ENVIRONMENTAL AND SOCIAL ASSESSMENT FOR EBRD GREENFIELD: CATEGORY "A" PROJECT

JORDAN: THE NORTH SUBSTATION AND OHTLs PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

September 2024

FINAL

REV. 04

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AAAC	All Aluminium Alloy Conductors
AC	Alternating Current
ACS	Aluminium Clad Steel
ACSR	Aluminium Conductor Steel-Reinforced Cable
AOI	Area of Interest
ASL	Above Sea Level
AZE	Alliance for Zero Extinction
CAP	Corrective Action Plan
CARC	Civil Aviation Regulatory Commission
CBO	Community Based Organisation
CITES	Convention on International Trade in Endangered Species
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CoC	Code of Conduct
COD	Commercial Operation Date
DC	Direct Current
DCT	Double-Circuit Transmission Tower
DEM	Digital Elevation Model
DoA	Department of Antiquities
DLS	Department of Land and Survey
DOS	Department of Statistics
EBRD	European Bank for Reconstruction and Development
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EHS	Environmental, Health and Safety
EHSS	Environmental, Health, Safety and Social
EMF	Electromagnetic Field
EMMP	Environmental Mitigation and Monitoring Plans

EMRC	Energy and Minerals Regulatory Commission
EPC	Engineering, Procurement, and Construction
EPRP	Emergency Preparedness and Response Plan
E&S	Environmental and social
ESAP	Environmental and Social Action Plan
ESA	Environmental and Social Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
EU	European Union
GCI	Getty Conservation Institute
GIIP	Good International Industry Practice
GIS	Geographic Information Systems
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GMM	Greater Mafraq Municipality
GoJ	Government of Jordan
GRM	Grievance Redress Mechanism
HCD	Higher Council for the Rights of Persons with Disabilities
HEC	Hydrologic Engineering Centre
HEC-RAS	Hydrologic Engineering Centre – River Analysis System
HTLS	High Temperature Low Sag Conductors
HV	High Voltage
IBA	Important Bird Area
IBAT	Integrated Biodiversity Assessment Tool
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IDF	Intensity Duration Frequency
IE	Industrial Emissions
IFC	International Finance Corporation
IPA	Important Plant Area
IUCN	International Union for Conservation of Nature
JEA	Jordan Engineers Association
JCA	Jordan Contractors Association
JSMO	Jordan Standards and Metrology Organisation
KBA	Key Biodiversity Area
KPI	Key Performance Indicator
LOA	Letter of award
LV	Low Voltage
MEGA	Middle Eastern Geodatabase for Antiquities
MEMR	Ministry of Energy and Mineral Resources
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
MoMA	Ministry of Municipal Affairs
MoTA	Ministry of Tourism and Antiquities
MPWH	Ministry of Public Works and Housing
MS	Management System
MSDS	Material Safety Data Sheet
MV	Medium Voltage
MW	Mega Watt
MWI	Ministry of Water and Irrigation
NEPCO	National Electric Power Company
NGO	Non-Governmental Organisation

NIEHS	National Institute of Environmental Health Sciences
NO_2	Nitrous Oxide
NTS	Non-Technical Summary
OHTL	Overhead Transmission Line
OHS	Occupational Health and Safety
OPGW	Optical Ground Wire
PAP	Project Affected People
PCB	Polychlorinated Biphenyls
PIP	Project Implementation Plan
PIU	Project Implementation Unit
POP	Persistent Organic Pollutants
PR	Performance Requirement
PSD	Project Summary Document
RAP	Resettlement Action Plan
RAS	River Analysis System
RF	Resettlement Framework
RP	Resettlement Plan
RSCN	Royal Society for Conservation of Nature
ROW	Right of Way
SCADA	Supervisory Control and Data Acquisition
SCS	Soil Conservation Service
SDS	Safety Data Sheet
SEP	Stakeholder Engagement Plan
SF6	Sulphur Hexafluoride
SLD	Single Line Diagram
SO_2	Sulphur Dioxide
SSA	Storm and Sanitary Analysis
SSC	Social Security Corporation
STATCOM	Static Synchronous Compensator
TMP	Traffic Management Plan
TSP	Total Suspended Particulates
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Convention on Climate Change
WAJ	Water Authority of Jordan
WHO	World Health Organisation
WMP	Waste Management Plan
WWTP	Waste Water 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 develop and build the following:

1. The North Substation which is a new 400/132/33 kV transmission substation, and related equipment in the Rihab area, located around 61km northeast of Amman, Jordan.
2. The overhead transmission line (OHTL) with several 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.

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

1.2 The Need for the Project

The current issues that trigger the need to establish the North substation:

- Congestion in the area due to increasing generation sources (traditional and solar energy projects), leading to bottlenecks and overloading of electrical components under contingency conditions.
- There are voltage problems in the northern region during peak load periods.
- Bottlenecks in the northern region's transmission lines, which could result in cascading outages if not addressed.

Establishing the substation will address these challenges and bring several benefits to the energy infrastructure, reliability, and grid stability, which include:

- Avoiding the congestion and overloading in this region, thus ensuring smoother energy flow, and reducing the risk of system failures.
- Enhancing grid stability by maintaining voltage levels within standard values according to the grid code, especially during peak load periods under contingencies.
- Increasing the reliability of the electrical grid by mitigating the risk of cascading outages, thereby ensuring uninterrupted power supply to the northern region.
- Improving 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 Megawatt (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.
- 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 (NEPCO Restructuring loan[1]).

1.3 Lender Environmental and Social Requirements and Project Category

As this Project is a greenfield Project that could result in potentially significant adverse future environmental and/or social impacts, the EBRD has categorised the Project as "A" in terms of its 2019 Environmental and Social

[1] NEPCO Restructuring Loan (2018) Project Summary Document (PSD) published on EBRD website: https://www.ebrd.com/work-with-us/projects/psd/nepco-restructuring-loan.html

(E&S) Policy, which means that a comprehensive Environmental and Social Impact Assessment (ESIA) and review of associated documents must be carried out, followed by their public disclosure for a minimum period of 120 days.

The EBRD commissioned an environmental and social (E&S) consultant to prepare an Environmental and Social Impact Assessment (ESIA)[2] 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. This ESIA is being prepared for financing requirements and not to obtain a local environmental permit.

The ESIA shall also cover any associated facilities in relation to the Project. As defined in the ESP 2019, Associated facilities are not financed by EBRD as part of the Project but in the view of EBRD are significant in determining the success of the Project or in producing agreed project outcomes. These are:

1. NEW facilities or activities.
2. Without which the project would not be viable. and
3. Would not be constructed, expanded, carried out or planned to be constructed or carried out if the project did not exist.

There are no associated facilities related to this Project.

The Project shall be planned and executed in a manner that ensures E&S compliance and alignment with all national applicable legislation, and with international best practice. In addition to the national legislations, the Project will comply with the ESP 2019 of the EBRD and its associated Performance Requirements (PRs).

1.4 National Environmental Permitting Requirements

The E&S Consultant has assisted NEPCO to prepare and submit a" Project Summary" document to Ministry of Environment (MoEnv) number 4373/4/1/7 dated 15 May 2024 for the purpose of obtaining their decision regarding the environmental permitting requirements for the Project.

Based on letter no. 4/5/4278 dated 9 July 2024, the MoEnv requested a Comprehensive Environmental Impact Assessment (EIA) study.

1.5 This Report

This report is prepared for EBRD to ensure E&S risks and required mitigation measures are considered and reflected in the loan agreement documents with NEPCO and for public disclosure for a minimum period of 120 days.

The MoEnv requires an ESIA to be prepared and submitted by a local accredited Environmental Impact Assessment (ESIA) consulting company (list provided on MoEnv website[3]) for an environmental permit to be issued for the Project.

[2] An Environmental Assessment study is referred to as EIA when it is undertaken in accordance with local requirements and as an Environmental and Social Impact Assessment (ESIA) when it is undertaken in accordance with International Financing Institution requirements. Both terms are used in this report without any difference in scope and content since the EIA considers international financing requirements.

[3] https://www.moenv.gov.jo/ebv4.0/root_storage/ar/eb_list_page/%D8%A7%D9%84%D8%AC%D9%87%D8%A7%D8%AA_%D8%A7%D9%84%D8%A7%D8%B3%D8%AA%D8%B4%D8%A7%D8%B1%D9%8A%D8%A9_%D8%A7%D9%84%D9%85%D8%B9%D8%AA%D9%85%D8%AF%D8%A9_%D9%84%D8%B9%D9%85%D9%84_%D8%AF%D8%B1%D8%A7%D8%B3%D8%A7%D8%AA_%D8%AA%D9%82%D9%8A%D9%8A%D9%85_%D8%A7%D9%84%D8%A7%D8%AB%D8%B1_%D8%A7%D9%84%D8%A8%D9%8A%D8%A6%D9%8A_%D9%84%D8%B9%D8%A7%D9%85_2024.pdf

This report 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.

The target of this ESIA is to comply with the lender (EBRD) requirements and ensure that all relevant E&S risks and impacts are assessed, mitigated, and monitored in accordance with good international industry practice (GIIP).

The ESIA will be undertaken based on:

- Applicable local, national, and regional requirements, including those related to environmental impact assessments (the "Environmental Classification & License Regulation and its Amendments No. 69/2020").
- The EBRD 2019 ESP and its associated PRs, and relevant European Union (EU) requirements (including, but not limited to, the EU Environmental Impact Assessment Directive and industrial emissions (IE) Directive).
- Relevant international conventions and protocols relating to E&S issues, as transposed into national legislation.

1.6 The E&S Consultant

The EBRD has appointed ECO Consult (Jordan) to carry out the ESIA for the Project (referred to the E&S Consultant or the E&S Team in this report). ECO Consult is an international consulting company and is accredited by the MoEnv to undertake environmental assessments for projects in Jordan. The E&S Consultant Team consists of experienced capable experts with related experience.

1.7 Parties Involved in the Project

Table 1 below provides the key entities involved in the Project and their involvements.

Table 1: List of Key Entities Involved in the Development and Implementation of the Project

Entity	Involvement and Relevance to the Project
NEPCO	▪ "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	▪ The Project financier and responsible for the monitoring of E&S safeguard compliance.
Contractors and Subcontractors	▪ Providing the final design of the Substation and the OHTL. ▪ Undertaking the construction activities of the substation and the OHTL.
Ministry of Environment (MoEnv)	▪ 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	▪ Is the Consultant assigned by the EBRD to prepare the ESIA for the Project.

Entity	Involvement and Relevance to the Project
Project Implementation Unit (PIU) Consultant	▪ 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.
E&S ESAP Implementation Consultant	▪ 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.

1.8 Report Content

This ESIA Report includes the following Sections:

Table 2: ESIA Document Structure

Section	Description of Content
Section 2: The Project Area	Provides a detailed description of the Project in relation to its location, the key project components and an overview of the proposed activities that are to take place during the various Project phases.
Section 3: The Project Description	Provides a description of the key features of the proposed Project components, facilities, the Project design, project phases and activities, and implementation timeline.
Section 4: Methodology and Scope of Work for the ESIA	Details the methodology and scope of work used to assess the potential environmental and social impacts of the project.
Section 5: Analysis of Alternatives	Provides an overview of the project's strategic importance and discusses the selection of the preferred project site, justification for its necessity, and outlines future considerations for the design and environmental impact assessments.
Section 6: Regulatory and Policy Framework	Provides a description of the regulatory framework and standards applicable to the Project, including the national legislations and lender requirements.
Section 7: Stakeholder Engagement and Consultation	Discusses the regulatory context for stakeholder engagement, identifies the relevant stakeholders, and describes the stakeholder consultation and engagement plans which are undertaken as part of the ESIA process for the Project
Section 8 – Section 17:	These sections first present the baseline conditions within the Project site and surroundings, and then assess the anticipated impacts from the Project throughout its various phases on such a receptor. Finally, for each identified impact a set of mitigation and monitoring requirements have been identified which aim to eliminate the impact and/or reduce it to acceptable levels. This includes the following: Climate (Section 8), Landscape and Visual (Section 9), Land Use, Land Ownership and Resettlement (Section 10), Geology, Hydrology and Hydrogeology (Section 11), Archaeology and Cultural Heritage (Section 12), Air Quality and Noise (Section 13), Biodiversity (Section 14), Infrastructure and Utilities (Section 15), Occupational Health and Safety (Section 16), Socioeconomic Conditions (to include public health and safety).
Section 18: Summary of Anticipated Impacts	Based on the outcomes of the above, this section provides an overall summary of the anticipated impacts from the development of the Project.
Section 19: Environmental and Social Management Plan (ESMP)	Presents the Environmental and Social Management Plan (ESMP) for the Project, which mainly summaries the impacts identified as well as the mitigation measures and monitoring requirements to be implemented throughout the various Project phases. In addition, this section describes the institutional framework and procedural arrangement for the ESMP implementation as well as the implementation of an Environment, Health, Safety and Social Management System (EHSS MS).

2 THE PROJECT AREA

This section provides a detailed description of the Project in relation to its location. The main objective of the project is to construct a new 400/132/33 kV transmission substation in Rihab locality – Mafraq Governorate. In addition, the Project involves construction of an OHTL with a provisional concept route provided by NEPCO. Together, the North Substation and the OHTL are referred to as the Project.

2.1 The North Substation

The proposed North Substation is in Mafraq Qasabah district in Al-Mafraq governorate, which consists of the following localities: Al-Mafraq, Bal'ama, Rihab (in which the proposed North Substation is located), and Al-Manshiya. Rihab locality is also located within the jurisdictions of Greater Mafraq Municipality (GMM) area.

2.1.1 The Location Alternatives

NEPCO had considered two (2) alternative locations for the location of the substation. These potential locations were as follows and are shown in Figure 1:

- Alternative 1: land "Tamirah", which is around 120 dunums[4] (0.12 km^2)
- Alternative 2: land "Albarakeh", which is around 18 dunums (0.018 km^2)

Figure 1: Map Showing the Two Proposed Alternative Land Locations for the North Substation

- Alternative 1 "Tamirah":
  - Located at around 0.75 km from the main road.

[4] 1 Dunum = 0.001 Square Kilometres

- Almost all the neighbouring lands are vacant with no existing current land use, only a very few residential properties are located at around 1.5 km to the east of the "Tamirah" land as shown in Figure 2 and Figure 3.
- During the site visit undertaken by the E&S Consultant is 2022, the land was vacant and unused. **A subsequent visit to the site in June 2024 indicated the land was ploughed and planted with barely.** A review of historical aerial images for the area indicated that the site has been ploughed and planted (with barely) in 2015, 2019, 2023, and 2024 only. The aerial images did not show this being undertaken regularly on an annual basis. Based on discussions with one of the owners, it was understood that in some years, he ploughs the land and plants it with barley for fodder production. 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.

- Alternative 2 "Albarakeh":
  - Located adjacent to the main road at around 0.1 km.
  - Two (2) villages are located east and west of the "Albarakeh" at less than 0.5 km as shown in Figure 3 and Figure 4.

Figure 2: Alternative 1 "Tamirah" Land

Figure 3: Alternative 2 "Albarakeh"

Figure 4: Alternative 2 "Albarakeh" Surrounding Community Depicted from the Site

Following a site visit and audit undertaken by the E&S Team in 2022 and another undertaken independently by NEPCO, the following is decided in relation to the proposed substation location alternatives:

- 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". Figure 5 below shows the location of the selected land for the Substation at different spatial levels (National, Regional, Local and Land Detail).

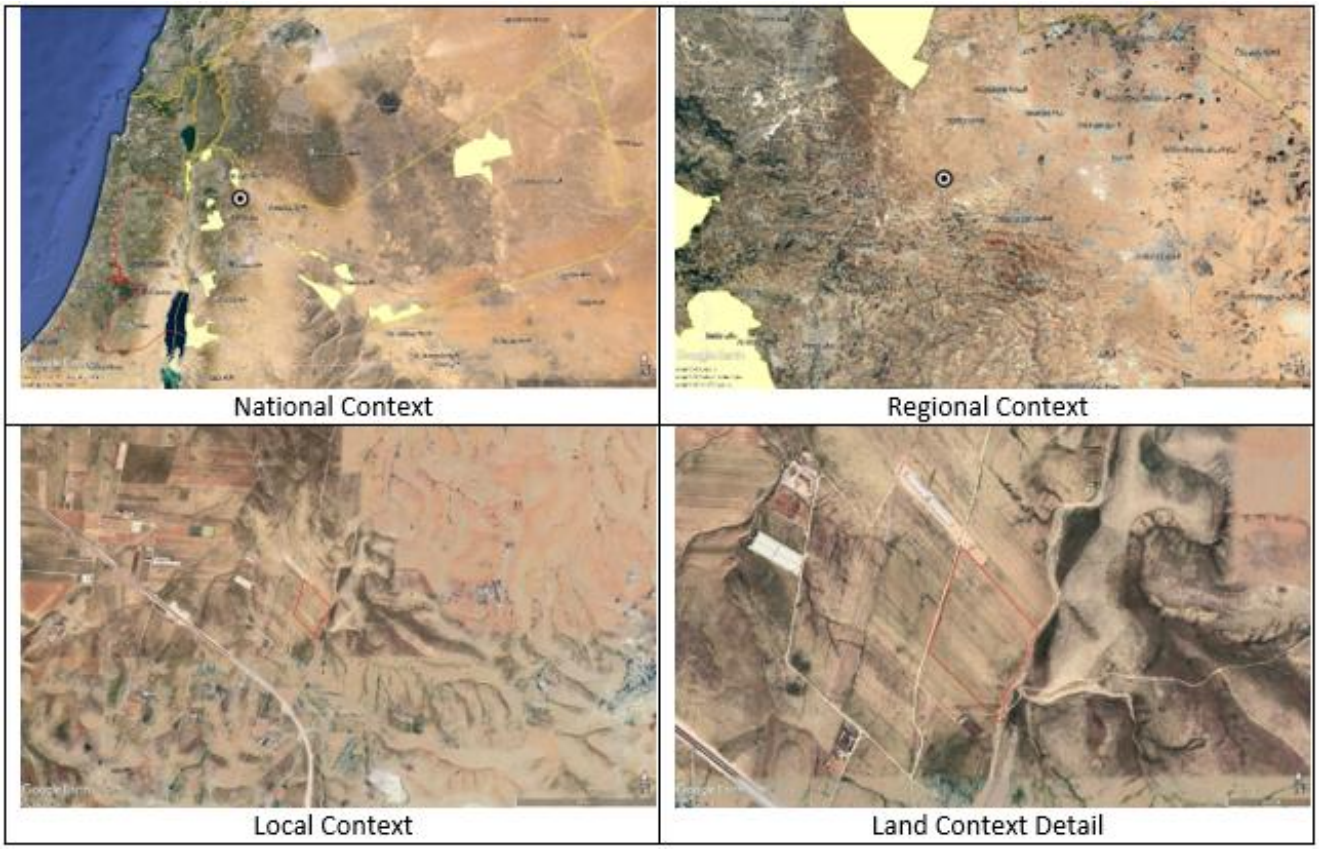


Figure 5: Project Location Contextual Overview from National to Local Scale

Photos taken from site visits in 2022 and 2024 to Alternative 1 land are included in Figure 6 below.

Figure 6: Photos of the Selected Site for the North Substation - Alternative 1 Land "Tamirah"

2.1.2 The Substation Site and Area

Tamirah 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.

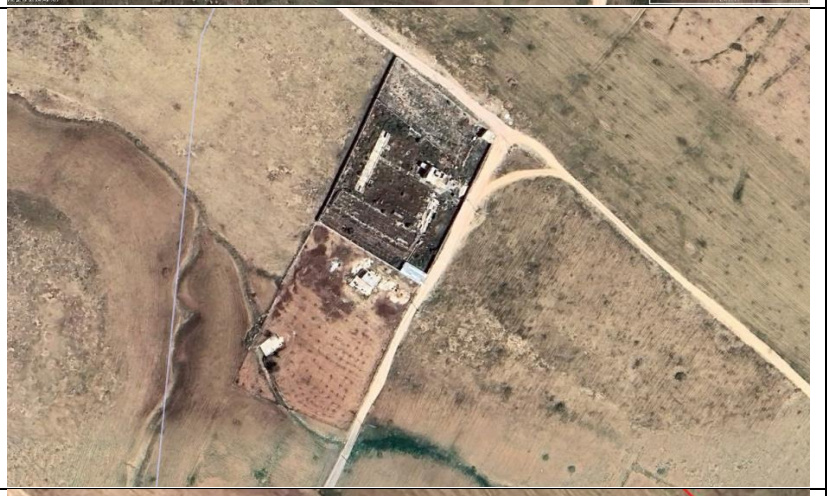
There are no residential settlements, or obvious sensitive receptors nearby. In 2022 the area was completely vacant and roads leading to the general area of the substation land and the substation land itself were still under construction. However, the visit in 2024 indicated some land use activities 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.

There are a few receptors within 1 km radius of the substation land delineated in Figure 7 and are listed in Table 3 below.

Figure 7: Key Receptors Within 1 Km of the Selected Project Site

Table 3: Key Receptors Within 1 Km of the Selected Project Site

#	Receptor	Description	Photo
1	Receptor 1 (Chicken Broiler Houses and workers temporary accommodation)	▪ Approximately 85 metre (m) North of the closest edge of the Tamirah land	
2	Receptor 2 (private house/farm that includes a private well)	▪ Approximately 640 m North-West of the closest edge of the Tamirah land	

3	Receptor 3 (Chicken Broiler Houses)	▪ Approximately 540 m North - West of the closest edge of the Tamirah land	
4	Receptor 4 (Private house/farm)	▪ Approximately 400 m South - West of the closest edge of the Tamirah land	
5	Receptor 5 (Private house/farm)	▪ Approximately 80 m North of the closest edge of the Tamirah land	
6	Receptor 6 (Structure remains)	▪ Lies approximately 300 m South of the closest edge of the Tamirah land	

Only a very few residential properties are located at around 1.5 km to the east of the Project site. The main communities of regulated land use (Al-Khanasry and Al-Faiha' localities), both located at more than 3 km from the Project site. The Project site is also located at around 0.75 km from the main road.

There are no residential structures onsite and no nearby settlements, or obvious sensitive receptors. The Project site is in a rural area. There are no nearby activities that would cause any pollution or noise.

During the site visit undertaken by the E&S Consultant is 2022, the land was vacant and unused. **A subsequent visit to the site in June 2024 indicated the land was ploughed and planted with barely.** A review of historical aerial images for the area indicated that the site has been ploughed and planted (with barely) in 2015, 2019, 2023, and 2024 only. The aerial images did not show this being undertaken regularly on an annual basis. Based on discussions with one of the owners, it was understood that in some years, he ploughs the land and plants it with barley for fodder production. 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.

The Tamirah site does not intersect any Key Biodiversity Areas (KBAs) or notable biodiversity sites such as Important Bird Areas (IBAs) or Ramsar areas. Anabasis articulata, a salt-tolerant plant, has been noted at the site, but it is not of high conservation concern. This plant, used as a soap substitute with medicinal properties, is unpalatable to livestock. Overall, there are no significant biodiversity concerns at the Tamirah site.

"The climate in the western part of the Mafraq Governorate is characterised by a semi-arid environment with distinct seasonal variations. This region experiences hot, dry summers and cool, wet winters, typical of the Mediterranean climate prevalent in the broader area."

Due to the climatic conditions, poor soil characteristics, and limited water resources the vegetation, natural habitat, and agricultural uses of the Project Site and area are limited. Due to the poor vegetation cover and growth, the site has a low value as a grazing area.

Figure 8: General Overview of Vegetation Cover Within the Project Site

2.2 The OHTL

NEPCO provided a preliminary route for the OHTL that starts from an area outside municipal boundary between the Al-Hashimeyeh municipality to the east and Birein municipality to the west, which is located in Zarqa Governorate and passes through several districts and localities and ends at the selected Project site in Rihab locality. The North Substation will be connected to the 400 kV OHTL on the 400 kV side, in addition to connecting with the Al Hassan Industrial Estate and Jerash 132/33 kV substations on the 132 kV side.

There is also a possibility of adding a new 132/33 kV substation in the future to the North 400 kV Substation to meet future loads in the region to reduce the loads of the Irbid, East Irbid, and Al-Hassan Industrial Estate substations. This is not included in this report.

2.2.1 The OHTL Connections

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 OHTL provisional routes provided by NEPCO is shown in Figure 9 below.

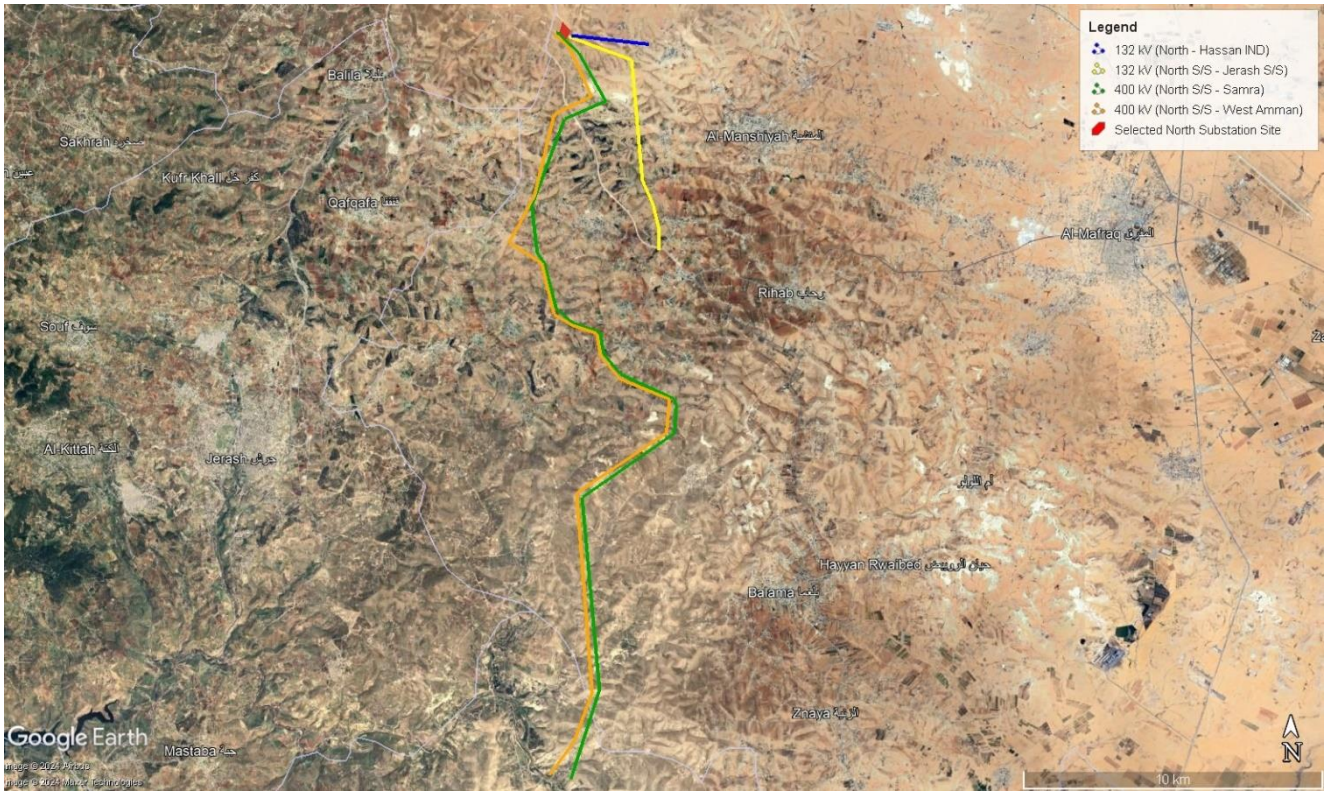


Figure 9: Provisional Route Provided by NEPCO for the OHTL

NEPCO is developing the North Substation and is currently discussing potential financing for the OHTLs with EBRD. Construction of the OHTLs expected to commence by Quarter 1-2 of 2027 and the OHTL shall be operational and energised by June 2028.

In parallel and under a separate project being developed by NEPCO, the plan is to eventually connect the OHTL to another OHTL being developed (Jerash – Rehab OHTL) and with an existing line leading to Al Hassan Industrial Estate, strengthening electricity provision to Al Hassan and to enhance electricity supply in the North. The contractor for Jerash – Rehab OHTL is expected to be awarded by mid-June 2024, with construction planned for completion by October 2025 and energising expected by February 2026.

It is important to note that the planning for the Jerash – Rehab OHTL is being conducted separately from that of the North substation and its associated OHTLs and is bound to happen regardless and at different time frames.

The North Substation and the OHTL project encompass a 132 kV route from the North substation to Al Hassan Industrial Estate as shown in Figure 9 (blue line) and another 132 kV route to Irbid East (yellow line). Upon completion of these lines, the existing Al Hassan line will be phased out.

Upon completion of the Jerash – Rehab and Rihab-Irbid East lines, the Jerash line will be disconnected from the existing line and connected to the Rihab – Irbid East line, completing a “ring” network (Figure 10). Additionally,

a new line will supply electricity to Al Hassan from the North Substation (132 kV Super-Heated OHTL (North – Al Hassan Industrial Estate) Length: 3 km).

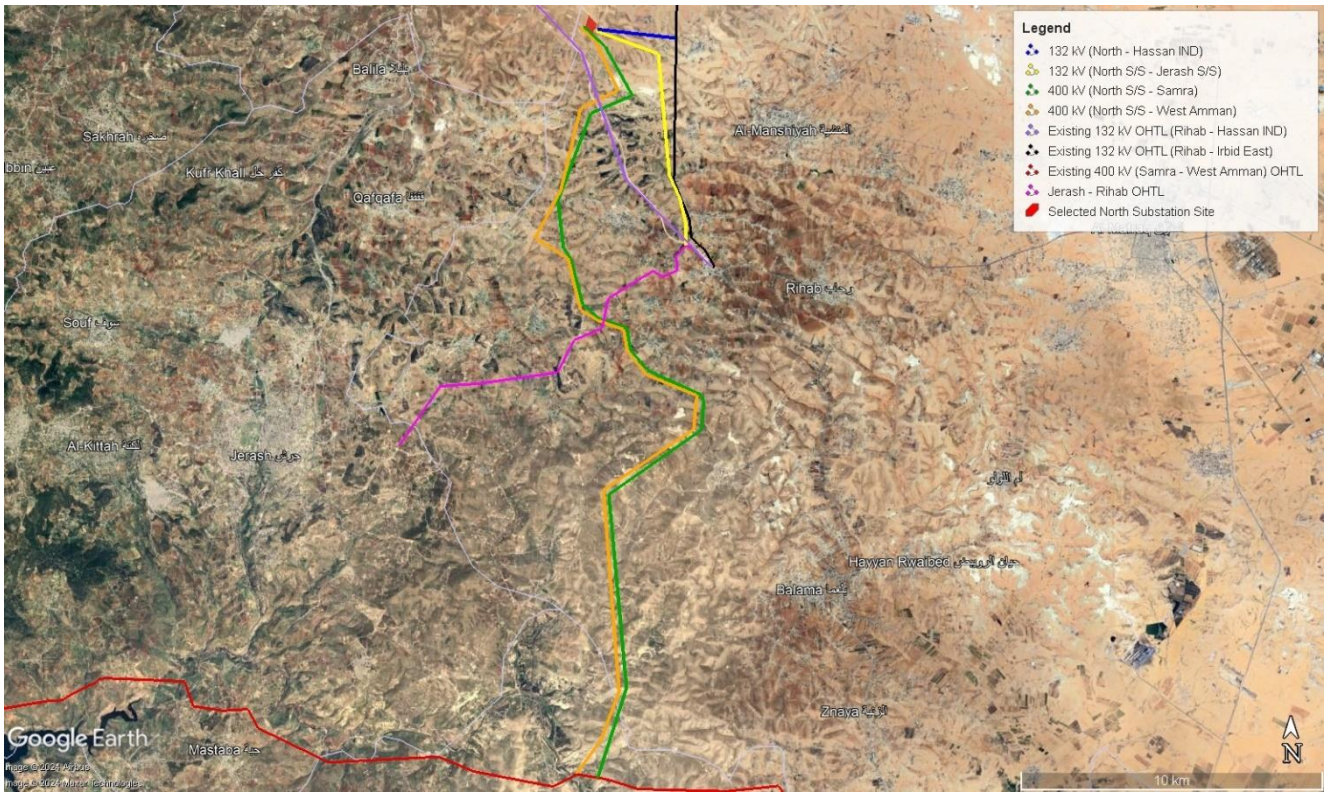


Figure 10: The Ring Network for the North Area as Planned By NEPCO

2.2.2 The OHTL Route and Area

The 400kV OHTLs start from area outside municipal boundary between the Al-Hashimeyeh municipality to the east and Birein municipality to the west, which is 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 9 above shows the provisional OHTLs route provided by NEPCO.

