers and other noisy equipment to reduce noise propagation. ▪ Use vibration isolation mounts and pads under equipment to minimise transmission of noise through the ground and structures. ▪ Ensure regular maintenance of equipment to reduce emissions and ensure efficient operation. ▪ Implement emission control technologies, such as particulate filters, to minimise emissions from diesel-powered equipment. ▪ For SF6 in substation: <ul style="list-style-type: none"> - Any new Circuit breaker and gauge for metering SF6 gas must have a SF6 leaks metering and prevention systems installed - Ensure SF6 periodic leakage detection and recovery actions are taken through liaising with the substation operator. - Ensure that SF6 leaks metering and prevention system is functioning properly - Implement a schedule for routine inspections and maintenance of SF6 equipment, which includes checking seals, gaskets, and connections for signs of wear or damage - Employ leak detection equipment, such as gas analysers, to detect any leaks in SF6 equipment. - Handling of hazardous material to be performed as mentioned within the accompanying I Safety Data Sheet (SDS). - Ensure that all personnel working with SF6 equipment receive adequate training in handling, maintenance, and leak prevention. This training should also cover the risks associated with SF6 and the proper response procedures in the event of a leak - Maintain detailed records of all maintenance, inspections, and leak detection activities. - Develop clear procedures for reporting any SF6 leaks, encouraging employees to promptly report even minor leaks without fear of repercussions - In the event of a leak detection, have a set of procedures in place to address it promptly. This may involve isolating the equipment, venting SF6 gas safely, and repairing or replacing faulty components - Continuously review and improve SF6 leak management procedures based on industry best practices and lessons learned from past incidents

Environmental Attribute	Potential Impact		Management Action
	OHTL	<ul style="list-style-type: none"> ▪ High-voltage transmission lines can generate small amounts of ozone due to corona discharge. However, the amount of ozone produced is typically very low and does not significantly impact air quality. ▪ OHTLs can produce a low-level hissing or crackling noise due to corona discharge, especially during wet weather conditions. This noise is noticeable in very quiet environments. 	<ul style="list-style-type: none"> - Arrange for periodic third-party audits or inspections to ensure compliance with international industry best practices and gain an independent perspective on the SF6 leak management efforts. - Keep SF6 equipment within the recommended temperature and pressure ranges, as operating outside these parameters can increase the risk of leaks. ▪ NEPCO to measure existing EMF levels at the applicable distances according to instructions from ‘Sanitary rules to ensure electrical safe distances from OHTL’ No. 1 for 2003 issued by the EMRC and at 30m according to IFC standards. Based on these findings, NEPCO will determine the most suitable safety distance to be applied for the new OHTL to reach EMF levels that does not cause public health impacts based on International Standards. This shall be reflected in the tender for the EPC contractor. ▪ NEPCO to implement measures to control operation noise, such as rubber footings. ▪ NEPCO to implement measures to control operation noise, this could include monitoring in case of complaint or request by resident or other affected persons. ▪ Implementation of mitigation if noise exceeds standards
Biodiversity	Substation	Potential avi-fauna fatalities due to electrocution	<ul style="list-style-type: none"> ▪ The ESIA shall comply with the “General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure” dated October 2022 issued by the RSCN with regards to the requirements for birds. ▪ Ensure the appropriate design measures in the substation in coordination with RSCN for protecting birds against collision and /or electrocution. A proper design may reduce 100% electrocution and minimise collision risk
	OHTL	<ul style="list-style-type: none"> ▪ The primary impact of the presence of an OHTL involves risks to birds and bats, which may collide with the transmission towers, particularly during their flight paths or migration seasons, potentially causing injuries or fatalities. ▪ The impact of EMF from high voltage power lines on wildlife is varied and still being researched. EMFs may affect birds' navigation and disrupt insects' magnetoreception. Studies on mammals show mixed results, and the effects on plant growth are inconclusive. Overall, EMFs' impact on ecosystems and biodiversity remains uncertain, needing more research. 	<ul style="list-style-type: none"> ▪ The ESIA shall comply with the “General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure” dated October 2022 issued by the RSCN and for the required mitigation and management measures to be integrated in the designs. ▪ The final OHTL alignment shall take into consideration the following design factors to avoid impacts on biodiversity: <ul style="list-style-type: none"> - Avoid tracing the transmission line through protected areas, environmentally sensitive areas or through forest areas - Locate the transmission line along the base of mountain or hill slopes, rather than in the centre of valleys where large birds might collide with the conductors - Ensure the appropriate design of the towers and associated components (cross arms, position of insulators) and installation of conductors according to best international practices for protecting birds against collision and /or electrocution. ▪ Bird Flight Diverters (BFDs) are to be installed along the entire length of the OHTL on the shield wire at suitable spacing where collision is a risk, and mainly on approximately 60% of the line between two pylons to reduce risk of collision as per expert advice and RSCN requirements.