The E&S Consultant undertook a site assessment to assess the accessible parts of the route. 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 considering the instructions for 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC[5].

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 OHTLs, NEPCO has officially coordinated with all related government authorities to gather all data related to the OHTLs 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.

5 https://emrc.gov.jo/echobusv3.0/systemassets/%D8%AA%D8%B9%D9%84%D9%8A%D9%85%D8%A7%D8%AA%20%D9%85%D8%B3%D8%A7%D9%81%D8%A7%D8%AA%20%D8%A7%D9%84%D8%B3%D9%85%D8%A7%D8%AD%20%D8%A7%D9%84%D9%83%D9%87%D8%B1%D8%A8%D8%A7%D8%A6%D9%8A..pdf

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 is done in accordance with the General Electricity Law No. 64 of 2002[6].

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.

In general, Zarqa governorate has a similar weather condition to Al-Mafraq Governorate. The Consultant did not observe any activities along the OHTL route that would cause any pollution or noise issues.

The terrain on the OHTLs route is difficult in some locations which could be in flood areas. This should be assessed in detail by the EPC Contractor.

The OHTLs route does not cross any KBAs or essential biodiversity sites. The alignment passes primarily through private agricultural land and some areas classified as forest land, where tree cutting is prohibited.

It is important to consider all existing sensitive receptors when finalising the OHTLs route and specifying the location of the OHTLs towers – this should be added as a requirement in the tender to assign the EPC contractor.

Selected key areas along the OHTLs route with example photos and findings from the site assessment are included in Table 4 below.

Table 4: Selected Areas Along the OHTLs Route with Example Photos and Findings from the Site Assessment

Description	Photo
▪ Houses and planted areas located within the vicinity of the planned OHTLs route. ▪ Animal waste observed at some locations along the route indicating grazing activities.	
▪ Retama Ratem plant was observed in some locations in the proximity and/or within the OHTLs. ▪ Plants of the genus Retama (Fabaceae) are used in traditional medicine of the Mediterranean Basin as a nauseant, laxative/cleansing, and vermifuge. Certain Retama species are also employed to treat a multitude of disorders, including diabetes, hepatitis, jaundice, sore throat, skin diseases, joint pain, rheumatism, fever, and inflammation.	
▪ A farm with planted olive trees, house, and poultry house is located within the vicinity of the planned OHTLs route.	

6 https://emrc.gov.jo/echobusv3.0/systemassets/%D9%82%D8%A7%D9%86%D9%88%D9%86%20%D8%A7%D9%84%D9%83%D9%87%D8%B1%D8%A8%D8%A7%D8%A1%20%D8%A7%D9%84%D8%B9%D8%A7%D9%85%20%D8%B1%D9%82%D9%85%2064%20%D9%84%D8%B3%D9%86%D8%A9%202002%20%D9%88%D8%AA%D8%B9%D8%AF%D9%8A%D9%84%D8%A7%D8%AA%D9%87.pdf

▪ Lands with native forest trees.	
▪ Fenced farms/ houses with planted olive trees and empty spaces are located adjacent to the planned OHTLs route.	
▪ A land designated by Ministry of Local Administration (MoLA) as a forest (Haraj) area with native forest trees is located within the planned OHTLs route. This area is covered with trees.	
▪ Farms planted with cropping olive trees are located within the planned OHTLs route.	
▪ A house/farm and a tent that belongs to the house owners and two empty structures are in the vicinity of the planned OHTLs route.	

3 THE PROJECT DESCRIPTION

This section provides a detailed description of the Project in relation to the key project components, and an overview of the proposed activities that are to take place during the construction, and operation phase.

3.1 The North Substation

3.1.1 The 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 power plant and consumer and may be changed in voltage in several steps. There are different kinds of substation such as Transmission substation, distribution substation, collector substation, switching substation and some other types of substations. The North Substation is a transmission substation. The general functions of a substation may include:

- Voltage transformation.
- Connection point for transmission lines.
- Switchyard for network configuration.
- Monitoring point for control centre.
- Protection of power lines and apparatus.
- Communication with other substations and regional control centre.

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

There are additional Project components that will be required on a temporary basis throughout the construction phase of the Project in particular. Those are identified below. The location of such components will not be available at this point, nor is it expected to be available during the ESIA preparation phase. Those will be identified once the EPC Contractor is appointed and a detailed design is completed. At this stage, EPC Contractor has not been selected yet. It is therefore not possible to estimate temporary land take for these temporary components. Once the final construction design drawings are available from the EPC, temporary land takes can be determined and calculated. Should this occur, it can be addressed through the Resettlement Plan (RP) to be prepared once the design is available.

Laydown areas: this is a temporary storage area where tools, materials, equipment and vehicles are stored when not in use. The laydown area for the substation may be allocated within the land acquired for the substation.

A batching plant will most probably not be required for the Project. The EPC Contractor will supply ready mix concrete trucks when required.

Worker camp areas will not be allowed within the vicinity of the Project site. If required, the EPC contractor can accommodate the workers within some of the closest local communities.

Offices will be required for the running the day-to-day activities of the Project. Generators are expected to be required for electricity supply.

NEPCO develops the basic concept design to include layouts, Single Line Diagram (SLD), structures, etc. for the substation. However, the final design shall be provided by the Contractor in collaboration with NEPCO and shall

be developed according to NEPCO requirements and international standards while ensuring the functional requirement of the line and substation facilities to meet the major technical parameters and project parameters.

In Figure 11, the substation plan provided by NEPCO is overlaid on Google Earth, showing the layout of the substation on the selected land with the North arow pointing to the North. The general design of the substation is provided in Figure 12 below. Note: the north arrow in Figure 12 does not align with the true north direction.

Figure 11: General Layout of the North Substation

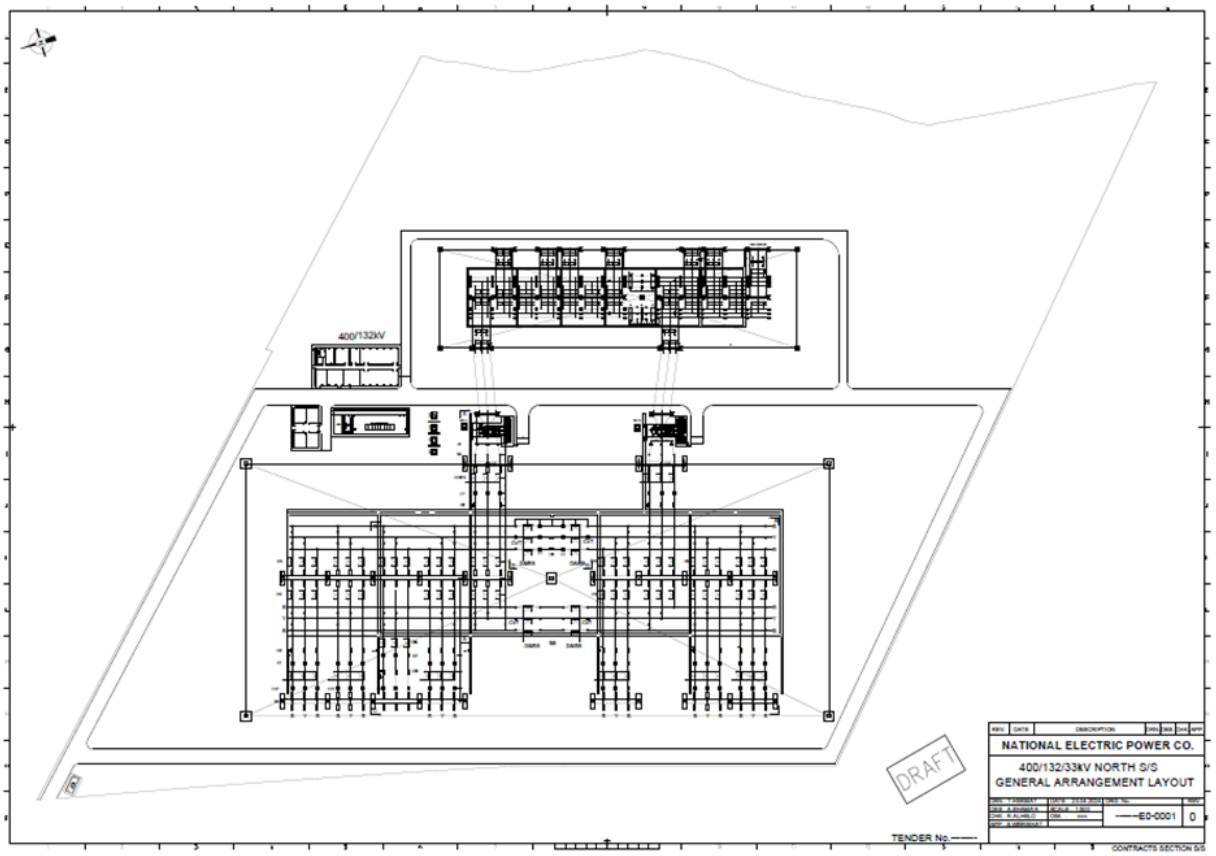


Figure 12: General Design of the North Substation

Figure 13 below shows a typical view of a substation.

Figure 13: Typical View of a Substation

3.1.2 Land Acquisition Requirements

The Alternative 1 land consists of 10 independent adjacent land plots (Figure 14) which are collectively privately owned by 172 persons.

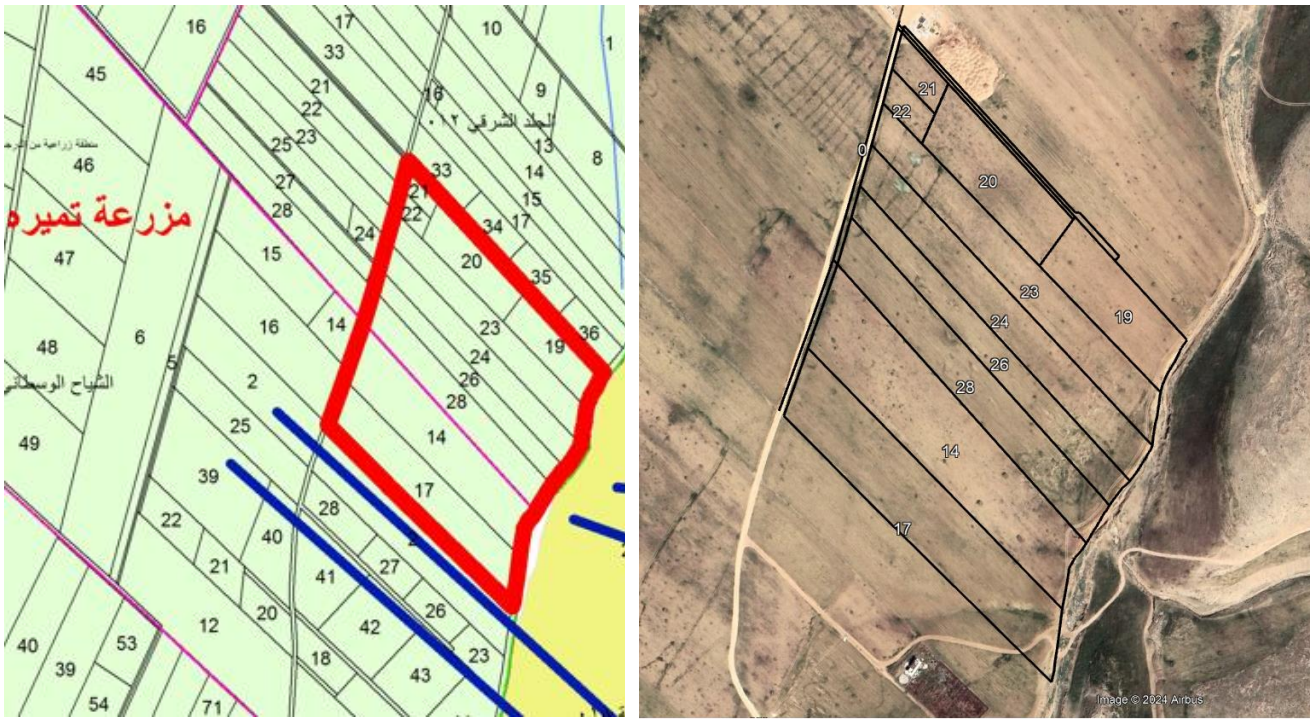


Figure 14: Selected Site for the North Substation Consists of 10 Independent Adjacent Land Plots

NEPCO will acquire four (4) land plots completely, and parts of the other six (6) land plots as indicated in the table below.

Table 5: The Land Selected for the North Substation including Total Land Area and Percentage of Land Acquisition

No.	Parcel Number	Basin	Total Area - Dunum (km2)	Area Acquired - Dunum (km2)	Area Acquired (%)
1	14	13	27.708 (0.027)	23.670 (0.024)	85.42

2	17	13	21.865 (0.213)	21.865 (0.022)	100
3	19	12	8.982 (0.009)	8.982 (0.009)	100
4	20	12	9.586 (0.010)	9.586 (0.010)	100
5	21	12	12.495 (0.012)	1.881 (0.002)	15.05
6	22	12	11.826 (0.012)	1.650 (0.002)	13.95
7	23	12	26.081 (0.026)	14.943 (0.015)	57.29
8	24	12	16.648 (0.017)	14.550 (0.015)	87.39
9	26	12	10.882 (0.011)	10.882 (0.011)	100
10	28	12	28.129 (0.028)	14.776 (0.015)	52.52

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 (0.12 km^2) 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.

3.1.3 The 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.

3.2 The OHTL

3.2.1 The 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 three (3) Phases, Double-Circuit Transmission Towers (DCT), which will be the carrier of the conductors that will transport the electrical power between both ends of the transmission line and connect the substation with the High Voltage National Grid. The typical structure of the DCT tower is presented in Figure 15 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 four (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. Conductors to be used for the lines are (All Aluminium Alloy Conductors) AAAC Yew for 32kV lines, Aluminium conductor steel-reinforced cable / Aluminium Clad Steel (ACSR)/(ACS) 560/50 for 400kV lines, and ACCC for the upgradation part of 132kV as High Temperature Low Sag Conductors (HTLS) conductors. The conductors will connect through the cross-arms.
    - Cross-Arms: each tower will have two six (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 two (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 within the cable can be used for high-speed transmission of data, either for the electrical utility's own purposes of protection and control of the transmission line, for the utility's own voice and data communication, or may be leased or sold to third parties to serve as a high-speed fibre interconnection between cities.
- Infrastructure Elements: Based on discussions with NEPCO, the only infrastructure requirements for the Project will be access roads, which might be required in areas where the towers are inaccessible based on existing site conditions. Such access roads are required for access of construction vehicles and machinery during construction and for maintenance activities during operation. There will be no permanent access roads established for the Project for construction or operation and maintenance activities. Access of vehicles and machinery during construction and for maintenance activities during operation will be only to tower locations. Access will be through existing tracks or dirt roads as applicable that lead directly to each exact footprint location. This will be confirmed and verified as part of the detailed design stage to be undertaken by the EPC Contractor. At this stage the EPC Contractor has not been contracted and there is no detailed design available. Consequently, whether any additional roads will be required or whether existing access roads will require any expansion and enhancement with any additional land being required is unknown. Should this occur, it can be addressed through the Resettlement Plan (RP) to be prepared 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.
- The number of towers, tower spotting, the height of each tower, and towers' final location, and the final route with its buffer will be determined at a later stage as part of the detailed design studies to be undertaken by the EPC Contractor which will be assigned by NEPCO at a later stage.

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 m 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 below. Final tower locations and numbers will be determined as part of the detailed design to be undertaken by the EPC Contractor.

Table 6: 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.

No land use activities are allowed within the footprint indicated above. There are sanitary protection zones applied as included in Section 3.2.2.

Figure 16 below shows a typical view of an OHTL.

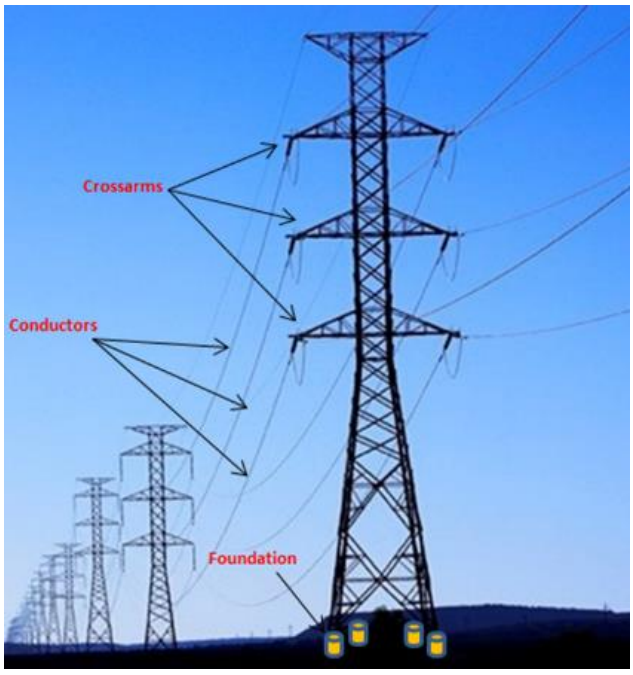


Figure 15: Key Components of a Transmission Tower

Figure 16: Typical View of an OHTL

There are additional Project components that will be required on a temporary basis throughout the construction phase of the OHTL in particular. Those are identified below. The location of such components will not be available at this point, nor is it expected to be available during the ESIA preparation phase. Those will be identified once the EPC Contractor is appointed and a detailed design is completed. At this stage, EPC Contractor has not been selected yet. It is therefore not possible to estimate temporary land take for these temporary components. Once the final construction design drawings are available from the EPC, temporary land takes can be determined and calculated. Should this occur, it can be addressed through the Resettlement Plan (RP) to be prepared once the design is available.

Laydown areas: this is a temporary storage area where tools, materials, equipment and vehicles are stored when not in use. Due to the length of the OHTL, it is likely that several laydown areas will be established along the route.

Batching Plant: it is not yet clear whether a mobile concrete batching plant will be established or whether it will be procured from permanent existing batching plants available within each working area along the OHTL route (most likely scenario). Batching plant will be required for preparation of the concrete to be used for foundation installation.

Worker camp areas will not be allowed within the vicinity of the OHTL route. If required, the EPC contractor can accommodate the workers within some of the closest local communities.

Offices will be required for the running the day-to-day activities of the Project. Generators are expected to be required for electricity supply.

3.2.2 Servitude and Transmission Line

Servitude Requirements

Electricity transmission projects require servitudes (or RoW) to protect the system from windfall, contact with trees, branches, utilities, buildings, and other potential hazards that may result in damage to the system, or power failures, as well as public health and safety concerns. Servitude is also utilised to access, service, and inspect transmission systems.

The International Finance Corporation (IFC) Environment, Health, and Safety (EHS) Guidelines for Electric Power Transmission and Distribution (2007)[7], states that the servitude width for transmission lines ranges from 15 to 100m depending on voltage and proximity to other servitudes, but typical range is between 15 and 30m.

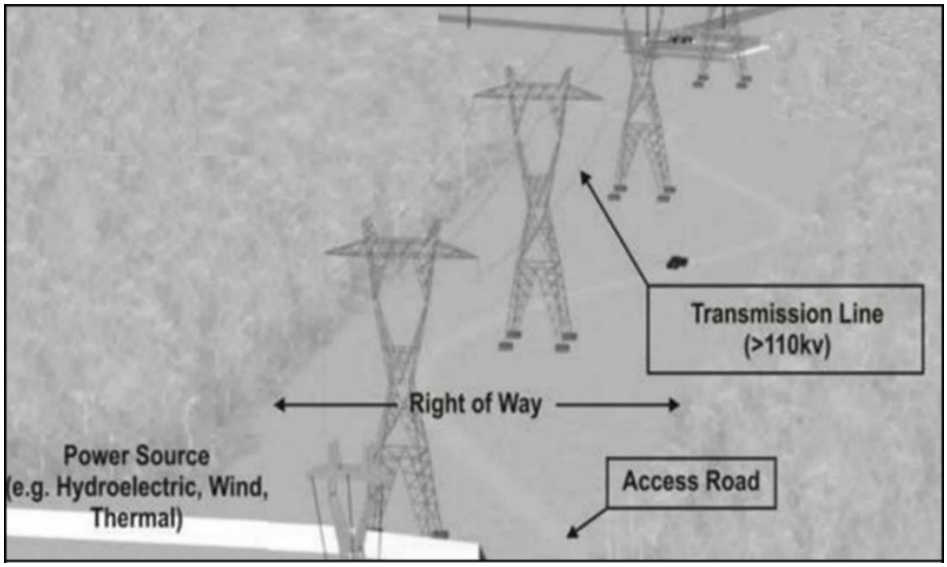


Figure 17: Right of Way and Access Road for OHTL (IFC, 2007)

Within the local requirements and context, as per the instructions for 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC[8], the instructions provide Sanitary Protection Zone determined to ensure safety for populations living near high voltage power lines. Applicable Articles of the Instruction 'Sanitary Rules to Ensure Electrical Safe Distances' No. 1 for 2003 Issued by the EMRC are outlined in Table 7.

[7] https://www.ifc.org/content/dam/ifc/doc/2000/2007-electric-transmission-distribution-ehs-guidelines-en.pdf

[8] https://emrc.gov.jo/echobusv3.0/systemassets/%D8%AA%D8%B9%D9%84%D9%8A%D9%85%D8%A7%D8%AA%20%D9%85%D8%B3%D8%A7%D9%81%D8%A7%D8%AA%20%D8%A7%D9%84%D8%B3%D9%85%D8%A7%D8%AD%20%D8%A7%D9%84%D9%83%D9%87%D8%B1%D8%A8%D8%A7%D8%A6%D9%8A..pdf

Table 7: Applicable Articles of the Instruction 'Sanitary Rules to Ensure Electrical Safe Distances' No. 1 for 2003 Issued by the EMRC

<table>
<tr><th>Instruction 'Sanitary Rules to Ensure Electrical Safe Distances' No. 1 for 2003 Issued by the EMRC</th></tr>
<tr><td>▪ Article 3
- For extended high or medium voltage electrical lines over or near the property, the land/property owner shall consider the electrical safety distances included in the Instruction and refrain from erecting any structures, obstructions, or planting obstructive trees within this distance.</td></tr>
<tr><td>▪ Article 4
- The licensed entity has the right to request property owners to cut or trim trees that obstruct electrical installations and which presence, movement, or fall causes damage to these installations, within the limits of the electrical safety distances included in the Instruction. If property owners do not comply, the licensed entity has the right to seek the Authority's intervention to make the appropriate decision.</td></tr>
<tr><td>▪ Article 6
- The electrical safety distances included in the Instruction for insulated lines and cables is considered zero, regardless of the voltage of the line or cable.</td></tr>
<tr><td>▪ Article 7
- The electrical safety distances included in the Instruction for uninsulated overhead lines at maximum bend is determined for the OHTL according to the following table:
<table>
<tr><th>Electrical Safe Distances</th><th>132 kV</th><th>400 kV</th></tr>
<tr><td colspan="3">Horizontal Distance</td></tr>
<tr><td>Horizontal Tolerances from Structures</td><td>4.6 m</td><td>6 m</td></tr>
<tr><td>Horizontal Tolerances from Lands Outside Regulatory Areas</td><td>4.6 m</td><td>6 m</td></tr>
<tr><td colspan="3">Vertical Distance</td></tr>
<tr><td>Elevation Above Ground Level</td><td>6.3 m</td><td>8 m</td></tr>
<tr><td>Intersection Elevation Above Road Level</td><td>11 m</td><td>15 m</td></tr>
<tr><td>Elevation Above Other Lines at Intersections</td><td>3.5 m</td><td>5 m</td></tr>
<tr><td>Elevation Above Tree Tops</td><td>3 m</td><td>4.5 m</td></tr>
<tr><td>Elevation Above Existing Structures' Roofs</td><td>4.6 m</td><td>7.6 m</td></tr>
</table></td></tr>
</table>

As per the 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC, the safety distance around the tower is as follows:

- For 400 kV OHTL: 8.6 m from each side and under the conductor
- For 132 kV OHTL: 4.6 m from each side and under the conductor

These safety distances are normally measured after construction along with the towers' bases. Agricultural activities are allowed in this safety distance. However, buildings and tall trees are not allowed.

Compensation for Permanent Damages

NEPCO, in accordance with the General Electricity Law No. 64 of 2002, does not undertake land acquisition for the 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.

NEPCO must compensate the landowner for the loss of value only and does not "expropriate" any area of the land, including the area directly occupied by the tower and tower footings. Compensation encompasses the entirety of the land occupied by the tower, the area beneath the line (with an escalating compensation rate corresponding to the voltage increase), and the buffer area/protection zone surrounding the overhead lines.

Table 8: Applicable Articles of the General Electricity Law No. 64 of 2002

<table>
<tr><th>General Electricity Law No. 64 of 2002</th></tr>
<tr><td>▪ Article 43
A- Notwithstanding what is stated in any other legislation, the entity licensed to generate, transmit, or distribute may perform the following actions:
1. Extending or establishing electrical lines, supplies or installations under any road or street or across or above any of them if necessary.
2. Extending or establishing electrical lines, supplies, or installations under or above any land, except for archaeological sites.
3. Installing electrical supplies or devices on any staircase, corridor, field, across or above any of them or on any property to provide consumers with electrical energy.</td></tr>
</table>

B- Before commencing the implementation of any of the works referred to in Paragraph (A) of this Article, the concerned licensed entity (to carry out generation, transmission, operation of the transmission system, wholesale or retail supply, or distribution to establish electrical facilities) is required to publish an advertisement in at least two (2) local daily newspapers no less than 15 days before the intended start date of the works.

C- The licensed entity to generate, transmit, or distribute electrical energy is obligated to compensate real estate owners for the work performed in accordance with the provisions of Paragraph (A) of this Article. This excludes any ministry, government department, public official institution, any municipality, or the consumer requesting direct supply of the service.

Note: There are no indications in the Law regarding timing of the provision of compensation and whether this is a prerequisite to being able to access the site/route and start the works. In addition, this Paragraph C or the Article 43 excludes public entities but does not provide details on the measures required for these public entities.

- Article 44

A- The licensed entity must pay to the affected person fair compensation for the damage caused to movable or immovable property because of the works.

B- If there is no agreement during negotiation between the relevant licensed entity and the landowner on the amount of compensation, the compensation decided by the court shall be paid in accordance with the provisions of Paragraph A of this Article unless the two parties agree to arbitration.

C- The affected person shall be compensated in accordance with the provisions of this law for the decrease in the value of the 'damaged' area of land under, through, or over which electrical lines pass from the date of the establishment of those facilities, considering the instructions for 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC when calculating the area of the damaged part of the land.

Note: based on additional clarification with NEPCO, definition of "date of the establishment of the OHTL" as per established legal precedents derived from court rulings (example provided by NEPCO) the term "establishment" is interpreted to signify the date of line energisation.

D- The compensation decided under Paragraph I of this Article will result in the imposition of annual legal interest at the rate decided by the CoM based on the Council's recommendation, calculated from the date of the establishment of the electrical facilities or the date of ownership of the land, whichever date is the latest, until the date of payment of the prescribed compensation.

E- The provisions of Paragraphs I and (D) of this Article apply to electrical installations established before the provisions of this law came into effect.

F- 1 – The claim for compensation or the benefits resulting from it, stipulated in Paragraphs I and (D) of this Article, shall not be accepted by the entity installing the electrical facilities or by the court after three (3) years have passed from the date of entry into force of the provisions of this law for electrical installations existing before the entry into force of its provisions, or after three (3) years have passed from the date of establishment of electrical facilities.
2- The claim for compensation against the entity establishing the electrical facilities shall not be accepted if the ownership of the land takes place after the establishment of the electrical facilities (i.e. energising the OHTL).

- Article 45

- The licensed entity has the right to own the land and any required rights for the purposes of carrying out the works and projects in agreement with the owners of the land and rights. If an agreement cannot be reached, the licensed entity shall submit a request to the Minister indicating that obtaining these lands and rights is necessary for the purpose of these projects, and if the Minister agrees, then the land and/or rights are immediately seized and acquired "immediate possession" and costs are covered by the licensed entity in accordance with the provisions of the applicable expropriation law (currently the Real Property Law No. 13 of 2019).

In the case where the OHTL passes over a certain private land, the landowner is compensated for the percentage of land covered by the OHTL based on the 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003 issued by the EMRC. This calculation is based on the following: (area of the entire land x price of the land x percentage to be compensated).

Based on the above, the area covered in the "permanent damages" calculation by NEPCO include the footprint of the tower locations, within the alignment of the OHTL, and the applicable protections zones. This only includes compensation for damages without undertaking a land acquisition process.

The right of way will have the following rules in place:

- No structures and no large trees will be permitted in the right of way and protection zones. The design to be undertaken by the EPC Contractor will avoid to the extent possible aligning the OHTL in proximity of permanent structures and buildings. However, any trees (cropping or forest) may fall within the ROW and protection zones and/or towers and these will have to be compensated by NEPCO and the rules in Table 7 apply.

- Land ownership will remain with current owners for all OHTL components and alignment. No land ownership transfer will take place.
- Agriculture will be permitted in areas outside the tower bases after the construction phase.

Given that the design for the OHTL and the location and footprint of the towers are not available at this point, a survey of permanent damage and a valuation assessment for compensation cannot be undertaken at this point. These are undertaken by NEPCO after the OHTL is energised (see Table 8). As such, this ESIA will include an RF report prepared separately and will provide measures to bridge gaps identified between the process carried by NEPCO and the EBRD PRs.

Temporary Land Requirements

There will be temporary land required during the construction phase for the temporary facilities as described earlier (e.g. laydown areas or access roads in case there are no existing tracks). The temporary land will not be subject to an acquisition process given that it is temporary short-term use for the period of construction. Those will be subject to an evaluation and compensation process.

Given that the design for the OHTL and details for temporary land requirements are not available at this point, this ESIA will include an RF report prepared separately and will provide measures to bridge gaps identified between the process carried by NEPCO and the EBRD PRs.

3.2.3 The 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 of 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 on site 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 minimise 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 energisation tests.
  - Commission the transmission line for operation, ensuring compliance with regulatory standards and safety requirements.

- Energising of the OHTL by NEPCO.

3.3 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.

4 METHODOLOGY AND SCOPE OF WORK FOR THE ESIA

The ESIA of the Project (North Substation) and the (OHTL) will be conducted following a rigorous and comprehensive approach to ensure that all potential E&S impacts are identified, assessed, and managed appropriately. As indicated in 1.4, the ESIA will be undertaken based on:

- Applicable local, national, and regional requirements, including those related to environmental impact assessments.
- The EBRD's 2019 ESP (and the incorporated PRs), and relevant EU requirements (including, but not limited to, the EU Environmental Impact Assessment Directive and IE Directive); and
- Relevant international conventions and protocols relating to E&S issues, as transposed into national legislation.

In general, the methodology includes the following main components each of which is discussed in detail below.

- Analysis of Alternatives
- Stakeholder consultation and Engagement
- Delineation of Study Boundaries and Scope of Assessment
- Environmental and Social Baseline Conditions
- Impact Assessment and Identification
- Development of an Environmental and Social Management Plan (ESMP)
- Disclosure requirements

This section presents the overall approach and methodology that was followed throughout the ESIA process for the Project.

4.1 Analysis of Alternatives

The ESIA shall identify and analyse alternatives and present the main reason for the preferred choice. The examination of alternatives is also considered to be a key element of the ESIA process under all international E&S standards and requirements as well.

The analysis of location alternatives is presented in "Section 2.1.1". The section discusses and compares the two considered sites by NEPCO for the substation. No alternatives are considered in terms of design at this point.

4.2 Stakeholder Consultations and Engagement

Stakeholder consultation and engagement is an essential part of the ESIA process and has been carried out in accordance with the international E&S standards and requirements.

The Project to date has included stakeholder consultation and engagement with various stakeholder groups such as national governmental entities, regional and local governmental entities, Non-Governmental Organisations (NGOs), local communities, and other as appropriate. This has been undertaken through bi-lateral meetings, e-mail communication, phone communication, formal letters, and other.

The stakeholder consultation and engagement activities are discussed in detail within "Section 7".

4.3 Delineation of Study Boundaries and Scope of Assessment

Before detailing the methodology of the assessment, it is important to delineate the study boundaries and the scope of the assessment that will be undertaken, both of which are discussed below.

Definition of Spatial Study Area or Area of Influence (AoI)

The overall Study Area for the ESIA represents the potential area of influence of the Project. This is 'the area over which significant effects of the project could reasonably occur, either on their own, or in combination with those of other developments and projects'.

In general terms, the Study Area for the Project ESIA will include the footprint of Project disturbance as demarcated in Figure 18.

This includes the OHTL route with different route connections with the following lengths: 31 km double line, 3 km, and 9 km as well as 100 m buffer on each side. The IFC EHS Guidelines for Electric Power Transmission and Distribution (2007), states that the servitude width for transmission lines ranges from 15 to 100m depending on voltage and proximity to other servitudes, but typical range is between 15 and 30m.

However, for the assessment of the individual environmental and social parameters (socio-economic, infrastructure and utilities, etc.), an appropriate thematic Study Area will be determined for each theme on a case-by-case basis. Such a thematic Study Area are clearly identified throughout this ESIA.

In identifying these thematic Study Areas, the type and degree of the potential direct and indirect effects will be taken into consideration. The core area where direct effects are likely to occur will be determined, as well as the wider area of influence where indirect, combined and cumulative effects are likely to occur on the surrounding areas and communities.

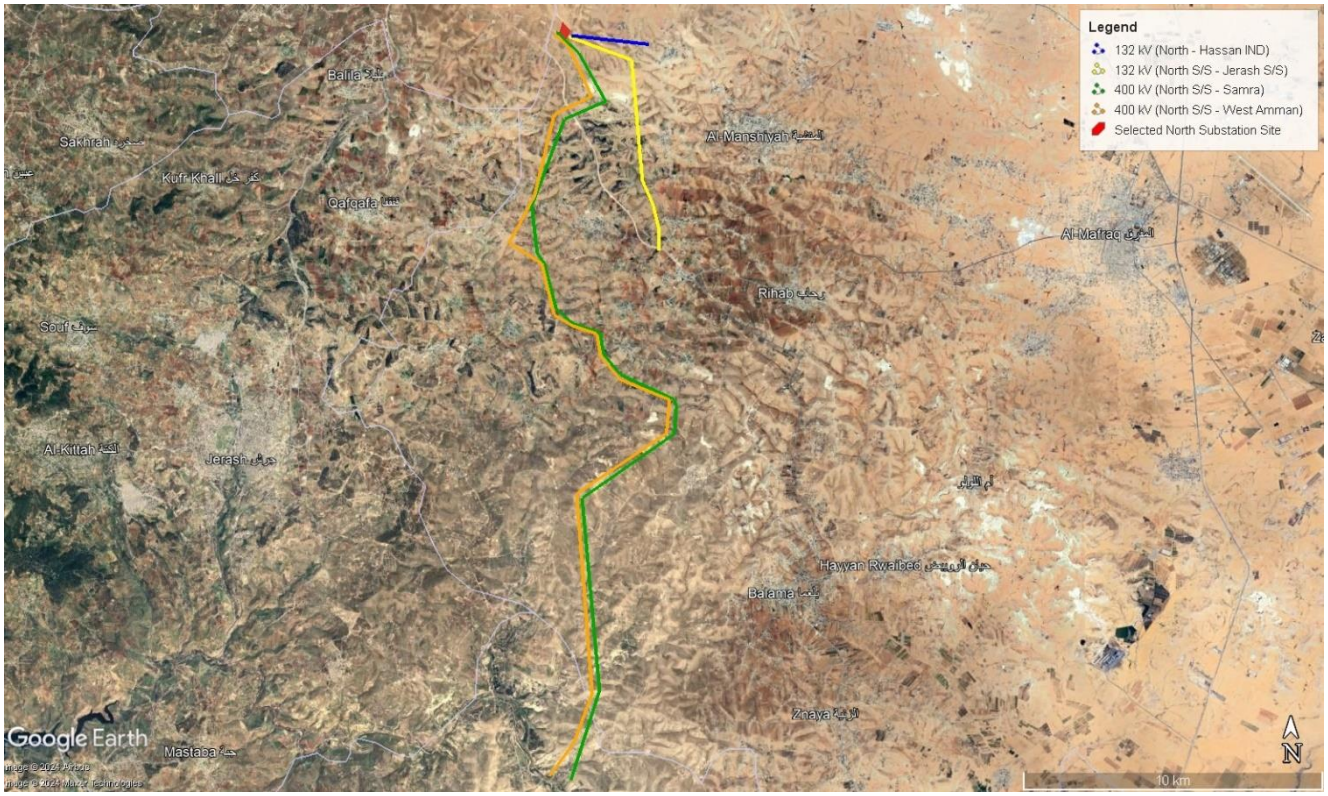


Figure 18: Spatial Study Area or AOI

Temporal Scope of the Assessment

The Project will be developed in a three-phase sequence as follows. The potential impacts are assessed throughout the various Project phases.

- Planning and Construction Phase: This includes onsite construction activities which will be undertaken by the EPC Contractors under the guidance of the Developer and EBRD with the support of the PIU. This mainly includes preparing the detailed design and layout of the Project and the OHTL, transportation of Project components onsite, construction of the substation, onsite site preparation and construction activities for installation of towers, as well as installation and extension of the electrical lines.
- Operation Phase: This includes the operation and maintenance activities of the Project and OHTL to be undertaken by NEPCO.
- Decommissioning Phase: Generally, the anticipated impacts throughout the decommissioning phase are similar in nature to impacts assessed during the construction phase – and specifically in impacts related to

soil and groundwater (from improper management of waste streams), air quality and noise, and occupational health and safety. Therefore, the assessment of impacts for those receptors and mitigation identified during the construction phase is assumed to apply to this phase without the need to reiterate or emphasise this throughout subsequent sections.

4.4 Environmental and Social Baseline Conditions

As part of the ESIA process, the baseline environmental and social conditions of the study area will be established. Describing the baseline includes identifying and defining the importance and sensitivity of the various E&S resources and receptors likely to be impacted, i.e. within the study area. Understanding the value or sensitivity of the resources and receptors to impacts and changes is an important consideration when determining the significance of effects and allows for better identification of the most appropriate measures that could be employed to avoid impacts, and to mitigate any adverse impacts.

The description of environmental and social baseline conditions will consider a wide range of data and information gathered from various sources, including:

- Desk-based studies and literature reviews.
- Data from statutory and non-statutory stakeholders.
- Field surveys and site investigations.

These studies have covered all the environmental and social aspects related to the Project. The baseline conditions are treated as those conditions which would prevail in the absence of the Project.

Studies of the environment and social baseline are described in "Sections 8-16" to include the following: climate; landscape and visual; land use, land ownership, and resettlement; geology, hydrology, and hydrogeology; archaeology and cultural heritage; air quality and noise; biodiversity; infrastructure and utilities; and socio-economic conditions. The table below outlines the methodology which was undertaken for assessment of the each of those baseline conditions.

Table 9: Assessment Methodology for E&S Baseline Conditions

Receptor	Assessment of Methodology
Landscape and Visual	▪ Prior to the undertaking of any site-related surveys, a full and detailed review of up-to-date aerial images from Google Earth for the Project will be undertaken. The objective is to identify any potential visual receptors within the entire Project footprint and boundary so that it can be inspected during the site survey. ▪ In addition, desktop review was undertaken to identify any other potential visual receptors within the wider area of the site (up to 1 km). ▪ A site survey will be undertaken to assess the general conditions of the Project site and OHTL route to include the character of the surrounding landscape and topographical conditions within the site and surroundings. ▪ In addition, the assessment will also identify any key visual receptors or structures of interest which could be affected by the Project and OHTL development such as human settlements, recreational activities, environmental reserves, remarkable/unique historical or cultural sites, water courses or other natural structures normally seen as valuable by the human perception.
Land Use, Land Ownership, and Resettlement	▪ Formal Land use review and assessment will be investigated through available secondary data from relevant governmental authorities. ▪ This will include the following: (i) land ownership and historical issues; (ii) designated land use planning such as key biodiversity areas (KBAs), land use planning, etc. The objective is to determine the assigned planning and land use context for the area and whether any conflict exists with the proposed Project.
	▪ Site survey will be undertaken for the Project site and the OHTL route in which the area will be surveyed to identify and investigate any land use activities undertaken in the Project site and the OHTL route. ▪ This will include: (i) physical land uses such as settlements (temporarily and permanent structures), commercial areas, etc.; (ii) economical land uses which lead to income sources or other means of livelihood (e.g. agricultural activities, grazing, etc.); and (iii) other formal and informal land uses such as Bedouin groups, nomadic groups, etc.

	▪ Should any activities be noted they will be recorded, and consultations will be undertaken with such land users to the extent possible to provide an assessment on activities onsite (type, period, nature, economical attributes, etc.) along with maps as appropriate.
	▪ Consultations with the relevant local entities (this will include Local Governmental Units, local community representative, landowners, property owners, etc.) to verify to the extent possible the data and indicators collected and identify other potential seasonal land uses.
	▪ This will include review of historical land uses for the Project area and an assessment of the existing land uses of the OHTL route. ▪ This will also include a discussion with the substation landowners and the neighbouring stakeholders to understand the land uses across the year and in previous years as possible. ▪ The land uses for the OHTL route will also be assessed to identify the land users and related stakeholder groups. ▪ The work will include consultation with public in the vicinity of the project site and OHTL as well as land users/owners. The consultation will be based on a series of pointed resettlement and livelihood restoration related questions to prompt for potential impacts in this regard. ▪ The Consultant will consult with the owners of private land acquired by the project, to gauge the owners' views on the compulsory land acquisition and compensation process undertaken for the substation land. The Consultant will also undertake the same for the OHTL to the extent possible in relation to the easement rights for the OHTL and the compensation to take place for damages. ▪ 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. ▪ This report will consider the findings of this ESIA and will provide avoidance measures to be provided to the EPC Contractor to consider in the design. ▪ At a later point, the EPC Contractor and the ESIA consultant to be assigned by NEPCO to obtain a national environmental permit for the Project and the OHTL shall conduct proper alternatives assessment for the OHTL in the design to ensure resettlement/ livelihood impacts are avoided. This shall be covered in the ESIA to the extent possible and based on design information available and by the Contractor during design of the OHTL alignment and tower footprint.
Geology, hydrology and hydrogeology	▪ Based on the desktop review the following will be summarised into the ESIA study: - Geological conditions within the project site and the OHTL to include formations, soil types, and geomorphology along will illustratively map. - Hydrology and hydrogeology conditions of the project site and the OHTL along with maps as appropriate. This should include surface and ground water within which the project and the OHTL is located to identify issues and provide suitable mitigation measures. - Hydrology conditions of the project site and OHTL to include catchment within which the project is located along with maps as appropriate. This should include drainage patterns, runoff volumes and surface water resources. - Identify flood risk potential and provide recommendations for additional measures to be prepared by the EPC Contractor.
Archaeology and Cultural Heritage	▪ Review of available secondary data on the site and its surroundings through a literature and desktop on any archaeology and cultural heritage sites within the area and its surroundings. ▪ Consult with the Department of Antiquities (DoA) to inform them of the Project and the OHTL and obtain their feedback regarding locations of registered archaeological sites in their database Middle Eastern Geodatabase for Antiquities (MEGA) – Jordan (http://megajordan.org/), which is a comprehensive database of registered archaeological sites in Jordan, developed through a collaboration between the Getty Conservation Institute (GCI) and the DoA. ▪ Agree with the DoA to undertake a site assessment by an archaeology and cultural heritage expert to ascertain the presence of any archaeological remains within the Project site and the OHTL. Through the site assessment any sites of interest will be recorded and photographed as appropriate. The results of the survey will be analysed by categorising the sites and assessing their significance. Finally, any areas of archaeological importance will be clearly identified (if any).

	▪ This will result in avoidance areas (if any) for the Project site and for the OHTL route to consider in the final design of the route.
Air Quality and Noise	▪ No air quality and noise monitoring programme will be undertaken given that the Project's nature would not result in any key air quality or noise emissions. ▪ Therefore, as part of the site visit undertaken any key sources of air pollution or noise will be identified. The list will identify such sources, location, emissions, and implications for project development. ▪ It is important to note that the MoEnv will require an air quality and noise monitoring programme, and this shall be undertaken at a later stage by the ESIA consultant to be assigned by NEPCO to obtain a national environmental permit for the Project and the OHTL.
Biodiversity	▪ Consult with the Royal Society for the Conservation of Nature (RSCN) and BirdLife Jordan (through RSCN) regarding the Project site and the OHTL route to understand their opinion on the site and the route and whether they have any specific concerns and recommendations for the baseline and impact assessment to be undertaken in this ESIA. The RSCN will also be consulted regarding their requirements in relation to their "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022 and whether they have specific requirements for the baseline survey based on the risks on biodiversity from the Project and the OHTL. ▪ Literature review that will be based on previous studies, data, surveys, and records available in published scientific papers, books, and journals on flora, fauna, avi-fauna species, and bats recorded within the Project site and the OHTL route. ▪ Mapping of recently updated Google Earth (KMZ) layers for KBAs obtained from the RSCN and the MoEnv against the Project and the OHTL route. It is important to note that those same sites are also included under the Integrated Biodiversity Assessment tool (IBAT) which is an international tool that provides information on protected areas, KBAs, and threatened species. ▪ Desktop review by a biodiversity expert for the area to identify if any key sensitive areas in relation to biodiversity within the area and highlight any specific areas/ issues that need to be considered in this ESIA. ▪ Site assessment undertaken by a specialised Consultant to verify desktop recommendations and highlight any specific areas which require specific avoidance and mitigation measures. ▪ IBAT Screening assessment will be undertaken to identify any potential key flora, fauna or avifauna species that could be within the Project site and OHTL route in particular. ▪ Field survey will be undertaken at the Project site and the OHTL. The field survey will mainly include field observations through line transects that cover the project area where the site will be examined carefully for the presence of floral elements, avi-fauna and bat elements, active animals, animal signs and tracts, active burrows, remains or any other vital signs that indicate the activity of animals. The survey will also consider any temporary roads that will be established to reach the location of the towers during the construction phase.
Infrastructure and Utilities	▪ Site survey to identify any visible infrastructure and utility elements to include roads, pipelines, railways, telecommunication transmission lines, water structures, broadcasting towers, etc. ▪ Characterisation of the existing infrastructure within the Project site and the OHTL route related to:(i) water resources and water supply, (ii) wastewater infrastructure and utilities; (iii) solid waste infrastructure and utilities; (iv) hazardous waste infrastructure and utilities; (v) electricity networks; and (vi) road networks.
Socio-economic	▪ Review of available secondary data. The social and economic conditions of the nearby communities will be characterised and assessed through secondary statistical data available from key governmental sources. After data has been collected, data interpretation will be undertaken in order of present socioeconomic baseline information for project area, including maps and pictures where appropriate. Such information will include demographic dynamics, population characteristics, employment status, income distribution, community structure, livelihoods, community health, poverty status, economic indicators, labour status in construction, and other data sets. This will be based on secondary data from available studies and statistics as applicable from official governmental entities.

4.5 Impact Assessment and Identification

The North substation has numerous positive national and strategic benefits as outlined in Section 1.2. These benefits are also expected from the OHTL.

This ESIA focuses on the related impacts from the Substation and the OHTL and provides an assessment of such impacts on environmental and social parameters for each receptor under Sections 8-16.

The following section provides a description of the approach, methodology and process adopted for the impact assessment presented within this ESIA.

4.5.1 Management Measures

Based on the impact assessment undertaken a set of management measures are identified for each impact which aims to address it. Management measures include the following:

- *Additional Requirements*: those are generally regulatory requirements which have been identified and which must be considered at a later stage.
- *Additional Studies*: for certain E&S receptors additional studies must be undertaken at a later stage, mainly during the national ESIA and the detailed design. Such studies and their scope, timing, etc. have been highlighted were relevant.
- *Mitigation Measures*: a vital step in the ESIA process is the identification of measures that can be taken to ensure that impacts are mitigated or reduced to acceptable levels. The ESIA will firstly consider the significance of any impacts caused by the Project and then assigned mitigation options through applying the following hierarchy:
  - Avoiding or 'designing out' impacts wherever possible.
  - Considering alternatives or modifications to the design (within the limited information available) to reduce the impacts wherever possible.
  - Applying measures to minimise and manage impacts on the receptor.
  - As a last resort, identifying fair compensation, remediation and offsetting measures to address any potentially significant residual effects.

  Some negative impacts can be easily mitigated, whilst others cannot or are too difficult and costly to mitigate. The various potential impacts are described in this ESIA, along with the provision of 'feasible mitigation measures' that can be implemented.
- *Benefit Enhancement*: for positive impacts it is not possible to identify mitigation measures, but rather benefit enhancement actions have been identified which aim to enhance the positive impact.

4.5.2 Approach to Assessment of Impacts

The adverse and beneficial E&S impacts of the Project have been identified and assessed against the established baseline. A consistent approach to the assessment of impacts was followed to enable E&S impacts to be broadly compared across the ESIA. A set of generic criteria were used to determine significance (see below) which were applied across the various E&S parameters.

As far as possible, E&S impacts were quantified. Where it was not possible to quantify impacts, a qualitative assessment was conducted using professional experience, judgment and available knowledge, and including the consideration of stakeholder views. Where there were limitations to the data, and/or uncertainties, these have been recorded in the relevant sections, along with any assumptions that were taken during the assessment.

To determine the significance of each impact, two overall factors are considered:

- The sensitivity of the E&S receiving parameter, as determined during the assessment of baseline conditions; and
- Magnitude and Nature of the impact.

4.5.3 Sensitivity of the Receiving Parameter

Receiving parameter sensitivity was determined using information taken from the baseline description on the importance, significance or value of the E&S component under examination. It is important to understand the sensitivity of the receiving parameter, as this is a measure of the adaptability and resilience of an E&S parameter to an identified impact. The following categories of sensitivity were applied to the assessment:

- High: The E&S parameter/receptor is fragile, and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.
- Medium: The parameter/receptor has a degree of adaptability and resilience and is likely to cope with the changes caused by an impact, although there may be some residual modification as a result.
- Low: The parameter/receptor is adaptable and is resilient to change.

4.5.4 Magnitude and Nature of the Impact

The magnitude of the impact is the scale of change which the impact may cause compared to the baseline and how this change relates to accepted thresholds and standards. The following categories were applied to the assessment:

- High: a large change compared to variations in baseline. Potentially a clear breach of accepted limits.
- Medium: change which may be noticeable and may breach accepted limits.
- Low: when compared with the baseline, change which may only just be noticeable. Existing thresholds would not be exceeded.

Furthermore, in determining the magnitude of the impact it is important to consider and consider several other factors which define the nature of the impact. This includes the following:

Type of Impact

- Positive: applies to impacts that have a beneficial E&S result, such as enhancement of conditions.
- Negative: applies to impacts that have a harmful aspect associated with them such as loss or degradation of E&S resources.

Type of Effect

- Direct: applies to impacts which can be clearly and directly attributed to a particular E&S parameter (e.g. generation of dust directly impacts air quality).
- Indirect: applies to impacts which may be associated with or are after a particular impact on a certain E&S parameter (e.g. high levels of dust could affect occupational health and safety).

Duration (how long the stressor or its effect last)

- Short Term: applies to impacts whose effects on the E&S attributes will disappear within a 1-year period.
- Medium Term: applies to impacts whose effects on E&S attributes will disappear within 5-years.
- Long Term: applies to impacts whose effects on E&S attributes will disappear in more than 5 years.

Reversibility

- Reversible: applies to impacts whose significance will be reduced and disappeared over time (either naturally or artificially), once the impacting activity ceases.
- Irreversible: applies to impacts whose significance will not be reduced nor disappeared over time (either naturally or artificially), once the impacting activity ceases.

Likelihood

- Low: applies to impacts that are unlikely to occur for several reasons either related to onsite conditions, nature of construction activities or other factors.
- Medium: applies to impacts that are likely to occur.

- High: applies to impacts that are almost certain to occur.

4.5.5 Assessing the Significance of the Impacts

The concept of 'significance' is central to the ESIA process and aids the identification and categorisation of E&S effects. As noted, to determine impact significance, the sensitivity of each E&S parameter/receptor is considered in combination with the magnitude of the impact. The table below demonstrates how these parameters will be considered in the assessment of significance.

Table 10: Determination of Significance

Magnitude and Nature of Impact / Sensitivity of Receiving Parameter/Receptor	**Low**	**Medium**	**High**
Low	Not significant	Minor	Moderate
Medium	Minor	Minor	Moderate
High	Moderate	Moderate	Major

While the above matrix provides a framework for the determination of significance, and enables comparison across E&S parameters, a degree of professional judgement must be used and some parameter-specific factors to be considered in making the determination of significance. Below provides additional guidance to the degrees of significance that will be used in the ESIA. Note that positive impacts are defined but are not rated for significance.

- *Major significance:* Based on the above methodology such impacts result in high magnitude and affect receptors that are highly sensitive. Those are impacts that are considered to have potentially significant and adverse risks and will be a key factor in the overall decision-making process of the Project. In addition, they will also require detailed considerations for mitigation and monitoring measures.;
- *Moderate significance*: Based on the above methodology such impacts either (i) result in medium magnitude and affects receptors that are of medium or high sensitivity; or (ii) result in high magnitude and affect receptors that are of medium sensitivity. Those are impacts that are considered to have potentially limited adverse risks and are unlikely to have a significant effect on the overall decision-making process. In addition, mitigation and monitoring measures require some consideration.
- *Minor significance*: Based on the above methodology such impacts either: (i) result in low magnitude and affects receptors that are of medium or high sensitivity; or (ii) result in medium magnitude and affects receptors that are of low sensitivity; or (iii) result in high magnitude and affects receptors that are of low sensitivity. Those are impacts that are considered to have minimal risks and unlikely to be of importance for the overall decision-making process. In addition, mitigation and monitoring measures are readily available to address such risks.
- *Not significant*: Based on the above methodology such impacts result in low magnitude and affects receptors that are of low sensitivity. Such impacts are beneath the level of perception and do not require any mitigation or monitoring measures.

4.5.6 Assessment of Residual Significance

If there are mitigation measures it is then necessary to assess the 'residual significance' after mitigation has been taken account. A re-assessment of Project impacts is then made, considering the effect of the proposed mitigation measures to determine the significance of the *residual effects*.

4.5.7 Assessment of Cumulative Impacts

For each of the impacts assessed, the ESIA will investigate the cumulative impacts which could result from incremental impacts from other known existing and/or planned developments in the area and based on currently available information on such existing/planned developments.

4.6 Development of a Framework Environmental and Social Management Plan (ESMP)

Based on the results of the impact assessment, development of management measures, and development of monitoring plan, a framework ESMP was compiled into a single table that details all the above. The framework ESMP will be a key document and will list the E&S requirements and detail the procedures necessary for managing the significant E&S issues connected to proposed Project activities. The framework ESMP will be developed specifically to provide flexibility in the nature and exact location of operations, while ensuring all potential impacts are identified and properly mitigated and monitored throughout the later stages of the Project. This framework ESMP can be used as a stand-alone document during the different phases of the Project by NEPCO, EPC Contractor, MoEnv, and other responsible parties.

The framework ESMP aims to provide high level mitigations and requirements for managing the E&S risks anticipated from the Project. Throughout the Project's construction and operation phase a detailed Environmental, Social, Health, and Safety Management System (EHSS MS) must be developed implemented by all relevant parties. The EHSS MS must be project and site specific and must build on and consider the requirements of the framework ESMP presented throughout this document.

The development and implementation of an EHSS MS is considered a key requirement under international E&S standards and requirements. The ESIA also identifies the overall framework, structure and key requirements for the EHSS MS for the key entities involved in the Project.

5 ANALYSIS OF ALTERNATIVES

This section presents the alternatives that were considered for the Project development. Site alternatives for the substation were discussed in Section 2.1.1.

Based on discussions with NEPCO and the need for the Project as explained in Section 1.2, NEPCO ascertains that the implementation of the Project is crucial in order to achieve the benefits included in Section 1.2. without the Project.

Without the Project, the stability of the electricity transmission network in the northern regions would not be supported and outages and system failures would continue to take place. In addition, additional existing and new renewable energy generation in the Northern area would not be absorbed by the electricity system which would undermine the benefits of developing clean energy such as solar power projects.

As indicated by NEPCO, this Project is strategic for the country and there is no other alternative. The Project needs to be developed and operated as soon as possible.

The location has been selected based on a technical assessment of several potential sites and the land selected (Tamirah) is the most suitable for the Project. This has also been corroborated by an E&S due diligence assessment commissioned by EBRD in 2022. Given that NEPCO has already carried out a land acquisition process for the Tamirah land, there are no other location alternatives that can be evaluated within this ESIA.

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.

This report will consider the findings of this ESIA and will provide avoidance measures to be provided to the EPC Contractor to consider in the design.

At a later point, the EPC Contractor and the ESIA consultant to be assigned by NEPCO to obtain a national environmental permit for the Project and the OHTL shall conduct proper alternatives assessment for the OHTL in the design to ensure E&S and resettlement/ livelihood impacts are avoided. This shall be covered in the ESIA to the extent possible and based on design information available and by the Contractor during design of the OHTL alignment and tower footprint.

In this ESIA, avoidance and mitigation measures have been identified in the ESMP, Section 20.3, which should be followed for any OHTL alternative routes that might be considered in the design stage.

As part of the detailed design and assessment of alternatives for the OHTL expected to take place in Q1 and Q2 2026, the EPC Contractor will be required to undertake an assessment of considered design alternatives and identify the most suitable alternative taking into account E&S risks and benefit analysis.

6 THE E&S REGULATORY FRAMEWORK

This Section presents the legal and administrative framework for E&S compliance in Jordan. The Project shall comply with the relevant national legislations in Jordan. In addition, the Project shall comply with the EBRD ESP 2019 and associated PRs as well as GIIP.

The following national policies, laws, regulations, and lender requirements are applicable E&S obligations for the Project, and therefore shall be complied with and taken into consideration during the design, construction, operational and decommissioning phases of the Project.

6.1 Institutional Framework

The Ministry of Energy and Mineral Resources (MEMR) is the key ministry mandated to review and regulate the power sector in Jordan. On the other hand, the Ministry of Environment (MoEnv) is mandated to undertake measures to ensure environmental protection of natural resources in Jordan.

The proposed Project is owned and operated by NEPCO.

NEPCO is a 100% state-owned public shareholding company established in accordance with the General Electricity Law No. 10 (1996) on the 1st of September 1996 when the vertically integrated state-owned Jordan Electricity Authority was unbundled into 5 separate companies. NEPCO is licensed by the Energy & Minerals Regulatory Commission (EMRC) to undertake the following:

- Operation of power system and demand / supply control (System Operator).
- Construction, operation and maintenance of system equipment such as transmission lines and substations (Transmission Network Owner).
- Planning of power system development.
- Purchase of electric power from power producers as single buyer and supply of the power to distribution companies and bulk consumers via the National Control Centre (at Amman South). Currently, the dispatch is done based on a manual system.
- Procurement of fuel for thermal power generation.
- Import/export of electric power through interconnection with Egypt and Syria.

In relation to the E&S aspects, the table below outlines the involved entities that will participate in the permitting and official application processes regarding the project and identifies their scope of work or mandate.

Table 11: Involved Entities in Relation to E&S Aspects

Entity	Mandate
Ministry of Environment (MoEnv)	▪ Maintain and improve the quality of the Jordanian Environment by sustaining and conserving Jordan's environmental resources and contributing to sustainable development. ▪ Set environmental protection legislations (protection of environmental resources including air quality, noise, soil protection, ecology protection, liquid effluents, etc.) ▪ Monitor and enforce compliance
Ministry of Energy and Mineral Resources (MEMR)	▪ Achieve a secure sustainable supply of energy and the optimum utilisation of natural resources complies with international best practices. ▪ Regulate the energy generation sector
Ministry of Local Administration (MoLA)	▪ Provides technical, financial and administrative advice for all the local councils in the Kingdom. It also supervises the municipal functions (land use planning, municipal solid waste management, construction and vocational licensing, establishing and maintaining secondary roads within municipality boundaries, and others) of municipalities and the joint services councils in Jordan except for areas under the jurisdiction of Greater Amman Municipality.
Ministry of Public Works and Housing (MPWH)	▪ MPWH is responsible for the development, preparation and implementation of plans and programmes for the construction of road networks and highways connecting different governorates (penetrating roads) in Jordan and keeping those roads constantly maintained. In addition to supervising the studies and designs, applying the quality control on all road projects, conducting different studies and research related to roads, etc.
Ministry of Agriculture (MoA)	▪ Organise the agricultural sector in line with national objectives to contribute to the achievement of sustainable rural development. As well as providing efficient agricultural services that meet the needs of citizens with high quality and effectiveness. They are also responsible for managing and controlling grazing reserves, maintaining and protecting forest areas, preventing illegal cutting of trees, etc.
Ministry of Labour (MoL)	▪ Achieving an active labour market with qualified and productive national employment in a stable and secure working environment through supervising labour and labour affairs and contributing to the organisation of the Jordanian labour market. MOL also provides the regulatory framework to govern occupational health and safety (OHS) at work.
Ministry of Interior (MoI)	▪ Maintain national security, cooperate with civil society institutions, create appropriate environment for investment, and assign Governors the role in the supervision and following-up of projects and development plans.
Ministry of Health (MoH)	▪ Maintaining public health as it offers preventive treatment and health services. It organises and supervises health services offered by the public and private sectors as well as providing health insurance for the public within available means
Municipalities	▪ Provide municipal services within their jurisdictions ▪ Operate solid waste management within their jurisdictions ▪ Joint services councils to manage transfer stations and landfills ▪ Monitor prevention of nuisances and compliance within their jurisdictions
Jordan Standards and Metrology Organisation (JSMO)	▪ Issues, approves, reviews, and monitors the implementation of standards and regulations regarding goods, products, and services. It established a national system of measurement and grants conformity certificates.
Social Security Corporation (SSC)	▪ Provide a comprehensive insurance system that includes a group of insurances aimed at protecting the worker against some risks that he/she may suffer and provide the regulatory framework for compensations in case of OHS accidents.
Department of Antiquities (DoA)	▪ Responsible for the management, protection, maintenance and preservation of archaeological sites in Jordan.

The Royal Society for the Conservation of Nature (RSCN)	▪ The RSCN is an environmental Non-Government Organisation (NGO) having a mandate for the conservation of Jordan's biodiversity and natural resources. In addition, it is empowered to establish and manage protected environmental reserves as well as Important Bird areas under the supervision of the MoEnv.

6.2 National Legislations

Table 12 below shows the key legislation and regulator/entity relevant to each of the E&S and health and safety (H&S) parameters that are applicable for this project.