Environmental Attribute	Potential Impact		Management Action
			<ul style="list-style-type: none"> ▪ Use isolated poles to prevent electrical shocks to birds through contact. ▪ Implement the Biodiversity management plan including carcass surveys. ▪ Other measures may also be required for the OHTL based on request from MoEnv and RSCN and based on expert advice. These will also be included in the project details.
Occupational Health and Safety	Substation	<ul style="list-style-type: none"> - Potential injuries from handling heavy equipment, tools, and materials. - Substations contain high voltage equipment and systems, posing risks of electric shock and arc flash incidents. - Working in confined spaces. - Substation equipment can generate significant heat and noise levels during operation. Prolonged exposure to high temperatures or loud noises can lead to heat stress, hearing damage, or other related health issues. - Exposure to chemicals, hazardous or flammable materials - Slips and falls. - Fires or explosions due to electrical faults, equipment failure, or external factors. - Exposure to Electric and Magnetic Fields (EMF). 	<ul style="list-style-type: none"> ▪ Replace hazardous substances (e.g., toxic oils or gases) with safer alternatives where feasible to eliminate potential exposure risks. ▪ The design of the substation shall include high safety measures, minimising hazards through equipment selection, layout, and insulation to reduce exposure to electrical, mechanical, and other risks. ▪ Develop an Occupational Health and Safety (OHS) Plan tailored to the nature of the operation and maintenance activities. ▪ Ensure that all workers engaged in maintenance activities have received adequate training. ▪ Have fire extinguishers. ▪ Ensure all workers involved in maintenance activities are equipped with proper Personal Protective Equipment (e.g., masks, eye goggles, breathing equipment, gloves, EMF shielding clothing, etc.). ▪ Prepare an Emergency Preparedness and Response Plan.
	OHTL	<ul style="list-style-type: none"> ▪ Potential injuries from handling heavy equipment, tools, and materials. ▪ Risks of electric shock and arc flash incidents. ▪ Exposure to chemicals, hazardous or flammable materials. ▪ Maintenance activities for OHTLs often involve working at heights, which poses significant safety risks. ▪ Fires or explosions due to electrical faults, equipment failure, or external factors. ▪ Exposure to Electric and Magnetic Fields (EMF). 	<ul style="list-style-type: none"> ▪ Replace hazardous substances (e.g., toxic oils or gases) with safer alternatives where feasible to eliminate potential exposure risks. ▪ Develop an OHS Plan tailored to the nature of the operation and maintenance activities. ▪ Ensure that all workers engaged in maintenance activities have received adequate training. ▪ Have fire extinguishers. ▪ Ensure all workers are equipped with proper PPE including EMF shielding clothing. ▪ Workers engaged in tasks at elevated heights must wear full-body harnesses and be equipped with lanyards or lifelines. ▪ Prepare an Emergency Preparedness and Response Plan.
Public Health and Safety	Substation	<ul style="list-style-type: none"> ▪ Trespassing of unauthorised personnel into the substation may result in exposure to electric shocks. ▪ Exposure of nearby residents to EMF. It is important to note that the magnetic field intensity 	<ul style="list-style-type: none"> ▪ Construct a high concrete perimeter wall around the Substation. ▪ NEPCO to measure existing EMF levels at the applicable distances according to instructions from 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC and at 30m according to IFC standards. Based on these findings, NEPCO will determine the most suitable safety distance to be applied for the new OHTL to reach EMF