Table 12: National Legislations Applicable to the Project

Component	Entity	Legislation
Landscape and Visual	▪ MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020
	▪ MoLA	▪ Buildings and Land Use Regulation No. 1 of 2022 ▪ Municipalities Law No.41 of 2015
Land Use	▪ MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020
	▪ MoLA	▪ Buildings and Cities and Villages Planning Regulation No.1 of 2022 ▪ Municipalities law No.41 of 2015
	▪ MoA	▪ Agriculture law no.13 for the year 2015 ▪ Instructions for Agricultural Land Protection No. 11 of 2022
	▪ Civil Aviation Regulatory Commission (CARC)	▪ Civil Aviation Law No. 41 of the year 2007
Geology, Hydrology, and Hydrogeology	▪ MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Waste Management Framework Law No. 16 of 2020 ▪ Solid Waste Management Regulation No. 44 of 2022 ▪ Hazardous Materials and Wastes Management Regulation No. 68/2020 ▪ Non-Hazardous Solid Waste Management Regulation No.44 of 2022 ▪ Soil Protection Regulation No. 25 of 2005 ▪ Environmental Protection from Pollution in Emergencies Regulation No. 26 of 2005 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020 ▪ Instructions for Hazardous Waste Management and Handling of 2019 ▪ Instruction for Management and Handling of Consumed Mineral Oils for 2014 ▪ Instructions for the management of electrical and electronic waste for the year 2021 are issued following the provisions of Paragraph (b) of Article (13) of the Hazardous Material and Waste Management System No. 68 for the year 2020
	▪ Ministry of Water and Irrigation (MWI)	▪ Water Authority Law No. 18 for 1988 and its amendments thereof ▪ Groundwater Control Regulation No. 85 for 2002 and its amendments thereof ▪ Protection of Water Resources Instructions of 2019
	▪ MoH	▪ Public Health Law No. 47 of 2008
	▪ JSMO	▪ Jordanian Standard 431/1985 – General Precautionary Requirements for Storage of Hazardous Materials

Component	Entity	Legislation
Biodiversity	▪ MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020
	▪ MoA	▪ Agriculture Law No. 13 of 2015 ▪ Classification of Birds and Wild Animal Species Forbidden from Hunting concerning the Level of their Protection Regulation No. 43 of 2008 ▪ Instructions for protecting wild birds and animals and regulating their hunting and Trade No.2 (Z) of 2021
	▪ RSCN	▪ "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022
Archaeology	▪ DoA	▪ Cultural Heritage and Antiquities Law No. 21/1988 and its Amendment Law No. 23/2004
	▪ MoEnv	▪ Environmental Classification & License Regulation and its Amendments No. 69/2020
	▪ Ministry of Tourism and Antiquities (MOTA)	▪ Protection of Urban and Architectural Heritage Law No.5/2022
Air Quality and Noise	▪ MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Air Protection Regulation No. 28 of 2005 ▪ Climate Change Regulation No. 79 of 2019 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020 ▪ Instruction for Reduction and Prevention of Noise of 2003
	▪ JSMO	▪ JS 1140 Ambient air quality of 2006 ▪ JS 1189 Maximum Allowable Limits of Air Pollutants Emitted from Stationary Sources for the year 2006 ▪ Motor vehicles - Emissions - JS 1052:1998 ▪ Motor vehicles – Emissions (Diesel engines) – JS 1053:1998 ▪ Motor vehicles – Emissions – Diesel engines – JS 1054:1998
Infrastructure and Utilities	▪ MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Waste Management Framework Law No. 16 of 2020 ▪ Solid Waste Management Regulation No. 44 of 2022 ▪ Hazardous Materials and Wastes Management Regulation No. 68/2020 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020 ▪ Solid Waste Management Instructions of 2019 ▪ Instructions for Hazardous Waste Management and Handling of 2019 ▪ Instruction for Management and Handling of Consumed Mineral Oils for 2014
	▪ MWI	▪ Water Authority Law No. 18 for 1988 and its amendments thereof ▪ Groundwater Control Regulation No. 85 for 2002 and its amendments thereof ▪ Sewage System Regulation No. 66 of 1994 ▪ Protection of Water Resources Instructions of 2019 ▪ Discharge of Non-Domestic Wastewater to the Sewage System Instructions of 2017
	▪ MoLA	▪ Municipalities Law No. 41 of 2015 ▪ Health Nuisances Prevention & Waste Collection Fees within Boundaries of Municipalities Regulation No. 68/2016
	▪ MoI	▪ Traffic Law No. 49 for 2008 ▪ Driver's Licensing Regulation No. 101 of 2008

Component	Entity	Legislation
		▪ Regulation for Maximum Dimensions, Weights, and Total Engine Power for Vehicles No. 30 of 2016 ▪ Instructions for Allowable Speed Limits for 2022
	▪ JSMO	▪ Water – Reclaimed domestic wastewater – JS 893:2021
Land Acquisition and Resettlement	▪ Ministry of Finance (MoF)	▪ Real Estate Law No. 13 of 2019
	▪ NEPCO	▪ General Electricity Law No. 64 of 2002
Public and Occupational Health and Safety	▪ MEMR	▪ General Electricity Law No. 64 of 2002
	▪ Energy and Minerals Regulatory Commission (EMRC)	▪ 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003
	▪ MoL	▪ Jordan Labour Law No. 8 for the year 1996 and its Amendments ▪ Flexible Work Regulation No. 22 of 2017 ▪ Work Permits for Non-Jordanians Regulation No. 142 of 2019 ▪ Occupational Health and Safety (OHS) Supervisors and Committees Formation Regulation No. 33 2023 ▪ Protection and Safety from Equipment, Machinery, and Workplace Regulation No. 43 of 1998 ▪ Preventive and Curative Medical Care for the Workers in Establishments Regulation No. 32 of 2023 ▪ Instructions for determining the types of sources of occupational hazards in the work environment and the precautions and measures necessary to prevent them of 2023 ▪ Instructions for Flexible Work of 2018 ▪ Instructions for Registering and Forming Collective Work Contracts and Extracting Copies from these contracts of 2002 ▪ Instructions for the Sectors Subject to the Provisions of the Formation of Safety Supervisors Committees for the year 1998 ▪ Instructions for the Protection of Employees from Occupational Hazards of No. 31 of 2023 ▪ Instruction for classification and assessment of risk from industrial activities of 2023 ▪ Instructions for the Initial Medical Examination of 1999 ▪ Instructions for the Periodic Medical Examination of 1999 ▪ Resolution for the Minimum Wage Amount of 2020 ▪ Resolution for Closed Occupations, Restricted Professions, and Occupations with Specialised Skills for Non-Jordanian Workers No. 19 of 2019 ▪ Resolution Regarding the Level and Accredited Trainers for OHS Supervisors Training in institutions for the year 2014 ▪ Resolution Regarding the Means and Devices of Medical aid and First Aid Tools for Workers in Institutions of 1997 ▪ Resolution Regarding the Periodic Examination Form of 2002 ▪ Resolution Regarding the Form that the Employer Must Fill to Report any Diseases or Occupational Suspicions Among Workers of 1999 ▪ Resolution Regarding Dangerous, Stressful, or Harmful Work for Juveniles of 2011 ▪ Resolution for Increasing Opportunities for Empowering Jordanian Women and Raising their Economic Participation Rate in the Jordanian Labour Market of 2018

Component	Entity	Legislation
		▪ The List of Occupational Injuries and Estimation of Resulting Disability Percentage as an Addendum to the Jordan Labour Law No. 8 for the year 1996 ▪ The List of Industrial Diseases that Result in Compensation to Worker as an Addendum to the Jordan Labour Law No. 8 for the year 1996
	▪ SSC	▪ Social Security Law No. 1 of 2014 and its amendments ▪ Insurance benefits regulation for the Social Security Corporation no. 14 for the year 2015 and its amendments ▪ Instructions for Occupational Safety and Health of the Social Security Corporation of 2011
	▪ MoEnv	▪ Environmental Classification & License Regulation and its Amendments No. 69/2020
	▪ MoH	▪ Public Health Law No. 47 of 2008 ▪ Crafts and Industries Law 16 of 1953 and its amendments thereof ▪ Instructions for Prevention of Health Nuisances from Workers Accommodation No. (1) for the year 2013
	▪ Higher Council for the Rights of Persons with Disabilities (HCD)	▪ Rights of Persons with Disabilities Law No. 20 of 2017
	▪ JSMO	▪ Water- Drinking Water – JS 286:2015 ▪ Fire prevention in use of cutting and welding processes - JS 1810:2008 ▪ Safety requirements – Safety of machinery – Safety distances - JS 1048:1996 ▪ Specification for industrial safety helmets – JS 136:2009 ▪ PPE – Safety Shoes / Professional Shoes / Protective Shoes – JS 1909/1920/1919:2010 ▪ Light and Lighting – Lighting of workplaces – Part 1: Indoor workplaces – JS 2253-1:2020 ▪ Light and Lighting – Lighting of workplaces – Part 2: Outdoor workplaces – JS 2253-2:2020 ▪ Emergency Lighting – JS 2259:2019 ▪ JS 1189 Maximum Allowable Limits of Air Pollutants Emitted from Stationary Sources for the year 2006 ▪ JS 2352-1 Recommended practice for the design of low-noise workplaces containing machinery Part 1: Noise control strategies ▪ JS 4871 Declaration and verification of noise emission values of machinery and equipment
Community Health, Safety, and Security	▪ MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Air Protection Regulation No. 28 for 2005 ▪ Climate Change Regulation No. 79 of 2019 ▪ Environmental Protection from Pollution in Emergencies Regulation No. 26 of 2005 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020 ▪ Instruction for Reduction and Prevention of Noise of 2003
	▪ MWI	▪ Water Authority Law No. 18 for 1988 and it is amendments thereof ▪ Groundwater Control Regulation No. 85 for 2002 and its amendments thereof ▪ Protection of Water Resources Instructions of 2019
	▪ MoH	▪ Public Health Law No. 47 of 2008
	▪ JSMO	▪ JS 1140 Ambient air quality of 2006
	▪ EMRC	▪ Instructions for 'Sanitary rules to ensure electrical safe distances from OHTL' No. 1 for 2003
Socio-economic	▪ MoEnv	▪ Environmental Classification & License Regulation and its Amendments No. 69/2020

Component	Entity	Legislation
	▪ MoL	▪ Resolution for Increasing Opportunities for Empowering Jordanian Women and Raising their Economic Participation Rate in the Jordanian Labour Market of 2018
	▪ MPWH	▪ Regulation for Obligatory Employment of Jordanian Workforce from Surrounding Communities in Construction Projects No. (131) for the year 2016

6.3 International Agreements and Conventions to Which Jordan is a Signatory

The Government of Jordan is a signatory to several important international agreements and have already incorporated many of the provisions in national legislations, often indicating that where the national law is inconsistent with international agreements to which Jordan is a signatory, the requirements of the international agreement will prevail. Accordingly, the terms of international agreements to which Jordan is a party are an important part of the legal framework within which the Project operates. Key Treaties and obligations are listed in Table 13 below.

Table 13: Key Treaties and Obligations Ratified by Jordan

International Agreements on Biodiversity, Flora, and Fauna	▪ Convention on Biological Diversity (1993) - signed by Jordan in 1993. Under this agreement, signatories are required to develop plans and policies for the protection and monitoring of biodiversity and to integrate these into national plans for development. ▪ Convention on Migratory Species (1979) - signed by Jordan in 2000. Signatories are required to protect migratory species throughout the migration range through coordinated efforts and research. ▪ Agreement on the Conservation of African-Eurasian Migratory Waterbirds (1995) - came into force in 1999 when ratified by several at least fourteen Range States, comprising seven from Africa and seven from Eurasia. The Agreement covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle. ▪ Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1973) - the objective of this convention is to save many and varied forms of wild fauna and flora by regulating the trade in specimens of species of wild fauna and flora. ▪ International Plant Protection Convention (1970) - the objective of this convention is to prevent the international spread of pests and plant diseases. ▪ United Nations (UN) Convention to Combat Desertification (1994) - the objective is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification through effective action at all levels; and ▪ Stockholm Convention on Persistent Organic Pollutants (POP) (2004) - the objective of this Convention is to protect human health and the environment from persistent organic pollutants.
International Agreements on Energy and Climate Change	▪ UN Framework Convention on Climate Change (UNFCCC) 1992 - the UNFCCC was established to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable, aiming to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. ▪ Kyoto Protocol to the UN Framework Convention on Climate Change (1997) - establishes a legally binding commitment for the reduction of four greenhouse gases produced by industrialised nations, as well as general commitments for all member countries: and ▪ United Nations Environment Programme (UNEP) Montreal Protocol on Substances that Deplete the Ozone Layer (1987) - an international treaty designed to protect the ozone layer by phasing out the production of several substances believed to be responsible for ozone depletion.
International Agreements on Cultural Heritage	▪ Convention Concerning the Protection of the World Cultural and Natural Heritage, (World Heritage Convention, 1972) - the primary mission of the Convention is to identify and protect the world's natural and cultural heritage considered to be of outstanding universal value.

Other International Agreements Relating to Environmental Protection	▪ Basel Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal - designed to reduce the movements of hazardous waste between nations and specifically to prevent the transfer of hazardous waste from developed to less developed countries.
Obligations Relating to Membership of the International Labour Organisation (ILO)	▪ C 29 Forced Labour Convention, 1930 (No.29) ratified 06:06:1966 ▪ C 81 Labour Inspection Convention, 1947 (No. 81) ratified 27:03:1969 ▪ C 98 Right to Organise and Collective Bargaining Convention, 1949 (No.98) ratified 12:12:1968 ▪ C100 Equal Remuneration Convention, 1951 (No.100) ratified 22:091966 ▪ C105 Abolition of Forced Labour Convention, 1957 (No.105) ratified 31:03:1958 ▪ C 106 Weekly Rest (Commerce and Offices) Convention, 1957 (No.106) ratified 23:07:1979 ▪ C 116 Final Articles Revision Convention, 1961 (No.116) ratified 04:07:1963 ▪ C 117 Social Policy (Basic Aims and Standards) Convention, 1962 (No. 117) ratified 07:03:1963 ▪ C 118 Equality of Treatment (Social Security) Convention, 1962 (No. 118) ratified 07:03:1963 ▪ C 119 Guarding of Machinery Convention, 1963 (No.119) ratified 04:05:1964 ▪ C 120 Hygiene (Commerce and Offices) Convention, 1964 (No. 120) ratified 11:03:1965 ▪ C 122 Employment Policy Convention, 1964 (No. 122) ratified 10:03:1966 ▪ C 124 Medical Examination of Young Persons Convention, 1965 (No.124) ratified 06:06:1966 ▪ C135 Workers' Representatives Convention, 1971 (No.135) ratified 23:07:1979 ▪ C 142 Human Resources Development Convention, 1975 (No.142) ratified 23:07:1979 ▪ C 144 Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144) ratified 5:08:2003 ▪ C 147 Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147) ratified 01:04:2004 ▪ C 150 Labour Administration Convention, 1978 (No. 150) ratified 10:07:2003 ▪ C 159 Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983 (No. 159) ratified 13:05:2003 ▪ C 185 Seafarers Identity Documents Convention (Revised), 2003 (No. 185) ratified 09:08:2004 ▪ C 111 Discrimination (Employment and Occupation) Convention, 1958 (No. 111) ratified 04:07:1963 ▪ C 138 Minimum Age Convention, 1973 (No. 138) species at 16 years ratified 23:03:1998 ▪ C182 Worst Forms of Child Labour Convention, 1999 (No.182) ratified 20:04:2000

6.4 Jordanian Environmental Clearance Process

The process for environmental clearance and obtaining the environmental permit in Jordan as required by the MoEnv is stipulated by the "Environmental Protection Law No. (6) of 2017", and "Regulation for Environmental Classification and Permitting Process Number 69 for the year 2020".

The following outlines the main highlights of Regulation Number 69 for the year 2020:

- It classifies establishments/ developments/ projects according to their degree of risk on the environment with category 1, within which the Project falls, being developments with major significant or complicated risk of environmental and social impacts. It requires such category 1 projects to undertake a comprehensive ESIA to obtain an environmental license and an environmental permit.
- Specific requirements for environmental impact assessment studies and clarifies procedures for granting and organising the environmental license and environmental permit.

Generally, the environmental permitting process, as governed by the MoEnv, is a two (2) step process. First, the developers of the projects, and prior to commencement of the ESIA study (if required), must apply for a site or location approval permit. This step is also considered as a screening process to identify if any studies are required as part of the clearance process. The second step involves undertaking the ESIA study (if and as required) in accordance with the "Regulation for Environmental Classification and Permitting Process Number 69 for the year 2020". Both steps are discussed in additional details below.

Step 1: Location/Site Approval Permit and Screening of Environmental Assessment Requirements

- ***Location/Site Approval Permit Application***: The Project Owner/Developer applies to the 'Central Licensing Committee' within the MoEnv with the intention to undertake a development project using the application form available at the MoEnv. The 'Central Licensing Committee' includes representatives from the MoEnv as well as other government authorities such as the MoA, MoLA, MoH, etc.
  The application lists the information required by the 'Central Licensing Committee' and which includes:
  - General information on the location of the project supported by a site map.
  - A brief description of the planned project, purpose and nature, capacity, major components, etc.
  - Implementation schedule for the proposed project at different phases and others.

The E&S Consultant assisted NEPCO to prepare and submit a" Project Summary" document to MoEnv number 4373/4/1/7 dated 15 May 2024.

- ***Location/Site Approval Permit Decision:*** The 'Central Licensing Committee,' upon receipt of the application, evaluates the data submitted and undertakes a site visit to determine the appropriateness of the site for the proposed development. Based on the findings of the site visit, and assessment of the documents presented in the application, the Committee either approves the site for the development of the project or rejects the site.
  This is decided based on requirements from the MoEnv stipulated within "Regulation Number 69 for the year 2020" and the conformity of the site with these requirements. This includes criteria related to setbacks from sensitive receptors such as community settlements, schools, hospitals, and areas within regularised land use as well as others related to the context on the site itself such as the presence of any archaeological sites or forest (haraj) areas.
- ***Screening Decision/ESIA Requirement:*** As part of the same decision process, the 'Central Licensing Committee' undertake a screening process to determine whether the proposed development project is subject to a formal Environmental Assessment procedure or not.
  The Regulation Number 69 for the year 2020 lists the projects that require a full ESIA or a Preliminary ESIA. Any project which may have a significant impact on the environment is classified into Category 1 (Annex 1 of this regulation) and refers to projects that require the preparation of a comprehensive ESIA before permission to operate, or a license can be given to begin construction.
  Annex 1 of the Regulation requires that Energy Production Projects including Power Plants and OHTL which are +15 km long undertake a comprehensive EIA study to obtain an environmental permit.

  Based on letter no. 4/5/4278 dated 9 July 2024, the MoEnv requested a Comprehensive Environmental Impact Assessment (EIA) study.

Step 2: EIA Study and Environmental Permit

- ***ESIA Technical Committee:*** In the case of a Project where the 'Central Licensing Committee' rule that ESIA is required, the matter is transferred from the 'Central Licensing Committee' at MoEnv to the 'ESIA Technical Committee' within the same Ministry, and the ESIA Study procedures are officially started. The 'ESIA Technical Committee' also includes representatives from the MoEnv as well as other government authorities such as the MoA, MoLA, and others.
- ***ESIA Study Phases:*** In summary, two successive phases of activities engage in the completion of a comprehensive ESIA study in Jordan:
  - Scoping Phase: this includes the undertaking of a scoping session and submission of a Scoping Report/ ToR approved by MoEnv for the study; and
  - Assessment Phase: this includes undertaking the baseline studies, evaluation, and assessment of impacts, and development of an ESMP.
- ***Scoping Phase:*** The scoping phase requires the submission of a Pre-scoping report to the Ministry. This provides the MoEnv with all available information about the Project as well as the nature of impacts expected to result from the project and the relevant persons affected to initiate the ESIA process by calling for a Scoping and Consultation Session. A Scoping and Consultation Session is then called by the MoEnv with all Project-related stakeholders. Following this, a Scoping Report/ToR is submitted to the MoEnv which will include: (i) details on the Project, (ii) environmental baseline description, (iii) key environmental and social impacts to be assessed in the ESIA, (iv) methodology for the ESIA, (v) legal and administrative scope on which the study preparation will be based and (vi) comments raised by the stakeholders during the scoping session. This report must be approved by MoEnv, before undertaking the ESIA study.
- ***Assessment Phase:*** The assessment phase is carried out in accordance with the approved ToR by the MoEnv and involves undertaking the baseline studies, impact assessment and development of the Environmental Mitigation and Monitoring Plans (EMMPs) for the various components that are expected to be impacted by the project and its activities. The ESIA document is the output of the assessment, prepared following the ToR.
- ***Approval of ESIA:*** Upon submission of the ESIA document, the 'ESIA Technical Committee' reviews the report and either approves the study and grants the environmental clearance for the Project or rejects the Project if the study indicates that the implementation of the Project would cause significant impacts on the environment and/or the ESIA fails to identify plans for reducing adverse impacts. To issue the environmental permit for the Project, the environmental clearance is required.

Subsequent steps after obtaining the ESIA approval:

After the approval of the ESIA Technical Committee on the comprehensive/preliminary ESIA study, the environmental license is issued. The environmental permit is phased to different verifications steps undertaken by the MoEnv before construction, after construction, before operation, and an update of the permit every five (5) years. This is done to ensure that all the conditions and requirements set forth in the environmental license are applied. The environmental permit shall be valid for a period of five (5) years of its issuance date, and it shall be renewed every five (5) years in accordance with the MoEnv requirements.

The E&S Consultant has assisted NEPCO to prepare and submit a" Project Summary" document to Ministry of Environment (MoEnv) number 4373/4/1/7 dated 15 May 2024 for the purpose of obtaining their decision regarding the environmental permitting requirements for the Project.

Based on letter no. 4/5/4278 dated 9 July 2024, the MoEnv requested a Comprehensive Environmental Impact Assessment (EIA) study.

6.5 EBRD Performance Requirements

In accordance with EBRD's 2019 ESP, EBRD seeks to ensure, through its environmental and social appraisal and monitoring processes, that the projects it finances:

- Are socially and environmentally sustainable.
- Respect the rights of affected workers and communities.
- Are designed and operated in compliance with applicable regulatory requirements and good international practice.

To translate this objective into successful practical outcomes, EBRD has adopted a comprehensive set of PRs covering key areas of environmental and social impacts and issues.

EBRD is committed to promoting EU environmental standards as well as the European Principles for the Environment, to which it is a signatory, and which are also reflected in the PRs. EBRD expects clients to assess and manage the E&S issues associated with their projects so that projects meet the PRs. The EBRD Performance Requirements applicable to this project are summarised in the table below:

Table 14: Overview of Key Points of EBRD Performance Requirements of Relevance to the Project

EBRD PR	Key Points Relevant to the Project	Applicability
PR 1: Assessment and Management of E&S Risks and Impacts	This PR outlines the process of appraising, managing and monitoring environmental and social issues associated with a project consistent with the European Union environmental impact assessment directive (85/337/EEC as amended).	Applicable and considered for this ESIA
PR 2: Labor and Working Conditions	This PR assures that human resources policies, procedures and standards will meet the following minimum requirements during the life of the Project with regards to labour and working conditions: ▪ Establish and maintain a sound worker-management relationship and promote the fair treatment, non-discrimination and equal opportunity of workers. ▪ Promote compliance with any collective agreements to which the client is a party, national labour and employment laws, and the fundamental principles and key regulatory standards embodied in the applicable ILO conventions. ▪ Protect and promote the health of workers, especially by promoting safe and healthy working conditions. In addition, EBRD requires compliance with applicable EU Occupational Health and Safety requirements.	Applicable and considered for this ESIA
PR 3: Resource Efficiency and Pollution Prevention and Control	Pollution prevention and abatement are key ingredients of a sustainable development agenda and EBRD - financed projects must meet good international practice in this regard. The impacts and issues associated with polluting activities need to be considered in all economic activities, and from effluents and emissions at the facility level, to impacts at a regional and global level where appropriate. This performance requirement assures that all aspects of the Project will meet the following objectives: ▪ To avoid or, where avoidance is not possible, to minimise adverse impacts on human health and the environment by avoiding or minimising pollution directly arising from projects. ▪ To assist clients in identifying project-related opportunities for energy and resource efficiency improvements and waste reduction. ▪ To promote the reduction of project-related greenhouse gas emissions.	Applicable and considered for this ESIA

EBRD PR	Key Points Relevant to the Project	Applicability
PR 4: Health, Safety and Security	While bringing many positive benefits to local communities, projects can also increase the potential for community exposure to risks and impacts arising from temporary or permanent changes in population; transport of raw and finished materials; construction, operations and decommissioning; accidents, structural failures, and releases of hazardous materials. This performance requirement addresses the project proponent's responsibility to identify and to avoid or minimise the risks and adverse impacts to community health, safety and security.	Applicable and considered for this ESIA
PR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement due to project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.	Applicable and considered for this ESIA and standalone RF and land acquisition and resettlement audit report.
PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	EBRD recognises the need for the protection and conservation of biodiversity in the context of projects in which it invests. In pursuing these aims, EBRD is guided by and supports the implementation of applicable international law and conventions and applicable EU Directives: ▪ To protect and conserve biodiversity. ▪ To avoid, minimise and mitigate impacts on biodiversity and offset significant residual impacts, where appropriate, with the aim of achieving no net loss or a net gain of biodiversity. ▪ To promote the sustainable management and use of natural resources. ▪ To provide for fair and equitable sharing of the benefits from project development and arising out of the utilisation of genetic resources. ▪ To strengthen companies' license to operate, reputation and competitive advantage through best practice management of biodiversity as a business risk and opportunity. ▪ To foster the development of pro-biodiversity business that offers alternative livelihoods in place of unsustainable exploitation of the natural environment.	Applicable and considered for this ESIA
PR 7: Indigenous Peoples	Indigenous peoples may be particularly vulnerable to the adverse impacts associated with project development, including risk of impoverishment and loss of identity, culture, and natural resource-based livelihoods. PR 7 seeks to ensure that business activities minimise negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways.	Not applicable as there are no indigenous peoples identified within Jordan
PR 8: Cultural Heritage	Cultural heritage is important as a source of valuable historical and scientific information, as an asset for economic and social development, and as an integral part of a people's cultural identity, practices, and continuity. EBRD requires the protection of cultural heritage from project activities.	Applicable and considered for this ESIA
PR 10: Information Disclosure and Stakeholder Engagement	EBRD considers stakeholder engagement as an essential part of good business practice and corporate citizenship. Effective community engagement is central to the successful management of risks and impacts on communities, as well as central to achieving enhanced community benefits. The specific objectives of this PR are: ▪ To identify people or communities that are or could be affected by the Project, as well as other interested parties. ▪ To ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation. ▪ To maintain a constructive relationship with stakeholders on an ongoing basis through meaningful engagement during project implementation.	Applicable and considered for this ESIA

7 STAKEHOLDER ENGAGEMENT

This section discusses in detail the stakeholder consultation and engagement plans which were undertaken as part of the ESIA process for the Project and provides an overview of the findings. In addition, this section also discusses the future stakeholder consultation and engagement plans which are to take place at a later stage of the ESIA process as well as the Project development.

7.1 Objectives

Stakeholder engagement is an integral part of ESIA good practice. The EBRD requires NEPCO to implement a technically and culturally appropriate approach to consultation and engagement with all stakeholders affected either directly or indirectly by the Project. The consultation programme for the Project shall be based on informed consultation and participation in line with good international practice requirements with affected people and is designed to be both fair and inclusive. Consultation activities are implemented by the Consultant to the extent possible – even though these are limited by the absence of cadastral information from the OHTL and the contact details for the owners for the Project land and the OHTL alignment.

Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively.

Stakeholders may include: (i) locally affected communities or individuals and their formal and informal representatives, (ii) national or local government authorities, politicians, religious leaders, civil society organisations and groups with special interests, (iii) the academic community, or other businesses.

The objective of stakeholder consultation is to ensure that a participatory approach takes place, which in turn documents concerns of all stakeholder groups and makes sure that such concerns are considered, responded to, and incorporated into the decision-making process of the development. Stakeholder consultation needs to be a two-way communication process that imparts information to stakeholders, but also obtains additional and on-the-ground information from them. Stakeholder consultation and engagement must take place at the inception phase of the ESIA process and implemented all through the study period.

The specific objectives of this section are to:

- Describe and identify the stakeholders affected and/or with an interest in the Project.
- Summarise stakeholder engagement and consultation conducted to date. In addition, describe how the views and issues raised have informed and influenced the development of the Project.
- Outline the future plans and approach to stakeholder engagement.

7.2 Stakeholder Identification and Analysis

The purpose of stakeholder identification is to identify and prioritise Project stakeholders for consultation. Stakeholder identification is an ongoing process, and thus key stakeholders will be identified during different stages of the Project. A systematic approach is used to map the stakeholders based on the Project zone of impacts. In this approach, by mapping the zone of social impacts, stakeholders are identified by the impact area.

As a result of the stakeholder mapping, Project stakeholders are categorised into the following main categories:

1. People and groups who will be directly or indirectly affected by the Project (such as local communities).
2. People and groups who may participate in the implementation of the Project (such as investors and lenders).
3. People and groups who are not affected by the Project development per se but may have a possibility to influence and make decisions on implementation of the Project (such as Ministries or regulatory agencies).

The main groups of stakeholders identified so far are listed in the table below. The list can be updated and modified in the course of the Project development.

7.2.1 Identified Groups of Stakeholders

Table 15: Identified Groups of Stakeholders

Stakeholder		Description	Influence Degree
Interested Parties			
National Electric Power Company (NEPCO)		▪ The owner and operator of the Project and will be the prime stakeholder to make decisions on all aspects of project implementation. It will also be responsible for designing and building the substation and the OHTL.	High
European Bank for Reconstruction and Development (EBRD)		▪ Project financier, and will be responsible for the monitoring of safeguard compliance; supervision of project, initiate and review Environment, Health, Safety, and social (EHSS) documentation and provide clearance to contract awards and signing / initiation of civil works to the Project	High
National Authorities	Ministry of Labour (MoL)	▪ Regulatory role in the project and responsible for monitoring the employers' compliance with the Labour Law.	Low to Medium
	Directorate of Civil Defence	▪ Involved in approving technical designs and drawings and providing emergency services during the project implementation.	Medium to High
	Ministry of Health (MoH)	▪ Regulatory role in the project includes issues related to the public health of the nearby communities	Low to Medium
	Ministry of Environment (MoEnv)	▪ Regulatory role in the project, and responsible for the approval of the ESIA Study and making sure it complies with the "Environmental Classification and Licensing Regulation No. 69 of 2020 and its amended Regulation No. 97 of 2020". It will also be responsible for granting the environmental clearance for the Project, as well as ensuring implementation of environmental protection measures related to the Project	High
	Ministry of Finance (MoF)	▪ Regulatory role in the project specifically includes Law No. 13 of 2019 which allows for land acquisition	Low
	Ministry of Agriculture (MoA)	▪ Regulatory role in the project includes land use issues related to grazing reserves and forest lands as well as potential impacts related to biodiversity.	Low
	Department of Antiquities (DoA)	▪ Regulatory role in the project includes issues related to archaeology and cultural heritage related to the Project.	Low to Medium
	Ministry of Local Administration (MoLA)	▪ Will be involved in changing designation of land use for the Project, if required.	Low to Medium
	Ministry of Public Works and Housing (MPWH)	▪ Will be involved in ensuring transportation activities are properly managed.	Low to Medium
	Jordan Engineers Association (JEA)	▪ Involved in reviewing technical drawings and granting construction permit for the Project	Medium
	Jordan Contractors Association (JCA)	▪ Involved in registering contractors to the Project and providing them with vocational licenses to work.	Medium
	Municipalities	▪ Responsible for providing infrastructure and utility services	Medium to High
	Jordan Standards and Metrology Organisation (JSMO)	▪ Regulatory role in the project includes issues related to ambient air quality.	Low to Medium
Non-Government Organisations (NGOs) Community Based Organisations (CBOs)		▪ Active within the Project area	Low to Medium
Affected Parties			
Private Landowners and land users		▪ This includes private owners of the land and land users where the substation will be constructed as well as owners of the lands through which the OHTL will pass.	High

Stakeholder	Description		Influence Degree
Local Communities	▪ This includes nearby residents, vulnerable groups (persons with disability, elderly people, youth, and local women), local businesses, and Community based Organisations (CBOs).		Medium to Low
	Local communities for the Substation: ▪ Al-Mafraq Governorate ▪ Mafraq Qasabah district ▪ Rihab Locality (in which the proposed North Substation is located) ▪ Greater Mafraq Municipality (GMM) ▪ Bani Obeid Municipality ▪ Tamirah Farm ▪ Al Khanasri ▪ Key Receptors Within 1 Km of the Selected Project Site (Table 3) - Receptor 1 (Chicken Broiler Houses) - Receptor 2 (private house/farm that includes a private well) - Receptor 3 (Chicken Broiler Houses) - Receptor 4 (Private house/farm) - Receptor 5 (Private house/farm) - Receptor 6 (Structure remains)	Local communities for the OHTL: ▪ Zarqa Governorate ▪ Al-Mafraq Governorate ▪ Beerein Municipality ▪ Rihab Municipality ▪ Alnaseem Municipality ▪ Bani Obeid Municipality ▪ Albasiliyah Municipality The OHTL passes close to the following communities ▪ Hamnanah ▪ Khreisan ▪ Alshareefah ▪ Humeid ▪ Alqasabah ▪ Hamamah ▪ Um Kharroobah ▪ Digmisseh ▪ Khirbet Almatwa ▪ Aldjeineyeh ▪ Tamirah Farm ▪ Al Khanasri ▪ Deir Waraa ▪ Buweidah	
Project Affected Person (PAPs)	▪ Mainly include landowners, land users, farmers, building owners, and informal users across the OHTL route.		High
Local Herders and Grazers	▪ Those who engage in grazing activities and might be present at or near the proposed sites during certain periods of the year.		High
Private Suppliers	▪ Suppliers for the site needs (i.e., food, construction materials, etc.)		Low to Medium
Contractors and Subcontractors	▪ Those who will be engaged in the construction activities during the implementation of the project		Low to Medium
Employees/workers	▪ workers involved in the Project's operational and construction activities		High

7.2.2 Vulnerable Groups

Vulnerable groups are groups that due to their socio-economic characteristics may experience impacts more severely and/or disproportionally compared to the rest of the community members.

Vulnerable groups are project specific and depend on a range of issues which must be understood such as project location, socio-economic and demographic context, as well as the nature of the development and type of impacts anticipated. Vulnerable groups may be severely affected by the Project by virtue of their physical disability, social or economic standing, and limited education, lack of employment or access to land. The key vulnerable groups within the context of the Project and their relevance are informal land users.

7.2.3 Project Affected Person (PAPs)

- In the context of land acquisition and expropriation, Project Affected Persons (PAPs) refer to displaced communities and persons who are entitled to compensation. For this Project they include the following:
  a. Persons whose structures are in part, or in total, affected temporarily or permanently by the Project.
  b. Persons whose residential or commercial premises and/or agricultural land (or other productive land) is in part, or in total, affected (permanently or temporarily) by the Project.
  c. Persons whose formal or informal businesses are affected in part, or in total, (temporarily or permanently) by the Project.
  d. Persons whose employment or hired labour or share-cropping agreement is affected, temporarily or permanently, by the Project.
  e. Persons whose crops (annual and perennial) and/or trees are affected in part, or in total, by the Project.
  f. Persons whose access to community resources or property is affected in part, or in total, by the Project.

PAPs which mainly include private owners of the lands and land users where the substation will be constructed as well as owners and users of the lands through which the OHTL will pass. OHTL construction and operation could entail economic displacement impacts on such PAPs (such as disturbance or agricultural activities, land fragmentation, land access, grazing/livestock activities) and/or physical displacement impacts.

As part of the ESIA disclosure package, the ESIA Team will prepare a RF for the Project. A land acquisition audit report for the substation land will also be prepared. At a later point, a detailed RP will be prepared for the Project which will entail detailed mapping and profiling of PAPs as well as consultation.

7.3 Stakeholder Consultation and Engagement to Date

The ESIA Team conducted visits to the Project area in June and July 2024, including the receptors around the Project area and carried out stakeholder engagement activities with key with affected groups and interested parties marked in yellow pins in Figure 19. Results shown in Table 16.

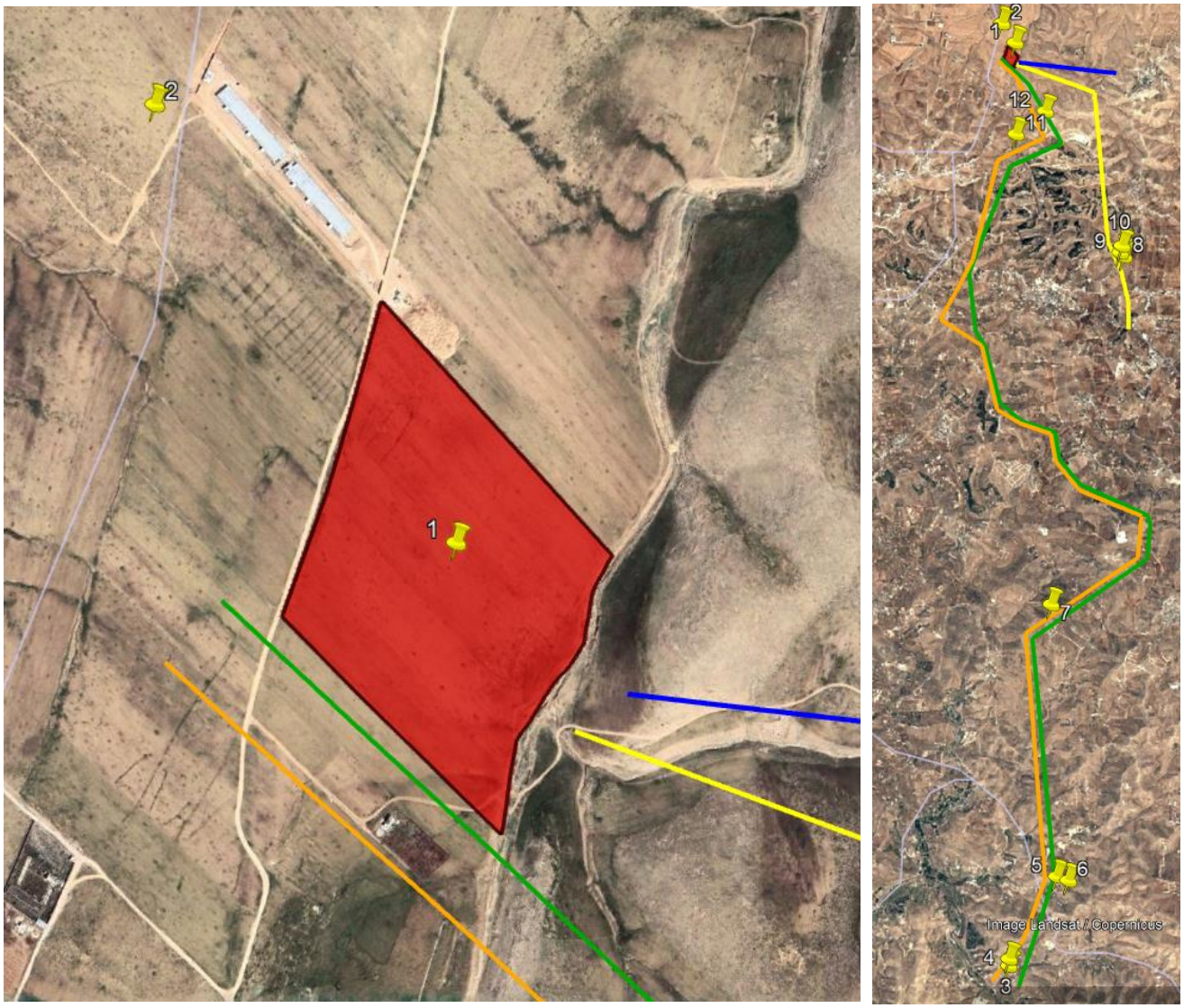
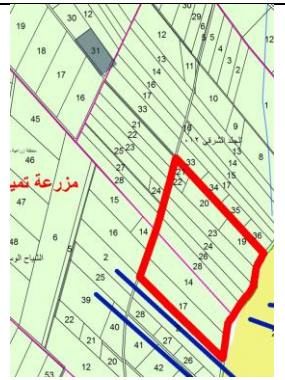


Figure 19: Stakeholders Consulted in the Vicinity of the Project Area

Table 16: Overall Summary of Consultations

#	Project/Area	Distance and direction of receptor in relation to the substation/OHTL	Date	Summary of Results	Supporting Photos
1.	Substation	10m North of the substation site	3 June 2024	▪ During the site visit, the ESIA team observed a temporary accommodation located to the north of the substation land, situated in front of the broiler house as shown in Figure 21. The team approached the house and spoke to the occupants, who identified themselves as workers from the broiler house and explained that this was their place of residence. They mentioned that there are three (3) other similar residences in the area. Additionally, they informed the team about some Bedouins living in tents approximately 1 km north of this residence. ▪ The ESIA team then proceeded to visit the broiler house located in the northern part of the substation site. There, they spoke to the Project Manager who oversees the construction of the broiler house. He informed the team that the construction phase has been ongoing for almost a year and is expected to be completed within a month, after which a new team will take over for operations. ▪ The Project Manager also shared that they own four other broiler houses situated to the west of the project site and have recently purchased adjacent land to expand by building additional broiler houses. They noted that constructing a broiler house typically takes around a year. Furthermore, he mentioned that the land to the north of their newly acquired property is a farm with a water well, privately owned by an individual who utilises it for agricultural purposes, as shown in Figure 21. ▪ Based on discussions, the Project Manager also indicated that the area in general, including the substation land, had been planted with Barley. The barley has still not been cultivated when the ESIA Team visited the site. Typically, seeding occurs in October-November and harvesting in July. ▪ The Project Manager provided contact details for a landowner in the general area to be contacted.	 **Figure 20: Temporary Accommodation Photo from the Site Visit**  **Figure 21: Receptors Around Tamirah Land that include Broiler Houses and Private House/Farm**

1.	Substation	The substation site	04 July 2024	▪ The ESIA team visited the proposed substation site. The team encountered a herder and proceeded to approach him. The herder provided the team with the contact number for one of the landowners, who was then contacted by the team. ▪ The landowner informed the team that the proposed substation site is situated on their private land owned by their family (10 members). ▪ The landowner informed the team that he works in the military, while many of the landowners are retired, with their source of income being their pension. ▪ According to the landowner, wheat and barley are cultivated on the land, which spans approximately 125 dunums. Production varies depending on the season's rainfall; in good years, about one sack of wheat or barley is produced per dunum, roughly 80 kg per dunum. The harvested grains are stored and used as fodder for the sheep. ▪ Seeding occurs in November, with harvesting typically taking place in May or June. However, this season (June 2024), there was no actual production, so what was seen during the site visit on July 4 was only dry grass. Irrigation relies solely on rainfall. ▪ A tractor is rented for ploughing, and all fieldwork during seeding and harvesting is conducted by family members, including offspring and grandchildren, without hiring outside workers. ▪ Regarding the new substation project on the land, parcel no.19,21 and 22 are owned by the same landowner and their relatives. The landowner was informed by a lawyer about NEPCO's acquisition. The lawyer mentioned that they would take their case to court to seek fair compensation. Without the lawyer, the landowner and their family would not have known about the acquisition, despite an announcement in the newspapers. ▪ NEPCO has offered compensation of 5,000 JD per dunum, which is equivalent to 5 JD per square meter. ▪ The team is attempting to contact the landowner to obtain further information regarding the following, aspects. However, even with the multiple attempts to contact the owner, they did not respond. - Contact information for other lawyers and landowners - Ownership details of the sheep - Production and harvesting information from the past ten years - Awareness of the current land use (harvesting) among other landowners - Date of initial harvesting - Grazing habits of the sheep during non-harvesting periods	 **Figure 22: Substation Site**

2.	Substation	Approximately 350m west of the Substation site	2 July2024	▪ The ESIA Team requested contact information for the landowners from (stakeholder No. 1 above), who provided the details of, the owner of parcel number 31 (delineated on Figure 23) near the proposed substation site, though not part of it. On July 2, 2024, the ESIA Team contacted the landowner, who stated that unknown individuals (informal land users), possibly nomads, have been cultivating and harvesting barley, wheat, and other grains on his land (No. 31) without their permission or any formal agreement. When asked if they had contact details for neighbouring landowners or the informal land users, the landowner indicated that he did not possess such information.	 **Figure 23: Location of Land Plot No. 31 in Relation to the Substation Site**
3.	OHTL	250m east of the proposed 400kV (North S/S – West Amman) line and approximately 410m west of the proposed 400kV (North S/S – Samra) line	3 July 2024	▪ The ESIA Team observed an active construction site. The team approached the construction workers who directed the ESIA team to the landowner, a real estate developer. The landowner informed the team that the site is to be developed into a recreational facility consisting of a horseback riding centre with stables and a restaurant/café. ▪ The landowner informed the team that they also own a few blocks of land around the construction site, which they acquired 4-5 years ago. The existing OHTL lines were already in place then. ▪ The landowner exhibited general awareness of the potential health consequences of residing near an OHTL. they also expressed concerns regarding the value of their land falling because of the proposed additional OHTLs the team mentioned. In the case of the proposed OHTL lying over their land, they are open to negotiations and possible compensation proposals.	 **Figure 24: The Landowner's Construction Site**

4.	OHTL	145m east of the proposed 400kV (North S/S – West Amman) line and approximately 460m west of the proposed 400kV (North S/S – Samra) line	3 July 2024	▪ The ESIA team observed an enclosed land area consisting of a farmhouse which falls in proximity to the proposed OHTL. The ESIA team approached one of the occupants, who identified themselves as the landowner. They mentioned that this is their place of residence and that on their land, they raise chickens and bees. Additionally, they have olive and palm trees. The products are for household use only, they mentioned that they are not considering selling or entering the market in the near future. They also mentioned that their main source of income is their pension. ▪ Their land lies next to existing OHTL, which the landowner expressed dissatisfaction about. They believe that they will be negatively impacted by the proposed OHTL project as they noticed that the bees on their farm are affected by the electromagnetic field generated and have reduced their pollination by half since the existing OHTL was energised. Furthermore, the landowner mentioned that the chickens hatched 50% less eggs than usual in the last year which they believe to be the year of operation of the existing OHTL. ▪ The landowner informed the team that their house is grid connected but autonomous in terms of water supply, as they have tanks that are regularly filled up and have sufficient capacity for water storage for times of shortage. ▪ The landowner informed the ESIA team that they will not accept any sort of financial compensation if the project were to take place and would object through court. The landowner did not express any positive thoughts regarding the proposed OHTL, even though they stated suffers from electrical shortages regularly.	 **Figure 25: Stakeholder no.4 land**  **Figure 26: Stakeholder no.4 House**
5.	OHTL	75m east of the proposed 400kV (North S/S – Samra) line	3 July 2024	▪ The team observed a construction site that falls within the vicinity of the proposed OHTL, with 3 personnel on site. One of them is the sibling of the landowner and the other two are workers. They informed the team that they are building a residential house/chalet for a total of 4 people. They mentioned that the land area is approximately 3 dunums and 400m2. They also informed the team that their sibling acquired the land 2 years ago and is unaware of electrical shortages in the area. They expressed general awareness of the possible health consequences of high voltage electricity/OHTL. ▪ The landowner's sibling indicated that if the proposed OHTL were to pass directly over their land, they would consider selling it. They noted that while the existing OHTLs are nearby, with a tower in the adjacent land to theirs, none of the existing lines currently pass directly over their land.	 **Figure 27: Stakeholder no.6 Construction Site**

6.	OHTL	Approximately 400m west of the proposed 400kV (North S/S – Samra) line	3 July 2024	▪ The ESIA team observed another construction site within the vicinity of the proposed OHTL. They approached the site and spoke to the landowner, who is building a small house for their family on their 3.5 dunum land, purchased in 2014. The land is currently barren, with no livestock being raised. The landowner's property is currently being built less than 15 meters away from the existing North Amman-Mafraq OHTL, a precaution recommended by several individuals to mitigate OHTL impacts, according to their statement. Additionally, their property is approximately 400 meters from the proposed OHTL. ▪ While the landowner is aware that living near an OHTL can generally pose health risks, they were unable to specify the exact concerns. When asked about any concerns regarding the proposed project 400 meters away, they mentioned that they couldn't be certain of any potential impacts.	 **Figure 28: Stakeholder no.6 Construction site**
7.	OHTL	Under the proposed 400kV (North S/S – West Amman) line and approximately 200m west of the proposed 400kV (North S/S – Samra) line	3 July 2024	▪ The ESIA team visited the houses in the area where the proposed OHTL passes directly over them. However, upon arrival, the houses were found to be closed with no occupants present, leading to the suspicion that they might be seasonal or vacation homes rather than permanent residences.	 **Figure 29: Locked house 1**  **Figure 30: Locked house 2**

8.	OHTL	Directly under the Proposed 132 kV (North S/S – Jerash S/S) line	4 July 2024	▪ The ESIA Team observed a property which falls directly under the proposed OHTL. The team was able to attain the phone number of one of the landowners, from the attending guard observed there. The landowner informed the team that him and their spouse jointly own 8.25 dunums of land, which includes a 75m2 house. Although they do not currently reside there, they plan to make it their permanent residence in the future. ▪ Currently, a guard is employed to maintain the property. The land is cultivated with approximately 400 relatively young olive, pistachio, fig, peach, and other fruit trees. Additionally, the landowner raises chickens and pigeons. They mentioned that the current production from the trees is for personal consumption, however, they may consider selling some of the yield in the future. ▪ The landowner expressed concerns about potential health risks associated with the OHTL project. However, they are not aware of any additional impacts that the OHTL might have on their property.	 **Figure 31: Stakeholder no.8 farm**
9.	OHTL	Approximately 30m west of the proposed 132 kV (North S/S – Jerash S/S) line	4 July 2024	▪ The ESIA team observed a property situated in the vicinity of the proposed OHTL. The team proceeded to ring the doorbell and request contact with the owner. The owner, was very cooperative. They informed the team that the total size of their property is 6 dunums including a house and two pools, totalling approximately 200-250 m2 in size. The rest of their land is used for cultivation, featuring olive trees, fig trees, apple trees, and other plants. Additionally, they mentioned that the engage in beekeeping and maintains around 120 sheep, which they sell during Eid al- Adha. The sheep are kept on his land as well. The landowner is a retired biologist, and now works as a car dealer. The landowner mentioned that they purchased the land in 2016. At the time, there were only a few trees. The solely built their residence, installed the pools, and expanded cultivation with additional trees. Their property serves as the permanent residence for their family of six members. ▪ The landowner expressed concerns regarding the proposed OHTL project. These include potential health risks associated with electromagnetic fields, as well as concerns about noise and visual disturbances. They are also concerned about the potential depreciation of their property value once the project is established. To address these concerns, the landowner proposed that the OHTL should be located no less than 250m away from their property, although they did emphasise their opposition to the project being implemented in this area. ▪ In terms of infrastructure, the landowner's property is independent in terms of water supply, where they purchase their own water, since there are no existing water or wastewater networks in the area.	 **Figure 32: Stakeholder no. 9 Property within the Vicinity of the OHTL**

10.	OHTL	Approximately 30m west of the proposed 132 kV (North S/S – Jerash S/S) line	4 July 2024	▪ The ESIA team observed a property which falls in the vicinity of the proposed OHTL. The team was able to get in contact with the property owner through their phone number, which the team obtained from their neighbour. ▪ The landowner informed the team that they are a retired police officer currently working at a private company. They also mentioned that they own a 4.5 dunum property with a 120 m2 house. The majority of their land is dedicated to cultivation, hosting approximately 150 olive trees, fig trees, and pomegranate trees. The produce from these trees is for personal use and not sold. They purchased the land in 2018 and constructed the house afterward. ▪ The landowner informed the team that they currently live in Amman and is in the process of preparing their 120 m2 house as their permanent residence, where they plan to move with their family. They expressed significant concerns about the proposed OHTL project in their area. Their neighbour, informed them about the project after being contacted by the ESIA team. ▪ The landowner expressed concerns regarding the OHTL project which include potential health issues from electromagnetic fields, noise pollution, and visual disturbance. They are also concerned about the potential depreciation of their property value once the project is established, as the area is frequently used for recreation by many people during spring. They strongly believe the OHTL project should be relocated elsewhere, suggesting it be situated at least 300-500 m away from their property. ▪ In terms of infrastructure, the landowner informed the ESIA team that their property is independent in terms of water supply, they purchase their own water due to the lack of existing water or wastewater networks in the area. They also emphasised their opposition to the project being implemented in this area.	 **Figure 33: Stakeholder no.10 Property Within the Vicinty of the OHTL**
11.	OHTL	Approximately 100m west of the proposed 400kV (North S/S – West Amman) line and approximately 415m west of the proposed 400kV (North S/S – Samra) line	4 July 2024	▪ The ESIA team visited the Gas Station and requested to speak to an engineer. One of the station workers provided them with the contact number of the Head of the Civil Department at Al Manaseer. The Engineer stated that their only request is for the OHTL to maintain a minimum distance of 100 meters from the gas station. They explained that a smaller distance could result in a catastrophe, as any potential sparks from the OHTL could ignite fumes from the underground tanks. Therefore, ensuring 100 meters should effectively mitigate this risk.	 **Figure 34: Manaseer Gas Station (Dijaneyeh)**

12.	OHTL	Directly under the Proposed 400kV (North S/S – West Amman) line and approximately 115m west of the proposed 400kV (North S/S – Samra) OHTL	4 July 2024	▪ The ESIA team observed a man in the quarry area, who identified himself as a worker and provided the team with the number of an individual, who works at the site and lives nearby. ▪ The worker, informed the team that they tend to divide their time between two locations, spending a few days each week at each place. One location is a rented property at the quarry, where they work as a guard and an operations supervisor for one of the machines. Additionally, they raise around 200 sheep at the quarry, which are owned by their father. The other location is a property owned by their father, accommodating around 17 family members and housing between 300 to 500 sheep. This property spans 350m2 and is located approximately 50m from the quarry. ▪ The worker expressed their main concerns regarding the OHTL project, specifically potential health risks and the depreciation of their father's property where their family reside.	 **Figure 35: Machinary at the Quarry Site**

In addition, The ESIA team visited several municipalities where the project is located or in close proximity to in July 2024, listed in the table below.

Table 17: Municipalities visited by the ESIA team

No.	Municipality	Position
1.	Birein	Head of Development Unit
2.	Balaama	Head of Development Unit / Municipal Administrative Director
		Engineer at the Tendering Department
3.	Al-Hashimeyeh	Executive Director of the Municipality
		Head of Development Unit
4.	Rihab	Municipal Director
5.	Al Naseem	Head of Regulatory Areas
		Survey Engineer for Qafqafa Area
		Director of Qafqafa Area
		Director of Al Rabwa Area
6.	Bani Obaid	Secretary of the Mayor's Office
7.	Basliah	Executive Director of the Municipality

The team briefed the designated contacts at the municipalities about the project, detailing the substation location and the proposed OHTL route. Additionally, they provided information on the project's objectives and requested socio-economic and environmental data from the municipalities to include in the ESIA report.

7.4 Future Stakeholder Engagement Activities

Future stakeholder engagement and consultations will mainly include the following, each of which is discussed in further details.

7.4.1 Disclosure of Documentation

The below documents will be disclosed on the EBRD's website to allow any stakeholder to review the studies and comment on the scope of work undertaken, key issues identified and any other issues of concern they might have. At the end of the disclosure period, all received comments will be addressed and considered and updated as appropriate.

- Environmental and Social Impact Assessment (ESIA) including Environmental and Social Management and Monitoring Plan.
- Non-Technical Summary (NTS).
- Stakeholder Engagement Plan (SEP).
- Resettlement Framework.
- ESAP.

The above will be disclosed in English and Arabic languages for a period of 120 days in line with EBRD Access to Information policy.

7.4.2 Stakeholders and PAPs

NEPCO, assigned ESIA Consultant, and the EPC Contractors shall undertake detailed consultation with related stakeholders for the preparation of the detailed design, construction, and operation of the Project.

Detailed consultations will be undertaken as part of the RP preparation. Guidance for these activities is provided in the RF prepared and submitted separately and part of the ESIA disclosure package.

7.4.3 Implementation of the Stakeholder Engagement Plan (SEP)

Stakeholder Engagement is an on-going process that involves stakeholder analysis & planning, disclosure & dissemination of information, consultation & participation, grievance mechanism, and on-going reporting to Affected Communities. A Stakeholder Engagement Plan (SEP) is developed and implemented that is scaled to the Project risks and impacts and development stage and be tailored to the characteristics and interests of the Affected Communities and key stakeholders.

The SEP for the Project describes the planned stakeholder consultation activities and engagement process and includes the following:

- Define the Project's approach to future stakeholder engagement.
- Identify stakeholders within the area influenced by the Project.
- Profile identified stakeholders to understand their priorities.
- Propose an action plan for future engagement with identified stakeholders.
- Set out the grievance/project complaints mechanism.

NEPCO shall be committed to implementing the requirements of the SEP throughout the lifetime of the Project. The SEP is provided as a standalone document.

The SEP will be updated to account for the measures in the RP to be developed at a later stage.

7.4.4 Grievance Redress Mechanism

A grievance is any complaint about the way a project is being implemented. It may take the form of specific complaints about impacts, damages, or harm caused by the Project, concerns about access to the project stakeholder engagement process or about how comments have been addressed, and concerns about Project activities during construction or operation, or perceived incidents or impacts. Also, positive feedback ad suggestions may be filed via the Grievance Mechanism.

During all project phases, the assigned Contractor and NEPCO will adopt a formalised GRM for the project to monitor and promptly resolve potential conflicts with stakeholders, including the employees and workers, to ensure that all complaints received from any stakeholder are considered and addressed in an appropriate and timely manner. Also, it will allow the public and community members and the workers to express their concerns and any complaints directly to NEPCO. The assigned contractor and NEPCO responsibilities for the grievance management during the project phases are:

- To publicise the GRM procedure and grievance receiving channels for the local community and ensure that they are accessible for the community.
- To inform the workers of the grievance mechanism at the time of hiring and make it easily accessible to them.
- To implement the GRM.
- To ensure grievance reports are issued monthly during construction phase on a quarterly basis during the operation phase.

In addition, the grievance procedure must consider the following:

- Stakeholders must be aware of the person responsible for receiving complaints.
- Stakeholders have the right to maintain the confidentiality of the grievance procedure and to appeal to a higher level of management if dissatisfied with the original findings.
- Employees have the option to lodge complaints with MoL to protect their rights.

8 CLIMATE

8.1 Assessment of Baseline Conditions

Assessment of baseline conditions in relation to climate was based on a thorough review of existing climatological data from government agencies like the meteorological department, focusing on temperature, precipitation, humidity, and wind patterns. Detailed data analysis was conducted to categorise climate characteristics into summer, winter, spring, and autumn periods, emphasising temperature ranges, precipitation levels, and humidity variations.

8.2 Results

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.

8.2.1 Summers

- **Temperature**: During the summer months, from June to September, temperatures in West Mafraq can soar, often exceeding 35°C (95°F) during the day. The heat is intense, and daytime temperatures can occasionally reach up to 40°C (104°F) during peak heatwaves.
- **Precipitation**: Rainfall is scarce during the summer, with virtually no significant precipitation, leading to dry and arid conditions.
- **Humidity**: The relative humidity is generally low, contributing to the dry and arid atmosphere.

8.2.2 Winters

- **Temperature**: The winter season, spanning from December to February, brings cooler temperatures. Daytime highs typically range from 10°C to 15°C (50°F to 59°F), while nighttime temperatures can drop significantly, sometimes approaching freezing point.
- **Precipitation**: Winter is the primary rainy season, with the region receiving the bulk of its annual precipitation during these months. Rainfall is moderate but can occasionally be heavy, contributing to the region's limited water resources.
- **Snowfall**: Although rare, snowfall can occur in the higher elevations of the surrounding hills and mountains.

8.2.3 Spring and Autumn

- **Temperature**: These transitional seasons, from March to May (spring) and from October to November (autumn), are marked by milder temperatures. Spring sees gradually warming temperatures, while autumn experiences a cooling trend.
- **Precipitation**: Rainfall during these periods is generally light to moderate, with spring sometimes receiving residual winter rains and autumn marking the onset of the rainy season.

8.2.4 General Climate Features

- **Wind**: The region can experience strong winds, especially during transitional seasons, which can exacerbate the dry conditions and contribute to dust storms.
- **Sunshine**: West Mafraq enjoys a high number of sunny days throughout the year, particularly in summer, which can lead to significant temperature variations between day and night.

- **Aridity**: Overall, the climate is arid to semi-arid, with limited vegetation and water resources. The dry conditions require efficient water management and adaptation strategies for agriculture and daily living.
- **Precipitation**: Mafraq Governorate, experiences a semi-arid climate with distinct seasonal precipitation patterns influenced by its geography and topography. The average annual rainfall ranges from about 150 to 300 mm, with most precipitation occurring during the winter months, from November to March, accounting for approximately 80% of the annual total. The peak of the rainy season is in December, January, and February, often bringing moderate to heavy rainfall, sometimes leading to localised flooding. Snowfall is rare but can occur in higher elevations. Spring sees a gradual decrease in rainfall, with March still receiving significant precipitation, while by May, the region transitions to much drier conditions, occasionally experiencing thunderstorms and windstorms. The summer months, from June to September, are extremely dry, with virtually no rainfall, putting stress on water resources and agriculture, necessitating irrigation. Autumn marks the transition back to the rainy season, with rainfall increasing in late October and November. The amount and distribution of rainfall can vary significantly from year to year, leading to challenges such as drought conditions or excessive rainfall in some years.

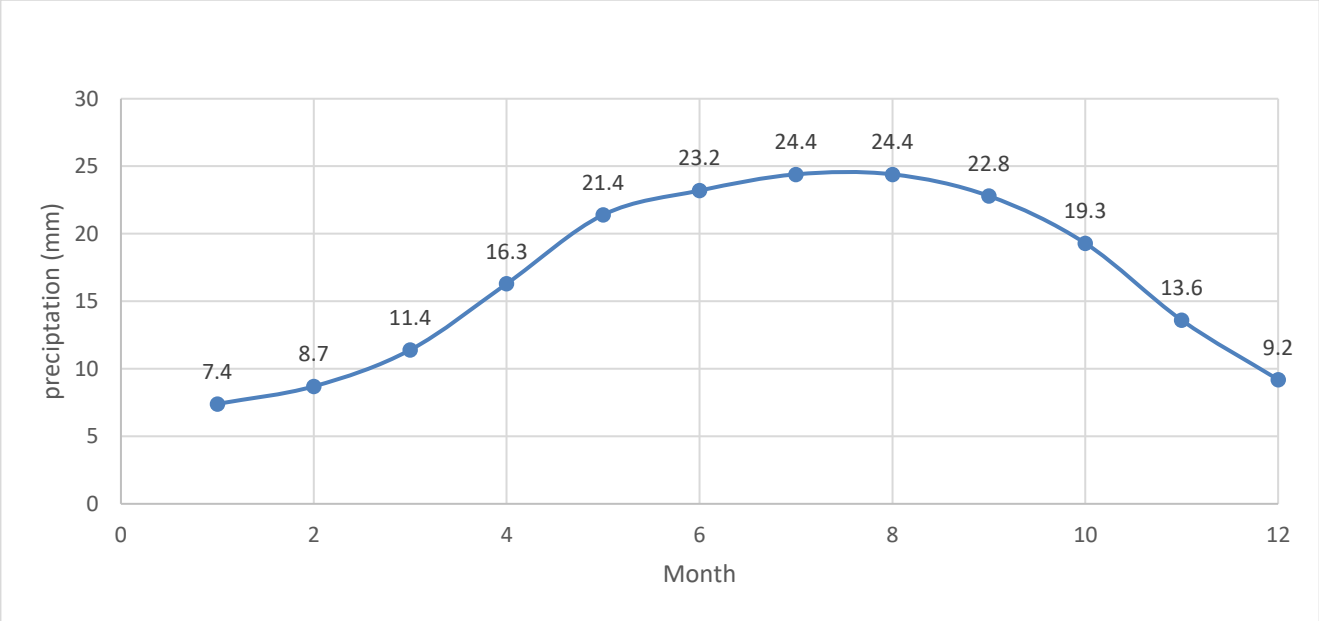


Figure 36: Average Monthly Precipitation from Mafraq Weather Station (Metrological Department-Jordan Climatological Handbook)

- **Temperature**: During the winter season, temperatures in Mafraq tend to be cool, with daytime temperatures averaging in the teens to low 10's degrees Celsius In contrast, summers can be scorching, with daytime temperatures frequently around 25°C and occasionally even reaching 40°C or more in some rare days.