Environmental Attribute	Potential Impact	Management Action
	<p>decreases significantly with distance from its source. The strongest EMF around a substation comes from power lines, while EMF from equipment like transformers drops rapidly with distance. Beyond the substation's fence, EMF is usually at background levels. Given that the nearest receptor is a farmhouse 80 meters away, there will be no significant impact.</p>	<p>levels that does not cause public health impacts based on International Standards. This shall be reflected in the tender for the EPC contractor.</p> <p>Limit public exposure to electric and magnetic fields (EMF), including:</p> <ul style="list-style-type: none"> ▪ As required by the IFC EHS Guideline, ensure that exposure level limits to the public should remain below the International Commission on Non-Ionising Radiation Protection (ICNIRP) limits ▪ NEPCO to ensure substation facilities are beyond the ESIA-required buffer zones/clearances for houses/properties and in accordance with NEPCO regulations.
OHTL	<ul style="list-style-type: none"> ▪ The main issue of concern during the operation of OHTLs includes the exposure of nearby residents to EMF generated from the OHTL. Despite that a range of experimental studies have failed to provide clear supporting evidence for the claim that EMF can be harmful to health, it is still sufficient to warrant limited concern. <p>As previously mentioned, magnetic field diminishes significantly as the distance from its source increases. This implies that the strength of the field reaching a residence or building will be considerably lower compared to its original point of origin. For instance, a magnetic field measuring 57.5 milligauss directly adjacent to a transmission line reduces to 7.1 milligauss at a distance of 30 meters, and further decreases to 1.8 milligauss at a distance of 60 meters (WHO 2010), and at a distance of 92 meters from transmission lines during average electricity demand, the magnetic fields from many lines can be similar to typical background levels found in most homes (Electric and Magnetic Fields Associated with the Use of Electric Power, NIEHS).</p>	<ul style="list-style-type: none"> ▪ NEPCO to measure existing EMF levels at the applicable distances according to instructions from ‘Sanitary rules to ensure electrical safe distances from OHTL’ No. 1 for 2003 issued by the EMRC and at 30m according to IFC standards. Based on these findings, NEPCO will determine the most suitable safety distance to be applied for the new OHTL to reach EMF levels that does not cause public health impacts based on International Standards. This shall be reflected in the tender for the EPC contractor. ▪ Limit public exposure to electric and magnetic fields (EMF), including: <ul style="list-style-type: none"> - As required by the International Financing Corporation (IFC) EHS Guideline, ensure that exposure level limits to the public should remain below the International Commission on Non-Ionising Radiation Protection (ICNIRP) limits - 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 existing EMF levels at the applicable distances according to instructions from ‘Sanitary rules to ensure electrical safe distances from OHTL’ No. 1 for 2003 issued by the EMRC and at 30m according to IFC standards. Based on these findings, NEPCO will determine the most suitable safety distance to be applied for the new OHTL to reach EMF levels that does not cause public health impacts based on International Standards. This shall be reflected in the tender for the EPC contractor.

With respect to cumulative impacts, the known development projects in the area at this stage include the current Project.

The majority of identified E&S impacts during the construction phase are manageable through the implementation of the prescribed management measures. Even with other construction activities for adjacent projects near the OHTL route, the temporary and small-scale nature of the OHTL construction activities makes cumulative impacts insignificant. Additionally, no negative cumulative impacts are anticipated during the operation phase. The primary impacts during operation are positive, as the Project aims to enhance grid stability and increase the reliability of the electrical grid by mitigating the risk of cascading outages, ensuring uninterrupted power supply to the northern region.

Furthermore, the Project aims to improve the electricity system's capacity to absorb existing renewable energy generation in the Northern area.

6. 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 and the OHTL, 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.

7. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING

Throughout the Project's construction and operation phase an Environmental, Health, Safety and Social (EHSS) Management System (MS) must be implemented by all relevant parties (i.e. EPC Contractor, and NEPCO as the Developer and Operator of the Project). The MS must be project and site specific and must build on and consider the requirements of the ESMP. The development and implementation of an EHSS MS is considered a key requirement under EBRD PR1.

NEPCO will be monitoring the implementation of EHSS requirements by the EPC contractors 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.

8. 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.
- Private landowners where the substation will be constructed as well as owners and users of the lands through which the OHTL will pass.
- 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 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 GRM at the time of recruitment; and ii) assigning Community Liaison Officers (CLOs) to communicate with stakeholders and construction workers prior to construction.
- During Construction: ii) NEPCO and the EPC contractors to maintain an open communication channel with local community and workers, and ii) GRM which EPC Contractors and NEPCO are responsible for.
- During Operation: GRM 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>):

- Non-Technical Summary (NTS) – xxxxxxxxxxxx
- Stakeholder Engagement Plan (SEP) – xxxxxxxxxxxx

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
Website: www.nepco.com.jo
Email: info@nepco.com.jo

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

EBRD will disclose on their website a Project Summary Document (PSD) (**xxxxxxxxxxxxxxxxxxxx**).

The SEP also identifies an additional grievance mechanism to be used by stakeholders for dealing with complaints, concerns, queries, suggestions etc. The grievances can be received by the EPC Contractors and NEPCO via **xxxxxxxxxxxxxxxxxxxx**. 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.

NEPCO through the HSE Department will be the focal point for the SEP and will be responsible for ensuring that the SEP is implemented adequately by the EPC Contractors as well as be responsible to implement the SEP during the operation phase. NEPCO higher management shall undertake quarterly reviews of the SEP implementation.

9. COMMUNICATIONS

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