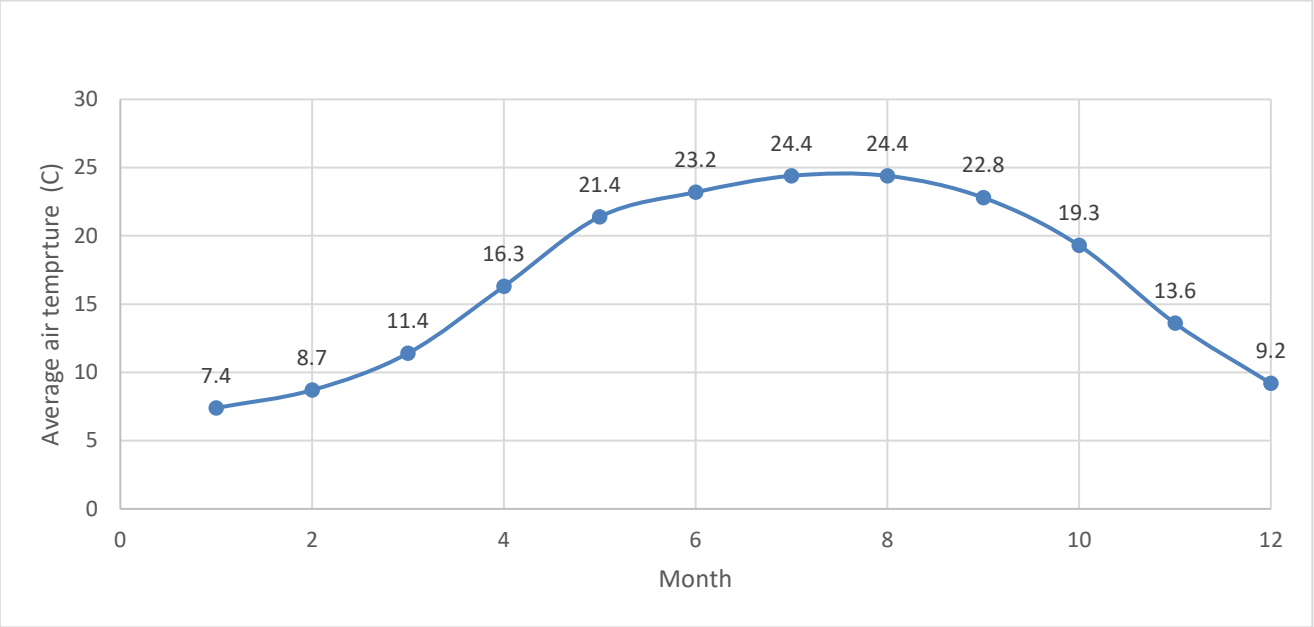


Figure 37: Average Monthly Temperature from Mafraq Weather Station (Metrological Department-Jordan Climatological Handbook)

9 LANDSCAPE AND VISUAL

This section provides an assessment of baseline conditions within the Project area and surrounds in relation to landscape and visual. The section then presents an assessment of potential impacts during the various Project phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

9.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to landscape and visual and presents the outcomes and results of the assessment.

9.1.1 Methodology for Assessment

The baseline assessment of the Project was based on secondary data review and a field survey, each of which is discussed in further detail below.

A. Secondary Data Review

Prior to the undertaking of any site-related surveys, a full and detailed review of up-to-date high-quality aerial images of the Project area was undertaken. The objective was to identify any potential visual receptors within the entire Project footprint and boundary so that it can be inspected during the site survey.

B. Site Survey

A detailed site survey of the Project area and a 100m buffer area from each side was undertaken. The survey aimed to characterise the general topography and landscape characteristics of the Project area as well as any potential visual receptors onsite.

9.1.2 Results and Outcomes

A. Landscape and Topography

The substation area, where the project culminates, is characterised by a gentle slope that extends from the southwest to the northeast. This gradual incline as shown in Figure 38 is advantageous for the installation and operation of the substation, as it ensures effective drainage and stability. The maximum elevation within the substation area reaches 710 meters above sea level (ASL), while the minimum level is approximately 697 meters ASL, providing a relatively consistent and manageable gradient.

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.

The elevations within this area exhibit significant variation, with altitudes ranging from 410 meters to 998 meters ASL. This variation in elevation is indicative of the diverse and rugged nature of the terrain. The highest points offer expansive views and strategic advantages for transmission line placement, while the lower elevations provide accessible pathways for construction and maintenance.

Along the OHTL, there is a significant variation in elevation, as illustrated in Figure 39 and Figure 40. The two (2) 31km OHTLs begin at an elevation of 410 meters at station 0+000, ascend to approximately 1,000 meters at station 22+000, and then descend to around 710 meters at the substation area.

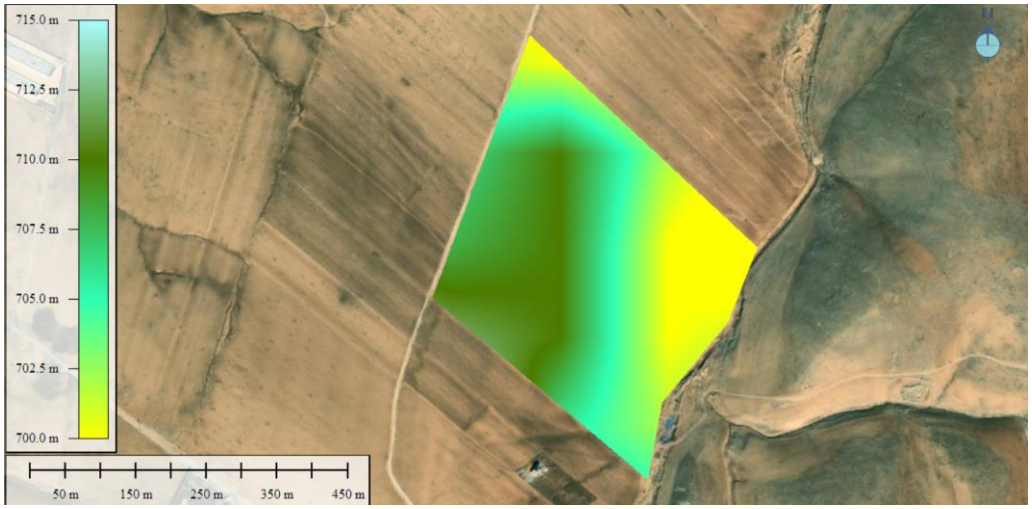


Figure 38: The Topography of the North Substation Site

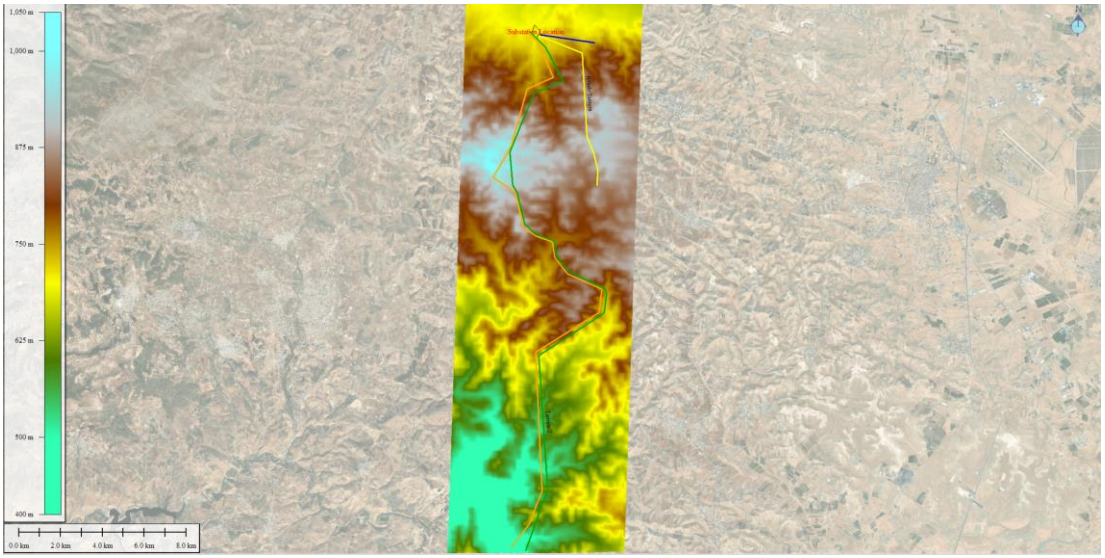


Figure 39:The Topography Along the OHTL Route

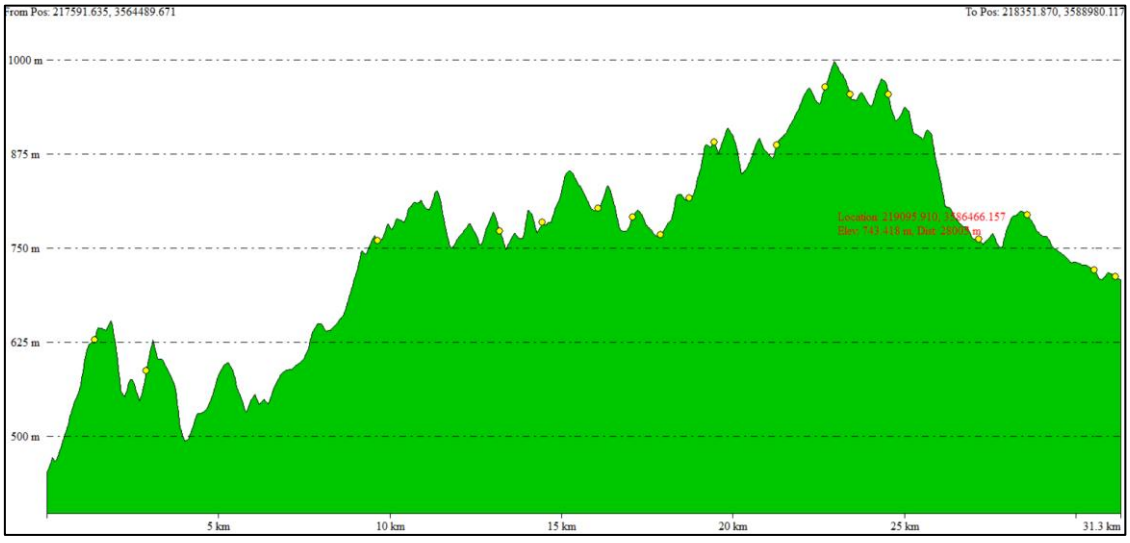


Figure 40: The Ground Surface Profile Along the OHTL Route

Based on a site visit undertaken by the ESIA Team, it was noted that the OHTL route runs through diverse and various landscape features that can be generally categorised as follows: (i) arid and semi-arid areas; (ii) agricultural areas; and (iii) areas with some shrub vegetation.

The figure below presents the general landscape features (agriculture, arid land and shrub vegetation) across the Project area.

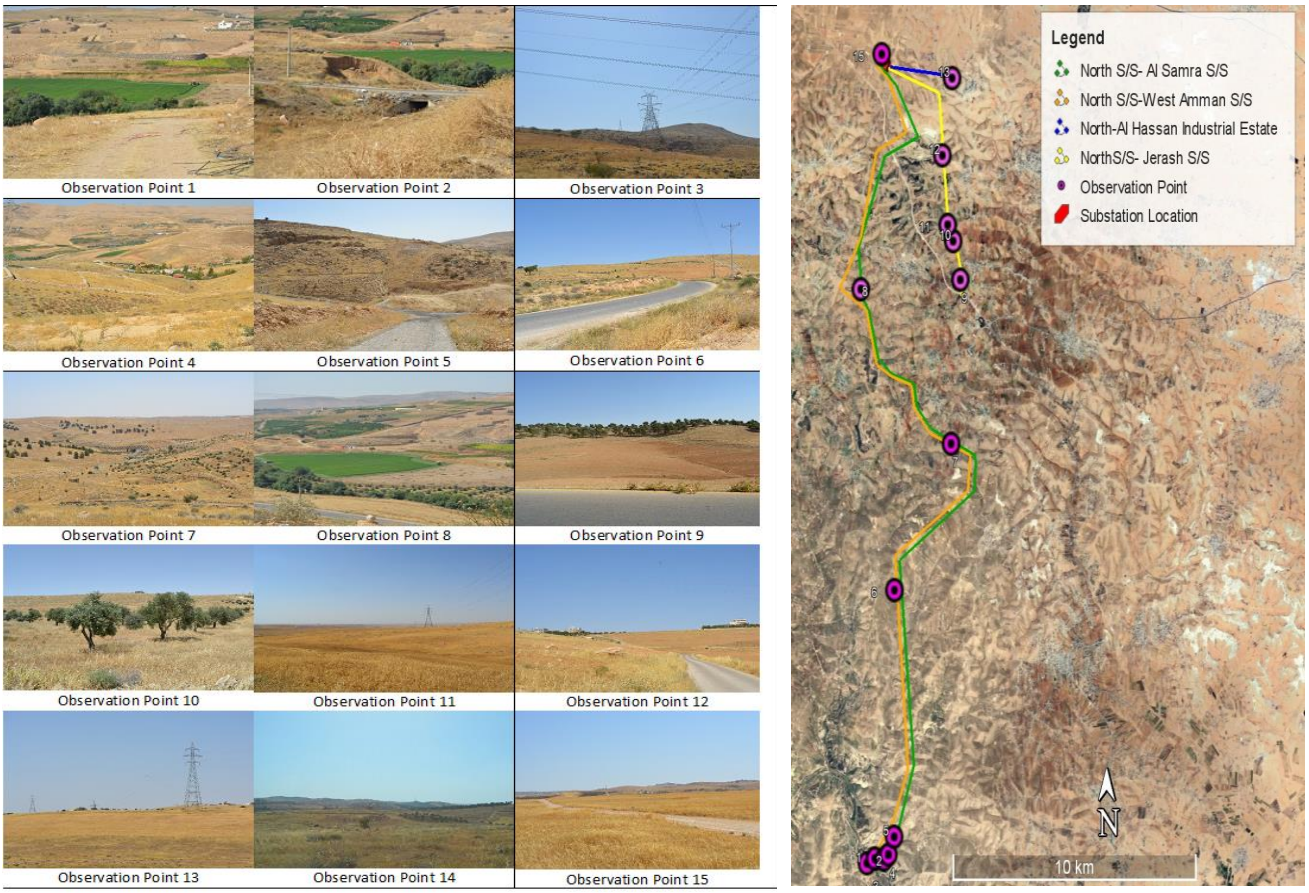


Figure 41: The General Landscape Features (Agriculture, Arid Land and Shrub Vegetation) Across the Project Area

In general, the landscape across the proposed OHTL passes through several vacant land areas as shown by the figure above. Most of the land areas can be characterised as arid or semi-arid, with some areas having land uses, communities, as well as farmhouses (visible in the image taken at observation point 4).

The landscape across the OHTL route also shows existing OHTLs and towers as shown by the images at observation points 3, 6, 11, and 13.

Agriculture and forest trees are found in parts of the route. Livestock herding is also practiced in limited parts of the route. Additionally, some infrastructure and utility elements extend within the route. Many parts of the OHTL route are vacant and undeveloped.

The 132 kV Super-Heated OHTL (North – Al Hassan Industrial Estate) passes through vacant land (observation point 14).

The 132 kV conventional conductor OHTL (norths/s- Jerash s/s) passes through forest areas, farmhouses, limited residential areas, and agriculture areas.

B. Visual

Within the Guidelines for Landscape and Visual Impact Assessment (GLVIA), Critical Receptors are defined as people or locations that are particularly sensitive to changes in the landscape or visual amenity. These receptors experience landscape and visual impacts more acutely than the general population.

Table 18: Critical Visual Receptors

Critical Receptors definition per GLVIA	Applicability to the Project
People: This can include residents, visitors, workers, farmers, businesses, or specific user groups who have a strong connection to the landscape due to origins/hometown.	Yes, in specific locations along the route/not critical

Locations: Places with high scenic value, ecological sensitivity, or cultural importance can be designated as Critical Receptors.	Low to Limited/not relevant
Visual Amenity: People who rely on the landscape for scenic beauty or recreational enjoyment may be highly sensitive to visual changes caused by a development project.	Low to Limited/not relevant
Sense of Place: Communities or cultural groups with a deep connection to a particular landscape may be particularly sensitive to alterations that affect its character or heritage.	Low to Limited/not relevant
Health and Wellbeing: People who rely on the landscape for mental or physical well-being, such as those using it for therapeutic purposes or outdoor activities, may be more susceptible to negative visual impacts.	Low to Limited/not relevant
People engaged in outdoor recreation, whose attention/interest is likely to be focused on the landscape or particular views, including from public rights of way.	Low to Limited/not relevant
Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience.	Low to Limited/not relevant
Travelers on scenic routes	Low to Limited/not relevant

Based on a site visit undertaken by the 'E&S Team', no critical visual receptors were recorded within the OHTL route or a 100m buffer on either side.

9.2 Assessment of Potential Impacts, and Mitigation Measures

This section identifies the anticipated impacts on landscape and visual from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

9.2.1 Landscape and Visual Impacts During Construction

Construction works expected to have a landscape and visual impact might include the following:

- Site establishment works including temporary soil piles.
- Construction activities, including the location of site compound areas, laydown areas and the use of cranes.
- Construction vehicle movements to and from the construction site and for general construction operations

The potential for visual impact will fluctuate throughout the period of construction. The intermittent but temporary introduction of prominent tall features such as cranes used during the construction phases would have some short term, temporary visual effects on the visual amenity of both nearby and to a lesser degree longer distance sensitive receptors.

With the introduction of all these construction activities, given that the scheme would occur over a relatively short period, it would result in a perceptible change in the existing view.

The sensitivity of visual receptors in closest proximity to the proposed construction activities can be classified as low for the substation site and for the OHTL low in vacant areas and medium in areas of residential and farmland uses. For the other viewpoints the construction would form an apparent small element in the wider landscape that may be missed by the observer or receptor. At most this would result in a low magnitude of change especially.

Consequently, with low to medium receptor sensitivity set against a low magnitude of landscape and visual change, the temporary landscape and visual effect during construction period would, as a worst case, result in a significance of effect that can be assessed as minor.

The potential impacts anticipated on landscape and visual during construction from the Project are presented in Table 19 and Table 20, respectively.

Table 19: Potential Impacts on Landscape and Visual During Construction of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Construction of the substation would temporarily impact the landscape and visual quality of the site and its surroundings. During the construction phase, the visual environment will feature typical construction elements such as equipment and machinery, including excavators, trucks, front-end loaders, compactors, and more.	▪ There are no avoidance measures to be considered.	▪ Ensure the construction site is tidy and organised by the end of each working day. ▪ Relocate and store construction machinery, equipment, and vehicles that are not in use to minimise their visual impact on the surrounding area. ▪ Ensure that waste streams generated are properly stored, collected, and disposed of.	▪ The EPC Contractor shall undertake inspections of the works at all times to ensure the mitigation measures are implemented.
Type	Negative			
Duration	Short Term			
Magnitude	Low			
Reversibility	Reversible			
Sensitivity	Low			
Likelihood	Medium			
Significance	**Minor**			

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Table 20: Potential Impacts on Landscape and Visual During Construction of the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Site preparation activities on-site for OHTL transmission towers and various project components, including foundations and access roads, are expected to involve tasks such as land clearing, levelling, excavation, and grading. These activities will temporarily impact the visual quality of the site and its surroundings during construction. The visual environment during this phase will include typical construction elements such as excavators, trucks, front-end loaders, compactors, and other machinery and equipment.	▪ There are no avoidance measures to be considered.	▪ Ensure the construction site is tidy and organised by the end of each working day. ▪ Relocate and store construction machinery, equipment, and vehicles that are not in use to minimise their visual impact on the surrounding area. ▪ Ensure that waste streams generated are properly stored, collected, and disposed of. ▪ Implement restoration and rehabilitation measures to	▪ The EPC Contractor shall undertake inspections of the works at all times to ensure the mitigation measures are implemented.
Type	Negative			
Duration	Short Term			
Magnitude	Low to Medium			
Reversibility	Reversible			

Sensitivity	Low to Medium		restore the site's visual quality through for example reinstatement and removing temporary structures	
Likelihood	High			
Significance	**Minor**			

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

9.2.2 Landscape and Visual Impacts During Operation

Key impacts are mainly limited to the operation phase.

The substation area is not densely inhabited. Some land use activities have been recently developed but none of residential nature. In addition, the substation components will be obscured by the high perimeter concrete wall.

For the OHTL, visual impacts associated typically concern the OHTL towers themselves (e.g. colour, height, and number) and impacts relating to their interaction with the character of the surrounding landscape and the visual receptor which might be present.

However, the towers are not considered mega or huge structures that would impose a key change on the landscape and visual character of the area. In addition, the area of the OHTL is already intersected with a number of existing OHTLs so it is already disturbed with similar facilities. Under a worst-case scenario, views from the critical receptors identified earlier could mainly include the OHTL towers. This assumes that there will be a direct line of sight from the receptor to the tower – i.e. that there is no blockage of view due to onsite receptors or difference of in elevation that would prevent the OHTL tower from being visible.

Although the receptor's identified earlier are considered of low to medium sensitivity, the magnitude of change is considered in general to be very small given the area already has OHTLs and towers and that it is likely to include just a number of towers that would have direct views and in such a case it would result in a perceptible change in the existing view, and/or without affecting the overall quality and/or character of the view.

Taking the above into account, such impacts are likely to be minor for both the Substation and the OHTL.

The potential impacts anticipated on landscape and visual during operation from the Project are presented in Table 21 and Table 22, respectively.

Table 21: Potential Impacts on Landscape and Visual During Operation of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Operation Phase				
Impact Description	▪ The substation is expected to be visible in the nearby area of the Project site, which may result in visual impacts. However, its visibility does not necessarily imply intrusion, as some individuals may not perceive it as a negative impact.	▪ There are no avoidance measures to be considered.	▪ Construct a high concrete perimeter wall around the Substation. ▪ Plant native trees and shrubs around the substation to efficiently shield it from nearby receptors.	▪ Documentation of submitted grievances related to visibility (if applicable) as part of the SEP and measures undertaken to resolve such grievances
Type	Negative			
Duration	Long Term			

Magnitude	Low		▪ A SEP along with a grievance mechanism will be implemented by NEPCO. Please refer to the standalone SEP for additional details.	▪ Visual inspections to ensure mitigation measures are implemented as applicable.
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	High			
Significance	**Minor**			

Table 22: Potential Impacts on Landscape and Visual During Operation of the OHTL

Project	**Summary**	**Avoidance Measures**	**Mitigation Measures**	**Monitoring and Reporting Requirements**
Operation Phase				
Impact Description	▪ 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.	▪ There are no avoidance measures to be considered.	▪ 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.	▪ Documentation of submitted grievances related to visibility (if applicable) as part of the SEP and measures undertaken to resolve such grievances ▪ Visual inspections to ensure mitigation measures are implemented as applicable.
Type	Negative			
Duration	Long Term			
Magnitude	Low			
Reversibility	Irreversible			
Sensitivity	Low to Medium			
Likelihood	High			
Significance	**Minor**			

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

10 LAND USE, LAND OWNERSHIP, AND RESETTLEMENT

This section presents the baseline assessment of the Project area in relation to land use, land ownership and resettlement as well as the assessment of potential impacts during the various Project phases. For each impact, a set of avoidance and mitigation measures were identified.

Note: a standalone Resettlement Framework (RF) has been developed for the Project – please refer to RF for any additional details.

10.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to land use, land ownership and resettlement and presents the outcomes and results of the assessment.

10.1.1 Methodology for Assessment

The baseline assessment of the 'formal' land use was based on collection of secondary data and plans available from the relevant governmental entities, mainly MoLA and MoA.

Understanding and characterising the informal or 'actual' land use of the Project site was mainly based on a site assessment undertaken by the ESIA team, as well as outcomes of stakeholder engagement undertaken with the stakeholders (refer to 'Section 7.3' for additional details).

10.1.2 Results and Outcomes

A. Formal Land Use

The formal land use of the Project area was identified by the ESIA Team based on available plans set by the relevant governmental authorities, including land use planning by MoLA; and areas of critical environmental concern by MoEnv and RSCN.

- **Land Use Planning by MoLA**

In accordance with the "Law for the Organisation of Cities, Villages, and Buildings No.97 of 1966", MoLA (previously Ministry of Municipal Affairs (MoMA)) is mandated to set specific land uses for areas in the Kingdom of Jordan that are within organised and regulated land use boundaries (urban areas). This legislation did not include details on allowed land use within areas that are outside regularised land use or organisational boundaries.

Therefore, in 2006 a project to prepare a land-use map for such areas (which lie outside the organised boundaries) was implemented. The output was the National Land Use Master Plan of 2007, which was an attempt to produce a harmonised land use plan for those areas that are outside of organised boundaries.

Accordingly, the "Land Use Planning Regulation No. 6 of 2007" was issued to regulate land use for those areas outside of organised boundaries and to divide territories by using zoning cryptography as follows:

- Agricultural areas sector, identified by the symbol (A).
- Rural areas sector, identified by the symbol (B).
- Marginal areas sector, identified by the symbol (C).
- Desert areas sector, identified by the symbol (D).
- Forest areas (Haraj)

According to Land Use Regulation and its amendments No. 6 of 2007 issued by MoLA and the maps obtained from MoLA (See Figure 42 and Figure 43), which illustrate the land use classifications that the proposed OHTLs pass through (detailed in Table 24), the allocated land use classifications for the Project include the following:

- Forest Areas: forested areas (Haraj) with native trees.
- Third Class Agricultural Area (A3): lands suitable for cultivating trees.

- First Class Rural (B1): appropriate for agriculture, residential developments and various other purposes.
- Second Class Rural Area (B2): appropriate for residential developments, cooperative housing associations, and various other purposes.
- Third Class Rural Area (B3): appropriate for agriculture, residential developments, cooperative housing associations, recreational facilities and various other purposes.
- Third Class Marginal (C3): lands suitable for grazing and forestry.

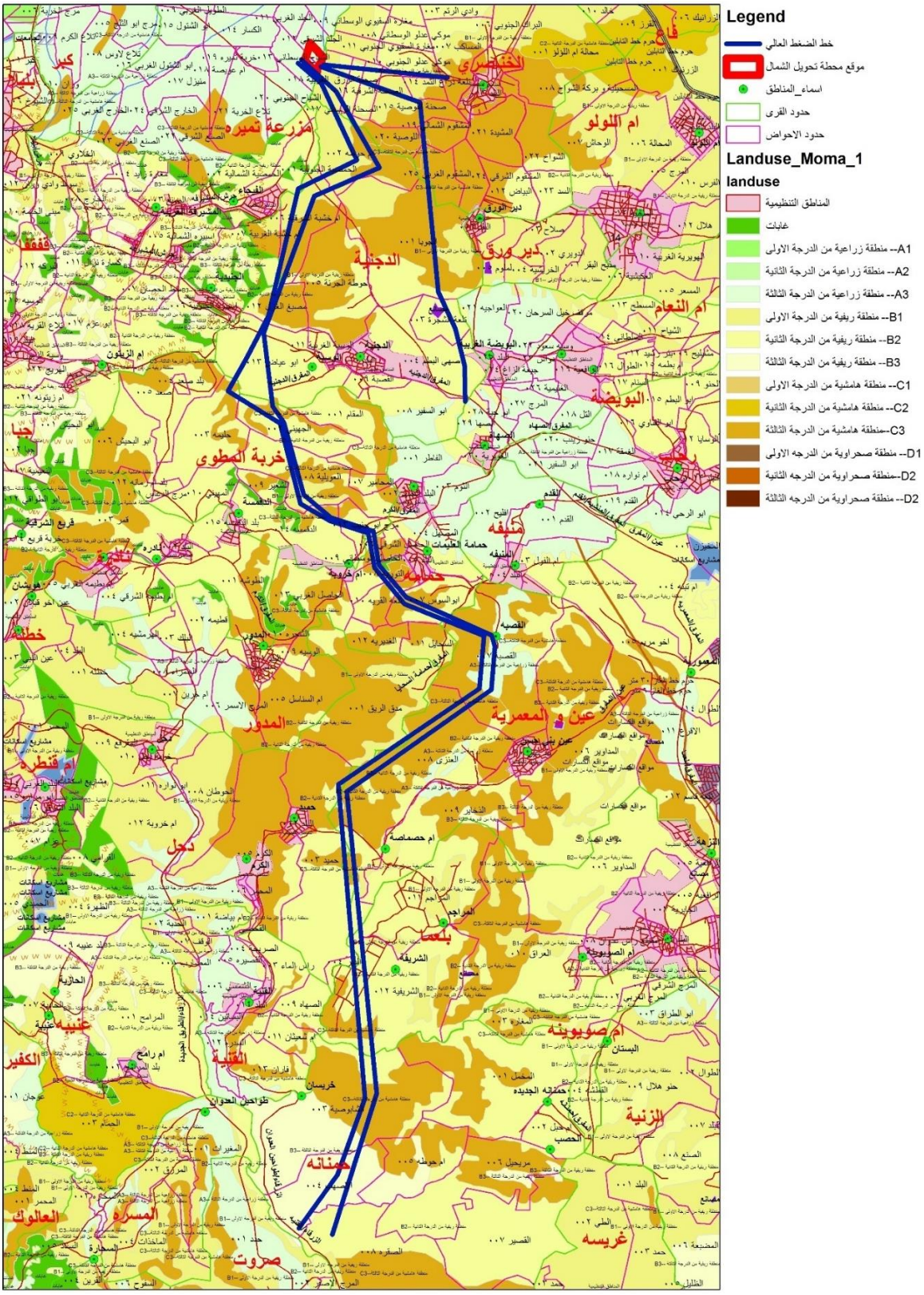


Figure 42: MoLA Land Use Plan for the Project

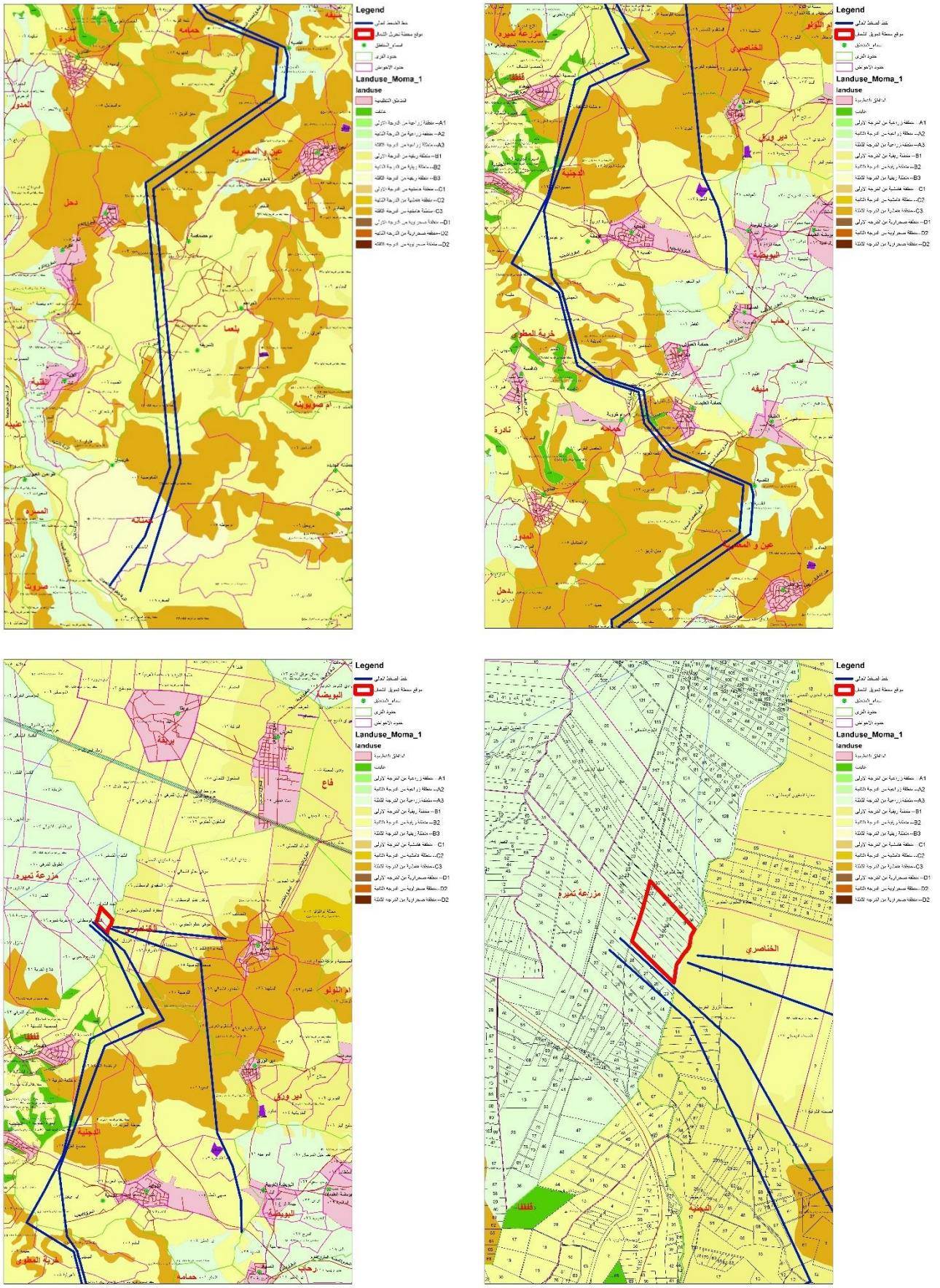


Figure 43: Close-up View of MoLA Land Use Plans for the Project

- **Grazing Reserves and Forest Area Planning – Ministry of Agriculture**

The MoA is entitled to planning grazing reserves in the Kingdom on rangelands. Such reserves are planned and established for sustainable grazing and prevention of overgrazing which generally reduce the usefulness, productivity, and biodiversity of the land and is one cause of desertification and erosion.

The Project site is not located within or near any grazing reserves. Figure 44 below presents the location of the Grazing Reserves in relation to the Project site.

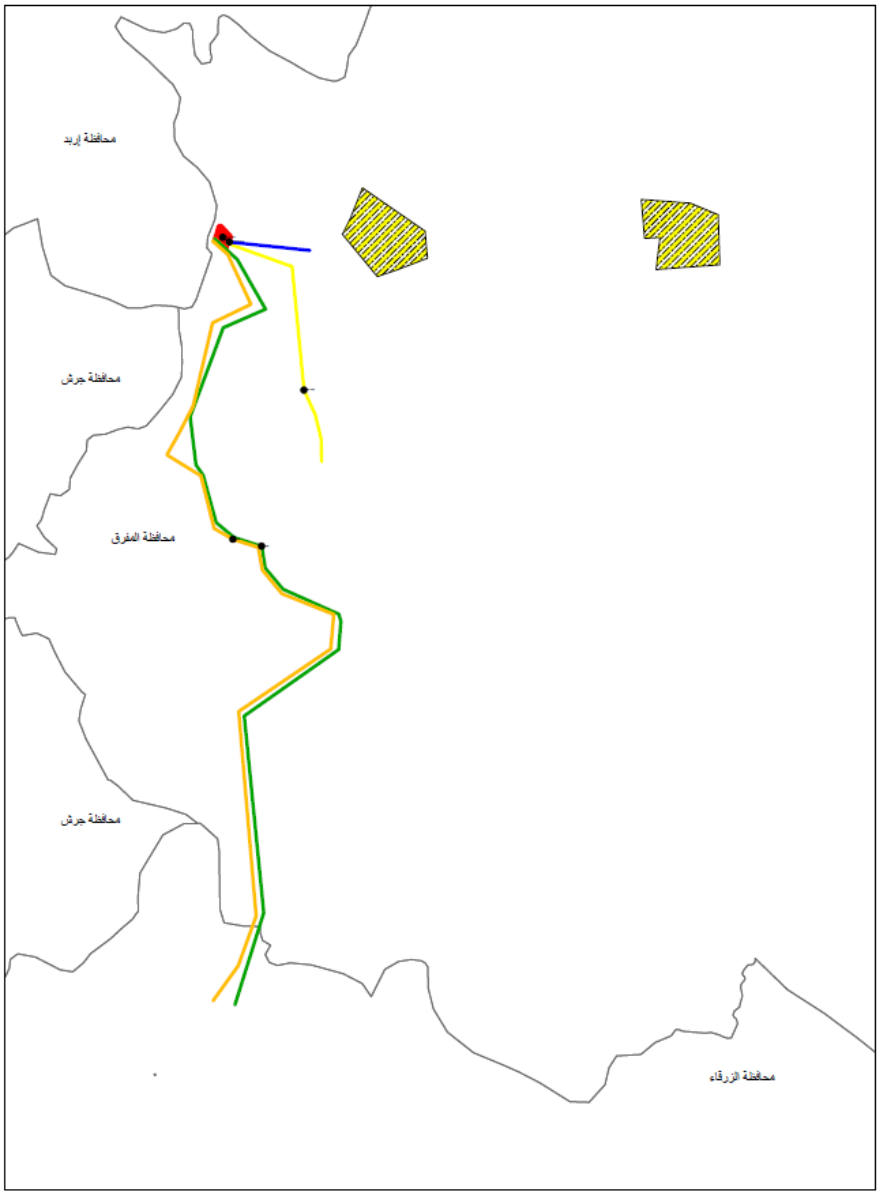


Figure 44: The Project Location in Relation to Grazing Reserves

According to the Instruction for Organising the Management of Government Forests and Forest Trees Growing on Treasury and Forest Lands No. 1 Z of 2017 issued by MoA:

- It is prohibited to cut certain types of forest trees.
- Construction works are not allowed on forest lands (Haraj) that contain trees with a density of more than 10% of the land area.
- In the cases that trees in the forest lands (Haraj) are allowed to be cut, some penalties and compensation measures are requested by MoA.

However, based on discussions with the MoA, they have an agreement with NEPCO that allows the latter to extend OHTLs within forest (haraj) land conditional that cutting forest trees is prevented to the maximum extent possible. In case cutting of some trees is required as a last resort, an official communication should be undertaken by NEPCO with MoA to indicate the areas where trees need to be cut and the number, type, and

age of the trees. MoA would then communicate to NEPCO whether any penalties or compensation measures would be imposed.

Figure 45 shows an example of a location along the proposed OHTL route which intersects with Haraj, along with proposed tower locations indicated by circles. This example demonstrates how to avoid tree cutting by positioning the towers in clear spots and maintaining an approximate span of 300 m between them.

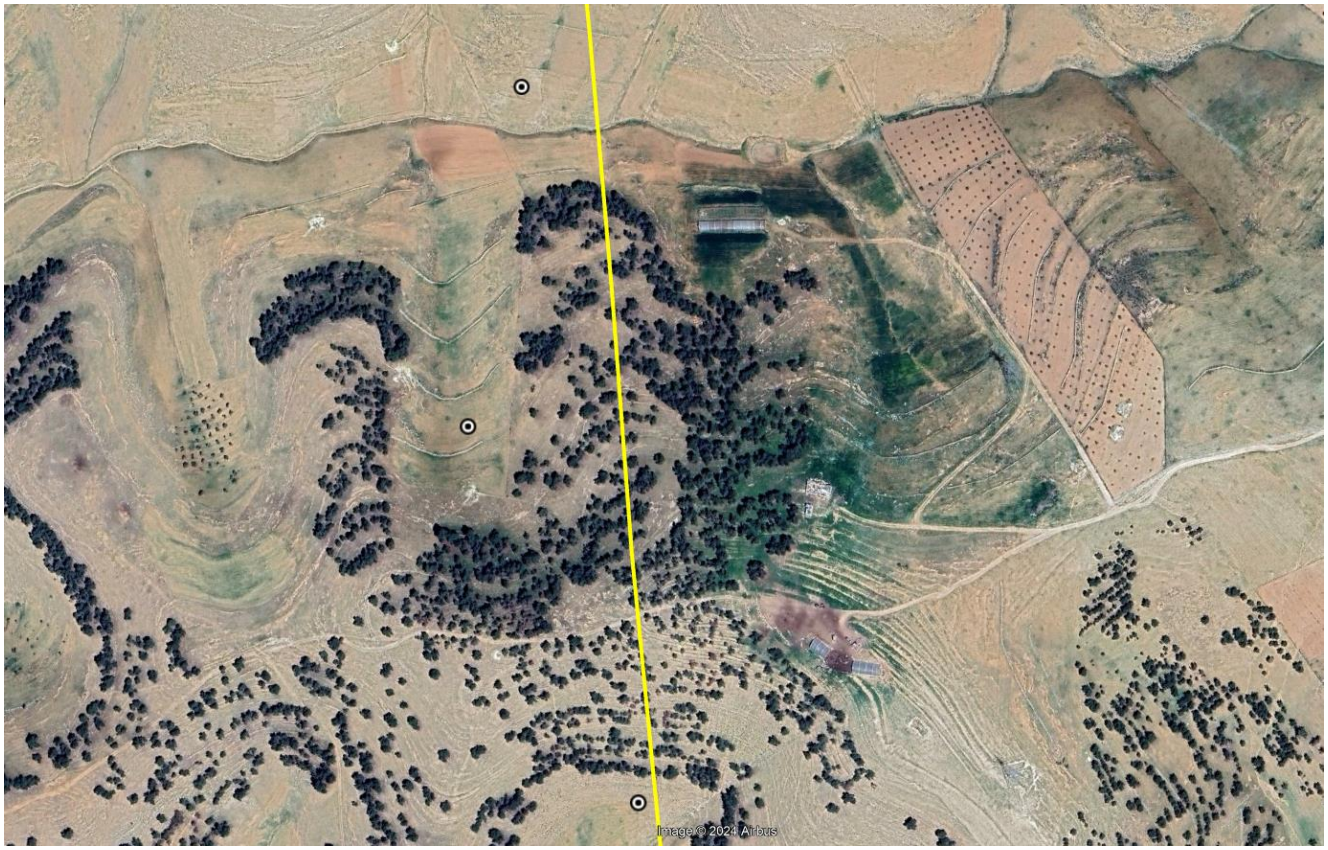
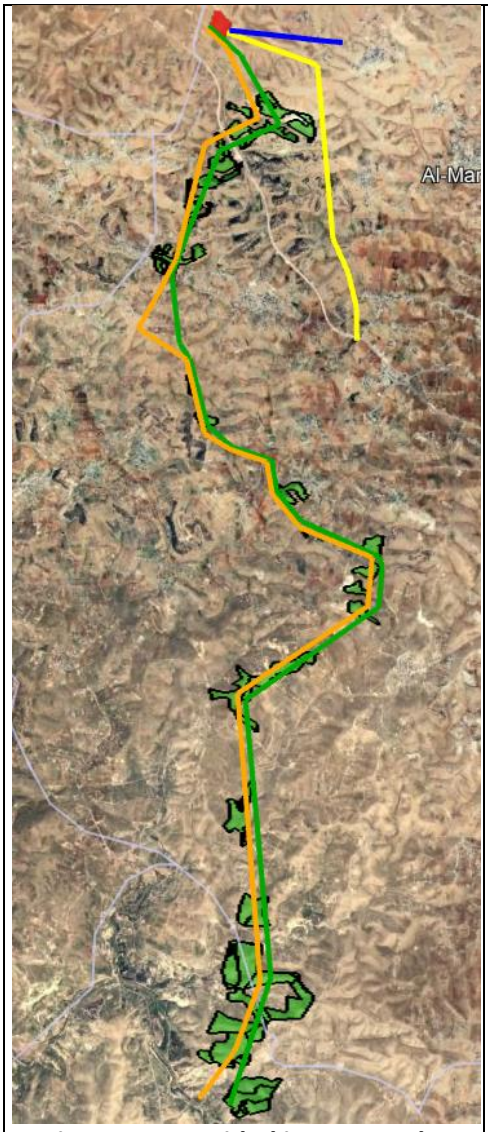
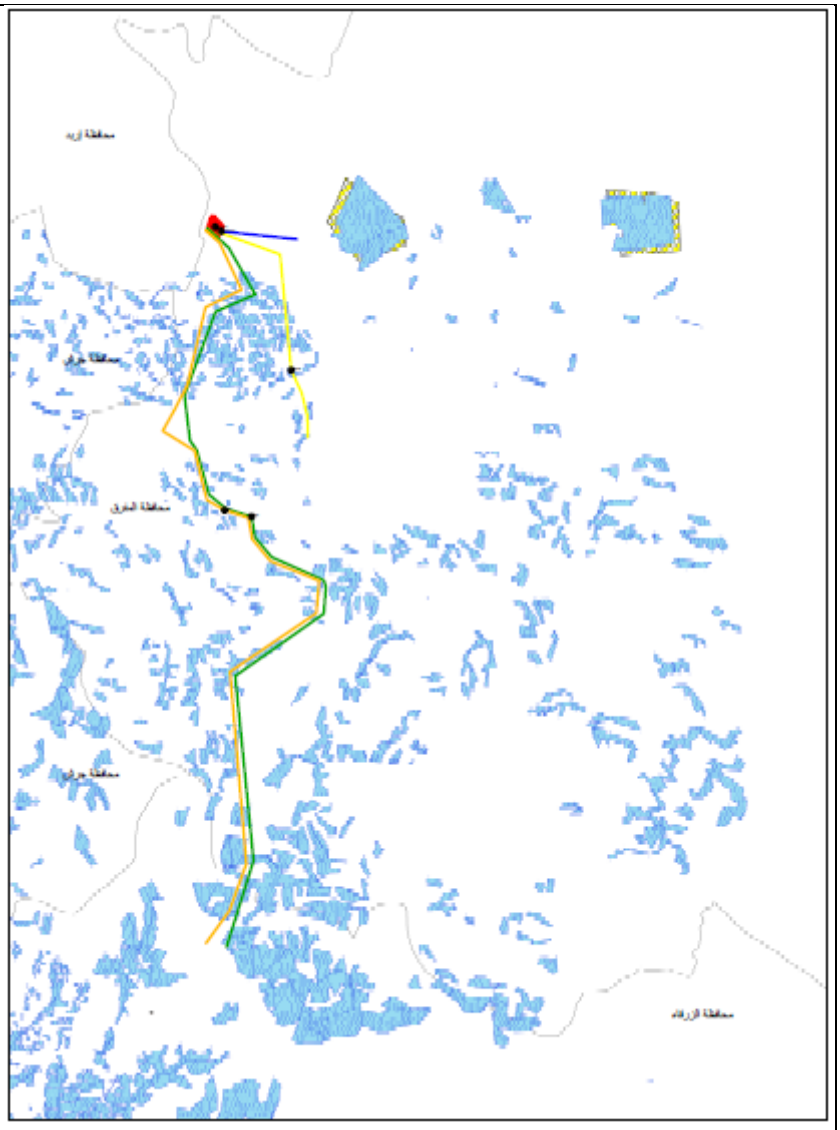


Figure 45: Example of a location along the proposed OHTL route where the OHTL intersects with Haraj, along with proposed tower locations designed to avoid tree cutting.

The proposed OHTL route conflicts with forest areas ("Haraj") as show in Figure 46. However, it is important to note that not all areas designated as forest or haraj land actually has a cover of forest trees. Some of these lands are vacant with no trees as shown in Figure 47.



First Data Provided in KMZ to the ESIA Team



Additional Areas Provided in PDF to the ESIA Team – Blue Represents Haraj Areas

Figure 46: The Project Location in Relation to Areas Designated as Forest or Haraj Land by the MoA

Figure 47: Example Areas within the OHTL Route Designated as Forest or Haraj Land and the Actual Forest Tree Cover Existing in these Areas

B. Actual Land Use

❋ History of Land Ownership

The substation land has a history of ownership that spans across 172 individuals as mentioned previously in the report. This indicates a shared ownership pattern, suggesting that the land may have been divided or inherited over generations. Table 23 below shows the distribution of land ownership.

Table 23: Land Parcel Ownership Details

No.	Parcel Number	Basin	Total Area (Dunam)	Area Acquired (Dunam)	Area Acquired (%)	Number of Owners**
1	14	13	27.708	23.670	85.42	3
2	17	13	21.865	21.865	100	2
3	19	12	8.982	8.982	100	10
4	20	12	9.586	9.586	100	26
5	21	12	12.495	1.881	15.05	10
6	22	12	11.826	1.650	13.95	10
7	23	12	26.081	14.943	57.29	86
8	24	12	16.648	14.550	87.39	59
9	26	12	10.882	10.882	100	3
10	28	12	28.129	14.776	52.52	5

*** The numbers in the (Number of Owners) column should not be summed up because multiple land parcels can have the same owners. For instance, land parcels 19, 21, and 22 are all owned by the same group of 10 individuals.*

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.

The ESIA Team contacted NEPCO and DLS to request the land ownership details but as explained by NEPCO and DLS, these details could not be provided at this point as this would entail providing all land deeds within a 1,000 m corridor, which is impossible. The ESIA Team tried to officially get a map showing government owned land (Khazinah) and privately owned lands, but this also was not available.

The Figure 48 below provides a map showing the government owned land (Khazinah) delineated in green and areas shown in white which represent the privately owned lands within the Project area. This has not been officially obtained for the purpose of this Project but has been developed based on maps the ESIA Team has in their records. The ESIA Team has accumulated, collected, and updated Geographic Information Systems (GIS) files over a number of years working on consultancy assignments across Jordan. These files are generally not publicly available, and as a result, there are limitations as to the comprehensiveness of the used layers. These details along with the cadastral maps and land ownership deeds will be obtained and updated by the EPC Contractor during the detailed design phase.

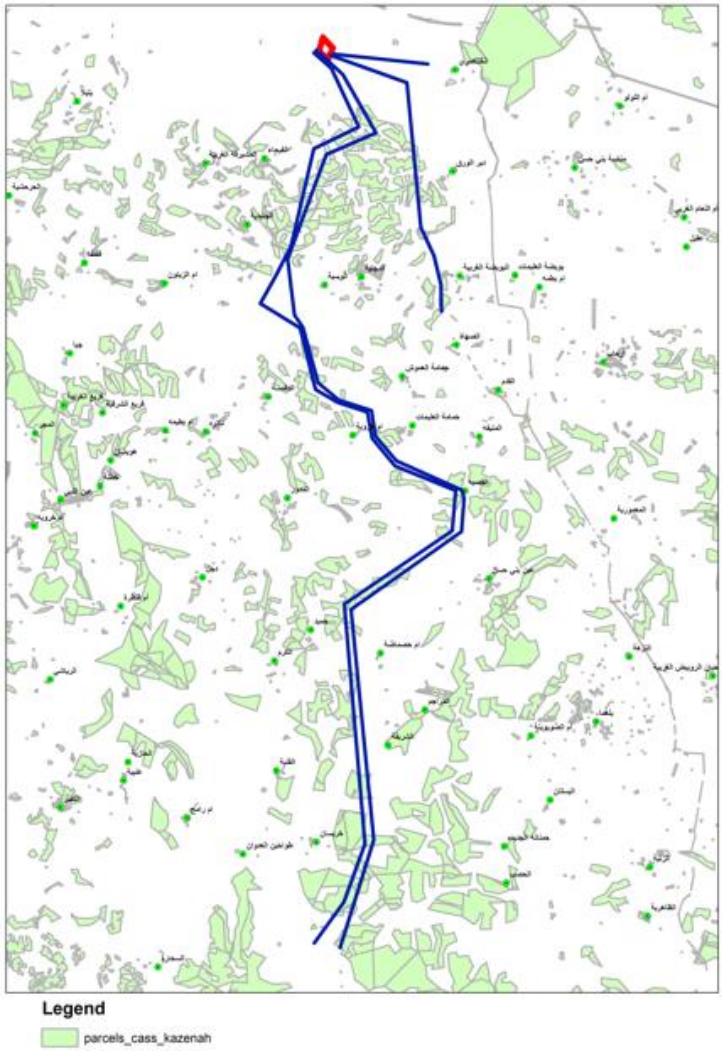


Figure 48: A Map Showing the Government Owned Land (Khazinah) and Privately Owned Lands within the Project Area

The percentage of the length of the OHTL connections passing through government owned land is provided below:

- 400 kV OHTL (north s/s – Al Samra s/s) – 26.5% of the length if government owned land
- 400 kV OHTL (north s/s -West Amman s/s) – 25% of the length if government owned land
- 132 kV Super-Heated OHTL (North – Al Hassan Industrial Estate) – 0% of the length if government owned land
- 132 kV conventional conductor OHTL (norths/s- Jerash s/s) – 17.7% of the length if government owned land

❋ Current Actual Land Use

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 barely. 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.

The current land use along the OHTL varies, reflect a mix of agricultural, residential, and vacant areas. Table 24 provides a comprehensive overview, detailing formal land use classifications, ownership, and identified stakeholders in the areas.

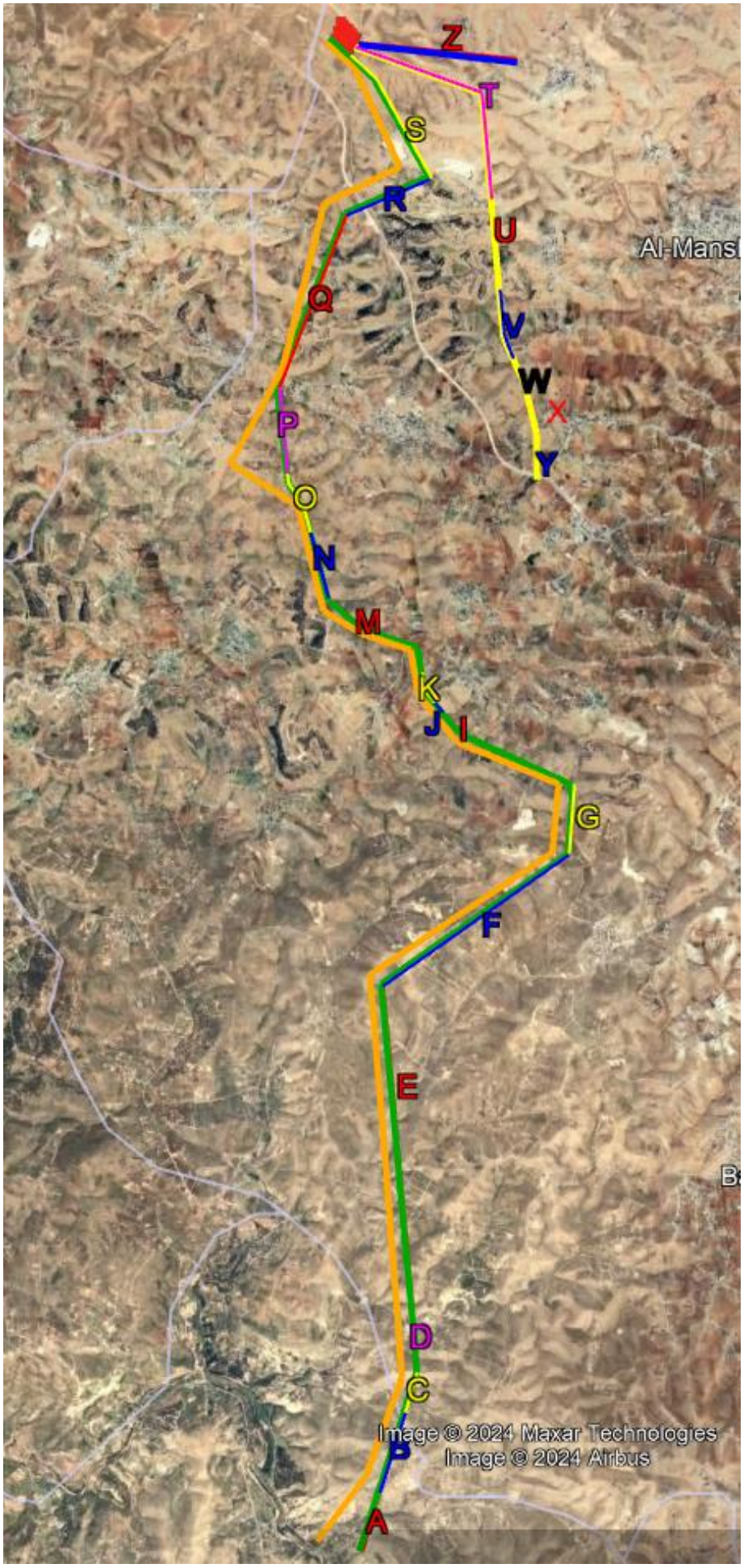


Figure 49: Sections with Identified Detailed Land Use, Ownership, and Identified Stakeholders in the Project Area

Table 24: Comprehensive Overview, Detailing Formal Land Use Classifications, Ownership, and Identified Stakeholders in the Project Area

Section (Figure 49)	Section Length (km)	Formal Land use (Estimated)	Actual Land use	Detailed Description on Land Use	Estimated Ownership % (Figure 48)	Stakeholders & PAPs*
A	1	50% Second-class Rural Area and 50% third-class Rural Area	Agricultural, residential, grazing and recreational	▪ Private "chalets" with swimming pools ▪ Residential buildings ▪ Recreational facility under construction consisting of a horseback riding centre with stables and a restaurant/café. ▪ Agricultural land used for forage cultivation that includes sprinklers ▪ Dry, rocky landscape with scattered sparse vegetation ▪ North Amman – Syrian Boarders" 400 kV OHTL is present along this route. ▪ Some farms with grazing (sheep). ▪ Private farms with trees and beekeeping.	▪ 60% Private Lands ▪ 40% Treasury Lands	▪ Owners of farmland ▪ Owners of construction land ▪ Owners of orchards and pastures ▪ Informal/formal land users
B	1.40	70% Third-class Rural Area And 30% Third-class Marginal Area	Vacant and undeveloped	▪ Difficult terrain ▪ Vacant Lands that are currently not utilised for any specific purpose. ▪ There is some access to the lands through unpaved roads.	▪ 70% Treasury Lands ▪ 30% Private Lands	▪ Informal/formal land users
C	0.7	Third-class Marginal Area	Agricultural, residential	▪ Private farms with trees and seasonal crops ▪ Private residential houses ▪ North Amman – Syrian Boarders" 400 kV OHTL is present along this route.	▪ 50% Treasury Lands ▪ 50% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures
D	0.7	30% Third-class Marginal Area and 70% Second-class Rural Area	Residential, agricultural and some vacant lands	▪ Some lands are predominantly dry fields, currently not utilised for any specific purpose and feature scattered sparse vegetation ▪ Residential buildings ▪ Private farms with olive trees and other seasonal crops ▪ Dry, rocky landscape with scattered sparse vegetation	▪ 50% Treasury Lands ▪ 50% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures
E	5.35	70% Second-class Rural Area and 30% Third-class Marginal Area	Residential, agricultural and some vacant lands	▪ The lands are predominantly vacant, currently not utilised for any specific purpose and feature scattered sparse vegetation, although some of them appear to be divided by roads and plotted for development ▪ Difficult terrain ▪ Olive trees farm ▪ Greenhouses ▪ Residential buildings ▪ Private farms with olive trees and other seasonal crops ▪ Dry, rocky landscape with scattered sparse vegetation	▪ 80% Private Lands ▪ 20% Treasury Lands	▪ Owners of farmland ▪ Owners of orchards and pastures

Section (Figure 49)	Section Length (km)	Formal Land use (Estimated)	Actual Land use	Detailed Description on Land Use	Estimated Ownership % (Figure 48)	Stakeholders & PAPs*
F	3.70	Third-class Marginal Area	Residential, agricultural and some vacant lands	▪ The first 500m, the lands are predominantly vacant, currently not utilised for any specific purpose and feature scattered sparse vegetation, although some of them appear to be divided by roads and plotted for development ▪ Private farms with olive trees and other seasonal crops ▪ Private "chalets" with swimming pools ▪ Difficult terrain ▪ Olive trees farm ▪ Greenhouses	▪ 80% Private Lands ▪ 20% Treasury Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
G	1	Third-class Agricultural Area	Residential, agricultural and some vacant lands	▪ Private farms with trees and seasonal crops ▪ Private olive trees farms ▪ Lands that are being cultivated to be used for growing crops and plants. ▪ Private residential houses ▪ Dry, rocky landscape with scattered sparse vegetation ▪ North Amman – Syrian Boarders" 400 kV OHTL is present along the route in this section.	▪ 100% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
H	1.40	70% Third-class Marginal Area and 30% Second-class Rural Area	Residential, agricultural and some vacant lands	▪ Empty Greenhouses ▪ Lands that are being cultivated to be used for growing crops and plants. ▪ Dry, rocky landscape with scattered trees. ▪ Few residential houses	▪ 80% Private Lands ▪ 20% Treasury Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
I	1	70% Third-class Marginal Area and 30% Second-class Rural Area	Residential, agricultural and some vacant lands	▪ Private farms with trees and seasonal crops ▪ Lands that are being cultivated to be used for growing crops and plants. ▪ Private residential houses ▪ Difficult terrain ▪ Dry, rocky landscape with scattered sparse vegetation	▪ 80% Private Lands ▪ 20% Treasury Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
J	0.2	Third-class Marginal Area	Forest areas and agricultural lands	▪ Hilly terrain that has some dense trees cover at the top of the hill "Haraj". ▪ Olive tree farm at the bottom of the hill. ▪ Rest of the hill appears to be empty and vacant.	▪ 100% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures

Section (Figure 49)	Section Length (km)	Formal Land use (Estimated)	Actual Land use	Detailed Description on Land Use	Estimated Ownership % (Figure 48)	Stakeholders & PAPs*
K	0.5	Forest Areas	Forest and agricultural lands	▪ Hilly terrain that has dense tree cover "Haraj". ▪ Olive tree farm at the bottom of the hill.	▪ 100% Treasury Lands	▪ MoA
L	0.30	Third-class Marginal Area	Agricultural	▪ Dense Olive tree farms	▪ 100% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures
M	1.70	70% Second-class Rural Area and 30% Third-class Marginal Area	Residential and agricultural	▪ Lands that are being cultivated to be used for growing crops and plants. ▪ Main Road ▪ Olive tree farms ▪ Private residential houses	▪ 100% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
N	1.10	70% Second-class Rural Area and 30% Third-class Marginal Area	Vacant Lands	▪ Lands are predominantly vacant, currently not utilised for any specific purpose and feature scattered sparse vegetation ▪ Hilly terrain ▪ A road passes through this area, facilitating access and transportation	▪ 70% Private Lands and 30% Treasury Lands	▪ Informal/formal land users
O	1.0	70% Second-class Rural Area and 30% Third-class Marginal Area	Agricultural and some vacant, undeveloped lands	▪ Some areas are olive tree farms that appear to be organised planting ▪ Parts of the area remain undeveloped, with a mixture of rocky and vegetated patches. ▪ There is one road running through the area and intersects agricultural fields	▪ 100% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
P	1.40	Second-class Rural Area	Residential, agricultural and some vacant lands	▪ Predominantly terraced fields for agricultural purposes, mainly olive groves ▪ Organised planting patterns visible throughout the landscape ▪ Scattered residential buildings are present, indicating small settlements or farmhouses. ▪ Structures are dispersed, likely related to agricultural activities. ▪ 3 major roads run through the area, providing access and connectivity.	▪ 100% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users

Section (Figure 49)	Section Length (km)	Formal Land use (Estimated)	Actual Land use	Detailed Description on Land Use	Estimated Ownership % (Figure 48)	Stakeholders & PAPs*
				▪ Some areas appear to remain vacant and undeveloped with sparse vegetation and rocky terrain.		
Q	3.0	70% Third-class Marginal Area and 30% Second-class Rural Area	Agricultural, Forest and some vacant lands	▪ Hilly terrain overall ▪ 50% of the area is predominantly vacant, currently not utilised for any specific purpose and feature scattered sparse vegetation ▪ 40% of the area pass through "Haraj" trees. ▪ 10% of the area pass through Olive groves.	▪ 80% Treasury Lands ▪ 20% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
R	1.50	60% Second-class Rural Area and 40% Third-class Marginal Area	Agricultural, "Haraj", residential and industrial	▪ Some areas appear to remain undeveloped with sparse vegetation. ▪ Some areas are "Haraj" with forest trees. ▪ A major road runs through the area, providing access and connectivity. ▪ There are 2 gas stations "Jo Petrol" and" Manaseer" in the area. ▪ There are a several private farms with tree plantations and accompanying houses.	▪ 80% Treasury Lands ▪ 20% Private Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Owners of businesses ▪ Informal/formal land users
S	2.45	50% Third-class Marginal Area, 40% First-class Rural Area and 10% Second-class Rural Area	Industrial and some lands are vacant and undeveloped	▪ A quarry is located along the proposed route, which is an open pit mine where materials like stone, rock and minerals are extracted. ▪ The rest of the area is predominantly vacant, currently not utilised for any specific purpose and feature scattered sparse vegetation	▪ 70% Private Lands ▪ 30% Treasury Lands	▪ Owners of businesses ▪ Informal/formal land users
T	4	50% Third-class Marginal Area, 40% First-class Rural Area and 10% Second-class Rural Area	Vacant and undeveloped	▪ Hilly Terrain and inaccessible area. ▪ The area is predominantly vacant with no specific land use, remaining undeveloped and unutilised. ▪ There are some minor green patches indicating small areas of vegetation or natural cover	▪ 100% Private Lands	▪ Informal/formal land users
U	1.50	Third-class Marginal Area	Forest Areas	▪ The area is mainly covered with "Haraj" trees and a few greenhouses. ▪ A major road runs through the area, providing access and connectivity. ▪ The rest of the area is vacant with sparse vegetation.	▪ 70% Treasury Lands ▪ 30% Private Lands	▪ MoA
V	1.15	60% Third-class Marginal Area and 40% Second-class Rural Area	Forest and Agricultural Areas	▪ The area is characterised by hilly, rocky terrain with dry, sparse vegetation and "Haraj" trees. ▪ There are private farms and olive groves within the vicinity.	▪ 70% Private Lands	▪ Owners of farmland

Section (Figure 49)	Section Length (km)	Formal Land use (Estimated)	Actual Land use	Detailed Description on Land Use	Estimated Ownership % (Figure 48)	Stakeholders & PAPs*
				▪ A major road runs through the area, providing access and connectivity.	▪ 30% Treasury Lands	▪ Owners of orchards and pastures ▪ Informal/formal land users ▪ MoA
W	1.0	Second-class Rural Area	Residential, agricultural and utilities	▪ Predominantly private terraced fields for agricultural purposes, likely olive groves. ▪ Private ownership, which is a 6 dunam property that includes a house and 2 pools, totalling approximately 200-250m^2. The rest of his land is used for cultivating, featuring olive, fig and apple trees, as well as other plants. Additionally, he engages in beekeeping and maintains around 120 sheep. ▪ Private ownership, which is 4.5 dunam property with a 120m^2 house. Most of the land is dedicated to cultivating, hosting approximately 150 olive, fig and pomegranate trees. ▪ Existing 132kV OHTL pass near the proposed OHTL.	▪ 70% Private Lands ▪ 30% Treasury Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
X	0.5	Second-class Rural Area	Residential, agricultural and utilities	▪ Some private terraced fields for agricultural purposes, mainly olive groves. ▪ Predominantly vacant lands with hilly, rocky terrain and dry vegetation. ▪ 2 roads run through the area, providing access and connectivity. ▪ Existing 132kV OHTL pass near the proposed OHTL.	▪ 70% Private Lands ▪ 30% Treasury Lands	▪ Owners of farmland ▪ Owners of orchards and pastures ▪ Informal/formal land users
Y	0.5	Second-class Rural Area	Forest Areas	▪ Area is predominantly covered with “Haraj” trees. ▪ A major road runs through the area, providing access and connectivity.	▪ 50% Treasury Lands ▪ 50% Private Lands	▪ MoA
Z	3	50% Second-class Rural Area, 40% First-class Rural Area and 10% Third-class Marginal Area	Vacant and undeveloped	▪ The whole area is predominantly undeveloped with rocky terrain and some minor unpaved roads	▪ 100% Private Lands	▪ Informal/formal land users

* Note 1: Since a details land survey and census were not undertaken within this ESIA, it cannot be concluded at this point whether informal land users actually exist but their relevance as PAPs cannot be dismissed either. As such, PAP identification includes informal/formal land users, but this does not mean that they are actually

present or relevant within the OHTL alignment. This requires a detailed survey to be undertaken as part of the detailed design. Further requirements are included in the RF.

*Note 2: Owners and tenants of residential buildings are not included in the Stakeholders and PAPs, on the condition that these buildings are avoided in the detailed design phase as this is the normal procedure applied by NEPCO during the detailed design.

10.2 Assessment of Potential Impacts, and Mitigation Measures

This section identifies the anticipated impacts on land use, and land ownership from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

10.2.1 Land Use, Land Ownership, and Resettlement Impacts During Construction

The potential impacts anticipated on land use and land ownership during construction phase for the substation and the OHTL are presented in Table 25 and Table 26, respectively.

Table 25: Potential Impacts on Land Use During Construction of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	**Physical Displacement Impacts:** ▪ 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. 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. **Economic Displacement Impacts:**	There are no avoidance measures to be considered since the land has already been acquired by NEPCO.	▪ 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 corrective action plan (CAP) agreed with NEPCO before tendering for the Contractor and required measures implemented before contractor can mobilise to the site. ▪ Develop and implement a PR5 compliant Resettlement Plan (RP). ▪ Develop and implement RP, updated SEP and Grievance Redress Mechanism (GRM). NEPCO to bear any grievance redress and commit to follow due process in compliance with PR5 requirements. In the development of the RP, the NEPCO will be required to conduct a census to determine eligible peoples and an inventory of their assets as a basis of determining their asset holdings. Both will be linked to a suitable development moratorium (which is a temporary freeze on development activity of assets to enable registering existing assets). ▪ NEPCO will engage directly with affected persons through a process of stakeholder engagement, including grievance mechanism as	▪ NEPCO shall implement the detailed monitoring and evaluation plan included in the RP, which shall contain a framework designed to track the implementation of the RP as well as Key Performance Indicators (KPI) for

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
	▪ During the field visit in June 2024, it was indicated that the land was ploughed and planted with barely. The ESIA Team was able to get the contact details for one of the landowners that plants the land, he indicated that this is a sporadic activity he undertakes in some years. He depends on rainfall and as such not all years are successful. He does not sell the fodder in the market but uses it to feed livestock they do not keep onsite. <u>The land acquisition for the purpose of developing the substation which inflicts restrictions on the land use will have adverse impacts on persons that use this land to include permanent economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood). This includes permanent economic displacement which will result in Full/Partial Permanent loss of source of livelihood associated with agricultural livelihoods.</u> ▪ It is important to note that in general NEPCO undertakes land acquisition and compensation process in accordance with the local/national relevant legislations in Jordan. For this land, NEPCO has already undertook and completed the land acquisition for the land plots under the '"immediate possession" procedure. NEPCO has still not covered the compensation costs to the landowners, but the initial valuation documents have indicated that the land is vacant and planted with barley. The land valuation undertaken by the land valuers from DLS is 5 JD per square metre which is the "base		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 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. ▪ To implement and update the SEP to account for the measures in the RP to be developed at a later stage to include a brief description of the way in which the displaced persons are to be engaged with during the planning, implementation, monitoring and evaluation of compensation, livelihood restoration and resettlement. ▪ The PAPs shall be engaged with to discuss their choices for compensation for the loss of assets, and the types of assistance measures that are to be provided to them. ▪ NEPCO shall offer landowners' compensation and/or assistance to help them improve or restore their standard of living or livelihoods in compliance with PR5 requirements. All assets shall be compensated at full replacement cost. ▪ Compensation will be based on a fair and transparent method of valuating assets. The valuation methodology shall be disclosed. ▪ The PAP shall be preferentially offered ways to directly benefit from the Project, which may include offering temporary employment and training opportunities during the construction phase. ▪ 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	implementation of plan, and of roles and responsibilities for implementation of the plan ▪ Monitor the land acquisition and compensation process to verify it meets the requirements of the PR5, including to ensure ongoing and proactive engagement with vulnerable people. ▪ The consultation process and proceedings shall be fully documented and reported to the Bank in the regular reports and included in the RP.

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
	price"[9] for the land as provided on the DLS website and not the "administrative price". This valuation has not been officially communicated to the landowners for the purpose of negotiation for compensation. ▪ 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.		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. ▪ At completion of land acquisition and compensation, NEPCO to audit the completed programme. ▪ 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.	▪ At completion of land acquisition and compensation, NEPCO to audit the completed programme. ▪ Professional valuers will accompany the assets survey, determine and apply the relevant rate to each asset, and prepare the valuation report for each affected person for the consideration of the resettlement planning team manager. These reports will also be used in preparation of engagement materials for consultations with affected
Type	Negative			
Duration	Medium Term			
Magnitude	High			
Reversibility	Irreversible			
Sensitivity	High			
Likelihood	High			
Significance	**Major**			

[9] According to discussions with the Land Acquisition Department in Ministry of Public Works and Housing (MPWH) on 24 June 2024, the Base Price is the price determined by the DLS and is available on their official website. The Base Price is based solely on the location of the parcel and land regulation provisions. On the other hand, another term being used by DLS is the "Administrative Price", which is typically higher than the Base Price, is based on various sources of real estate information, including registration deeds, land plans, location and building codes issued by the Jordan Engineers Association, estimated values of cropping trees and forest trees issued by the MoA, and detailed actual land price data from the DLS Surveys. Additionally, the natural topography of the land is considered.

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
				persons. The valuers will also be present during the implementation of the compensation distribution process.

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to Medium significance.

Table 26: Potential Impacts on Land Use During Construction of the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Main categories of potentially impacted land use identified according to land use: - 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.	▪ Conduct proper alternatives assessment for the OHTL **in the design** to ensure resettlement/ livelihood impacts are avoided. This shall be covered **in the ESIA** to the extent possible and based on design information available and by the Contractor **during design** of the OHTL alignment and tower footprint. The EPC Contractor shall consider feasible alternative options to avoid or minimise physical and/or economic displacement, while balancing environmental, social, and financial costs and benefits. ▪ Use optioneering to examine alternative OHTL routes, as well as alternative construction schedules and	▪ If avoidance is deemed unfeasible, an RP should be developed and implemented for physical and economic displacement impacts including livelihood impacts. The RP shall include the following key tasks: stakeholder engagement and grievance management, assets inventory, valuation study, socio-economic baseline census, drafting and disclosing displacement and livelihood restoration planning measures, drafting the Eligibility and Entitlement Framework for compensation, and drafting the RP document. Following approval, EBRD and NEPCO will present, disclose and finalise the RP document. Thereafter, NEPCO will	▪ NEPCO shall implement the detailed monitoring and evaluation plan included in the RP, which shall contain a framework designed to track the implementation of the RP as well as Key Performance Indicators (KPI) for implementation of plan, and of roles and responsibilities for implementation of the plan ▪ Monitor the land acquisition and compensation process to verify it meets the

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
	- Forest: areas with forest trees - Other: this category includes any kind of land which does not fall under the categories previously cited. It includes informal communal resources such as open grazing land, vacant undeveloped land. ▪ Initial identification of Stakeholders & PAPs in the OHTL route: - 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 that the IFC EHS Guidelines for Electric Power Transmission and Distribution (2007) which requires right of way width	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 point of view. The Contractor shall take all reasonable and feasible steps to avoid or, at least, minimise impacts of OHTL on the land – as practically as possible. ▪ Avoid the need to build new access roads whenever possible and use existing roads and access roads	implement the RP in full. Details for the RP process and requirements is provided in the standalone RF document disclosed along with this 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 to provide all required information to prepare the RP and implement the below measures including – **prerequisite for preparation of the RP**: - Land deeds - list of the landowners /users/occupiers of each impacted property will be needed as well as their contact details. - Cadastral information of each property impacted by the project - The final design and land required for the substation - The final designs of the OHTLs routes and location of each pylon and the footprint with dimensions, of the land for the base of each pylon - Mapping of the temporary components for the construction phase including all cadastral information and property areas and descriptions	requirements of the PR5, including to ensure ongoing and proactive engagement with vulnerable people. ▪ The consultation process and proceedings shall be fully documented and reported to the Bank in the regular reports and included in the RP. ▪ At completion of land acquisition and compensation, NEPCO to audit the completed programme.

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
	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 within the OHTL route. ▪ **Physical Displacement Impacts:** <u>There are no anticipated temporary and permanent physical displacement impacts that will result in project-related physical displacement (relocation or loss of shelter).</u> - 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:** - 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	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 by caused by opening new tracks. ▪ Select OHTL route that avoids densely utilised areas to minimise loss impacts. ▪ To avoid disruption to existing economic activities in the Communities and agricultural areas crossed by the OHTL, sections of land permanently and temporarily required for the Project construction will, whenever possible, be unused lands. Agricultural or grazing land used by stakeholders whose means of production or means of support depend mainly on land will be avoided as much as feasible. Non-used lands will be preferred for the sitting of the towers and for lay-down areas or temporary land 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 avoid as much as possible impacts on productive lands.	▪ Append a copy of PR 5 to the contract with the Contractors for the Project and AFs **<u>along with tender package</u>** ▪ Contractor, **<u>prior to any construction works and as part of design of the works</u>**, 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, **<u>prior to any construction works and as part of design of the works</u>**, 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 – as practically as possible. ▪ Contractor where possible and feasible, use existing roads and tracks for accessing the sites of the project components. **<u>Details to be submitted prior to construction</u>**. ▪ Conduct proper census and inventory surveys **<u>prior to construction</u>** ▪ Conduct land valuation through a third party in line with market rates **<u>prior to construction</u>** ▪ Provide photographs of all land plots that are not vacant showing the use of the land and assets on the land. This	

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
	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.	▪ 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. ▪ Whenever possible, 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. Postpone construction activities until after harvesting. ▪ To further avoid losses and impacts, 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.	shall be done **prior to construction and could be part of the design.** ▪ The Contractor to produce GIS maps of the project sites, including OHTL areas, showing the cadastral description and boundaries of the land plots. This should include areas of the land which will be impacted on both a temporary basis (such as laydown areas) and on a permanent basis (such as pylon bases). All boundaries should be dimensioned. The **mapping should be 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.**	
Type	Negative			
Duration	Medium Term			
Magnitude	High			
Reversibility	reversible			
Sensitivity	High			
Likelihood	High			
Significance	**Major**			

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
			▪ **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 that was not completely possible, then NEPCO must duly document that. ▪ Prior notice to the landowner/ user/occupier should be given. They are entitled to be informed about what activities are proposed on their land – as practically as possible. ▪ 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	

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
			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 the affected persons about the project's grievance mechanism and ensure that any issues or complaints received are resolved fairly and promptly. ▪ There will be no permanent access roads established for the Project for construction or operation and maintenance activities. Access to construction vehicles and machinery during construction and for maintenance activities during operation will be only to tower locations. Access will be through existing tracks or dirt roads as	

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
			applicable that lead directly to each exact 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 ▪ Mitigation measures listed for the substation are also applicable here.	

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to Medium significance.

10.2.2 Land Use, Land Ownership, and Resettlement Impacts During Operation

Table 27: Potential Impacts on Land Use During Operation of the Substation and the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Operation Phase				
Impact Description	▪ There are no anticipated impacts on land acquisition and resettlement during the operation phase.	----	----	
Type	Not Applicable			
Duration	Not Applicable			
Magnitude	Not Applicable			
Reversibility	Not Applicable			
Sensitivity	Not Applicable			
Likelihood	Not Applicable			
Significance	**Not Applicable**			

11 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

This section presents the baseline assessment of the Project site in relation to geology, hydrology and hydrogeology as well as an assessment of potential impacts during the various Project phases. For each impact, a set of avoidance and mitigation measures were identified.

11.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to geology, hydrology, and hydrogeology and presents the outcomes and results of the assessment.

11.1.1 Methodology for Assessment

Assessment of baseline conditions in relation to geology, hydrology and hydrogeology was based on a meticulous analysis of data sourced from government agencies, previous research efforts, and various surveys to ensure data quality and relevance. This was followed by detailed documentation of topography, climate patterns, regional hydrology, soil types, geological formations, and potential hazards. Existing vegetation, land use patterns, hydrological data, and groundwater features were also examined, with peak flow values for wadis simulated using Storm and Sanitary Analysis (SSA) software and the River Analysis System (RAS) developed by the Hydrologic Engineering Centre (HEC) in Davis (HEC-RAS) to provide a comprehensive understanding of the environmental context and modelling water flowing through systems of wadis and computing water surface profiles.

11.1.2 Results and Outcomes

A. 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:

- Recent deposits.
- Umm Rijam formation
- Muwaqqar formation.

These formations were identified in previous regional geological and hydrogeological studies of Jordan, including those by MacDonald (1696), Bender (1968), and UNDP/FAO (1970), as well as the Northern Region Waste Management Study (1998-1999). The nomenclature used follows the standards set by the Natural Resources Authority - Geological Mapping Division.

The field survey revealed the following main lithological characteristics of the outcropping formations, from top to bottom:

- **Recent Deposits**

These deposits occur in the form of alluvial deposits or consolidated gravels of chert and coarse limestone and are of small thickness. The gravels are mostly consolidated and covered by thin layer of soil. The thickness of the soil layer varies from few centimetres where bedrock exposed to more than 2 m.

Figure 50: Soil Cover Near Substation Site

- **Umm Rijam Formation (B4)**

This formation represents the uppermost part of the sedimentary rocks in the area, showcasing a significant geological layer. The exposed rocks at the disposal site are found in separate, unconnected locations on the tops of hills, indicating a fragmented distribution. The thickness of this formation at the substation site ranges from only 15 to 20m, which is likely due to significant erosion activity in this specific area. In contrast, the thickness of this formation varies widely in different locations across Jordan, from as little as 30 m to as much as 300 m. This formation belongs to the lower and middle Eocene in age and directly overlies the Muwaqqar Formation, which is prominently exposed in most parts of the disposal site. The rocks that are exposed consist predominantly of limestone, chalky limestone, and chalk, which are interspersed with layers of brown to black chert. This alternation with chert imparts characteristics that are typical of aquifers in Jordan, such as those found in regions like Ramtha, Azraq, and Jafer. Despite these typical aquifer characteristics, this formation cannot be considered an aquifer in this particular area due to its shallow thickness and the nature of its isolated exposures on the hilltops, which lack any substantial connection. Consequently, while this geological formation shares similarities with more extensive and connected aquifer systems found elsewhere in Jordan, its local manifestation at the disposal site limits its potential as a viable water source. Understanding the specific conditions and characteristics of this formation is crucial for geological assessments and any future developments in the area.

- **Muwaqqar Formation (B3)**

This formation is the oldest exposed rock in the disposal site and dates to the Maastrichtian-Paleocene age. According to MacDonald and Partners, the estimated thickness of this formation near the site is about 320 meters, as endorsed by WAJ/BGR in 1997. Lithologically, this formation is dominated by the presence of chalk, marl, chalky limestone, thin beds of chert, phosphate, bituminous chalk, and nodules and concretions of limestone. The exposed rocks of this formation, visible in the excavations at the substation site, are characterised by massive whitish chalk interspersed with thinly bedded marlstone and very thin beds of chert. A major joint system measured in this formation has an orientation of 120° NW/30° NE/SW, with some minor joint directions observed in the exposed Muwaqqar Formation, measured as 100° NE/SW, 70° NW/SE, and 170° NNW/SSE. Generally, the lithological description of these formations pertains only to the rocks outcropping at the surface. The subsurface geology of the underlying strata, including the Amman Formation (B2), Umm Ghudran (B1), Wadi As Sir (A7), and A6/A5 down to the basement.

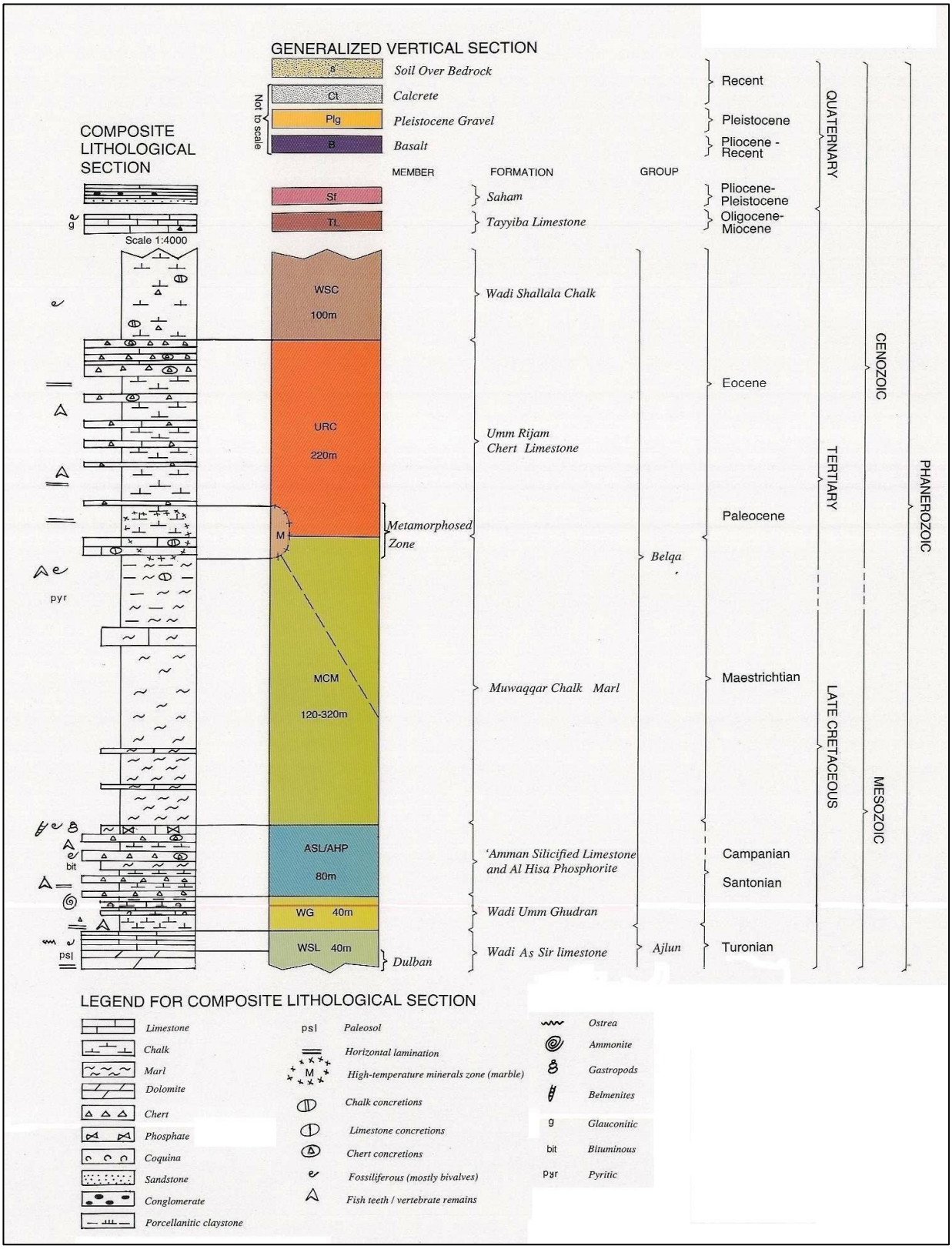


Figure 51: Generalised Vertical Section at the Substation Area

B. ***Hydrology***

The project site crosses five (5) catchment areas, with the substation located in one (1) of the major catchment areas. A visual representation of this catchment's boundaries, as well as the network of streams running through it, is depicted in Figure 52. Advanced geospatial tools and software, such as Global Mapper, were utilised to extract and comprehensively document the characteristics of this catchment area. The resulting dataset, summarised in Table 28, provides a concise overview of the essential attributes and features defining this

significant geographical area. This information offers valuable insights for various environmental and resource management endeavours within the context of the project.

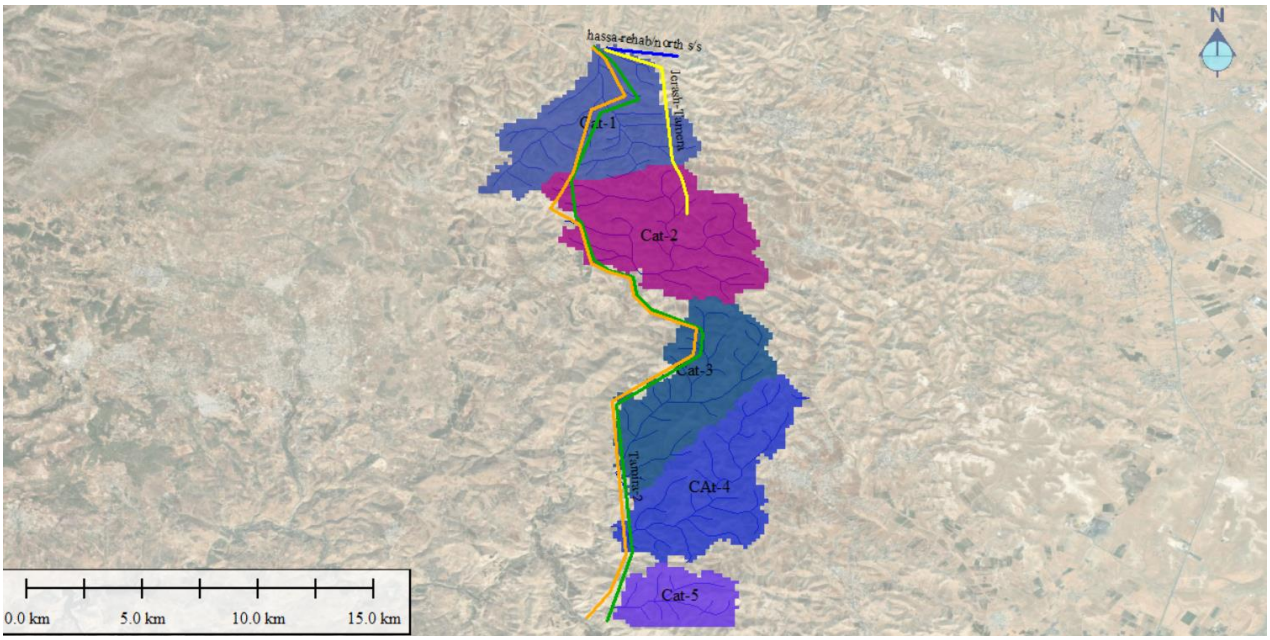


Figure 52: The Catchment Areas Effect on the Project Area

Table 28: The Catchment Areas Characteristics for the Project

Catchment Area ID	Area (km^2)	Flow length(m)	Maximum elevation(m)	Minimum elevation(m)	Average wadi slope (%)
Cat-1	27.4	8050	931	710	2.74
Cat-2	32.0	8560	961	766	2.27
Cat-3	27.5	9260	870	550	3.46
Cat-4	27.3	10710	765	565	1.86
Cat-5	9.9	4720	718	410	6.52

The topography within the catchment area, specifically in the western region of Mafraq, 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.

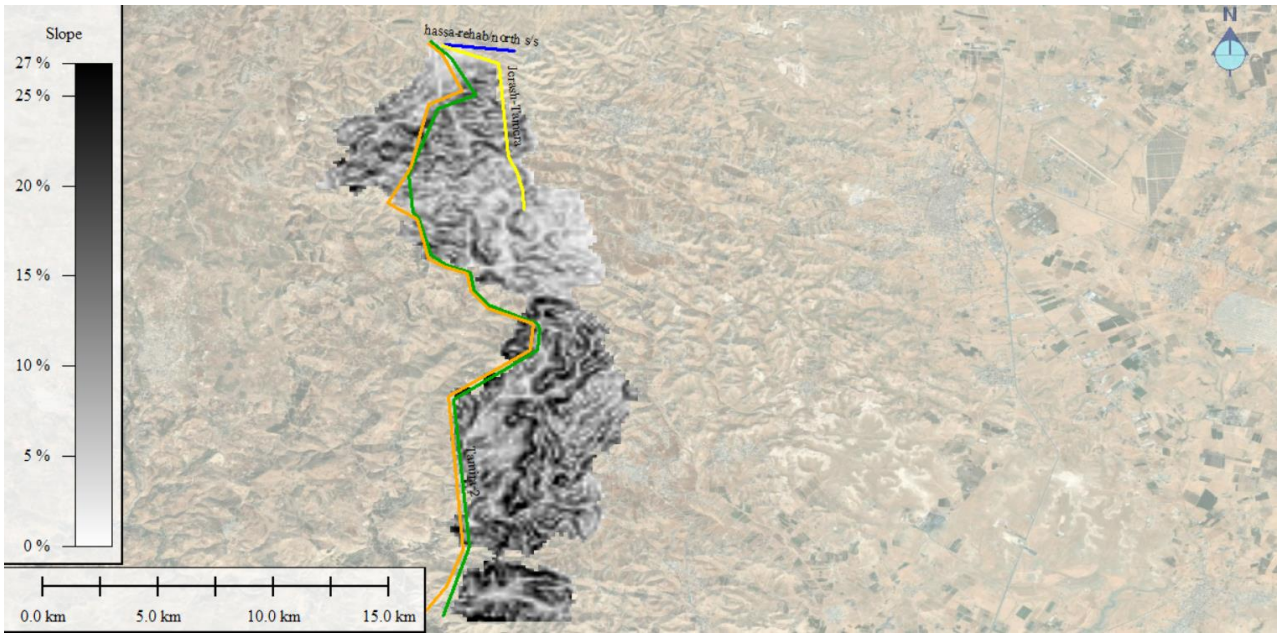


Figure 53: The Shoaib Dam Elevation and Slopes

- **Rainfall**

The catchment area generally undergoes a Mediterranean climate characterised by warm, arid summers and cool, moist winters. The bulk of the precipitation in Rihab town tends to concentrate in the winter months, chiefly spanning from November through March. Throughout this timeframe, the city often experiences substantial rainfall. An examination of rainfall data extracted from the information published by the Jordan Meteorological Department, reveals that the peak rainfall events consistently occurred in either January or February in each of those years. Figure 54 shows the Intensity-Duration-Frequency (IDF) curve for Rihab rain-gauge.

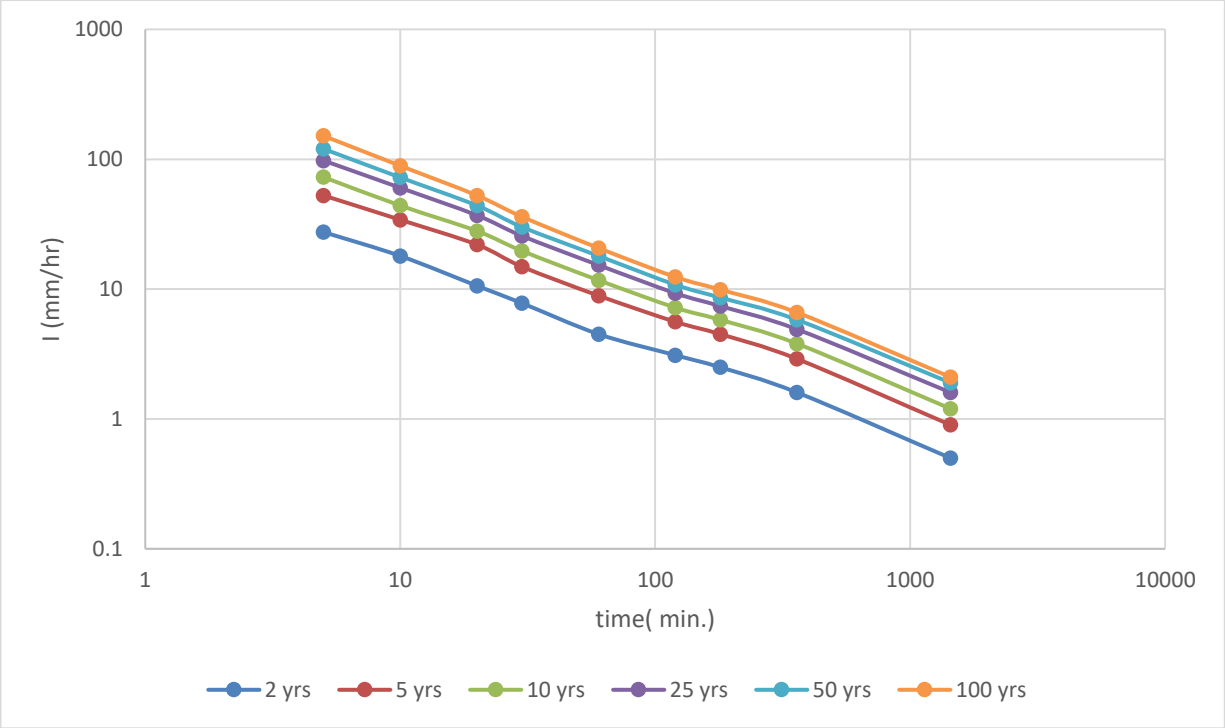


Figure 54: The IDF Curve for Rihab Rain-Gage Station

- **Surface Water in the Catchment**

The surface water dynamics in the project area, are predominantly characterised by intermittent flows in wadis, which are dry riverbeds that become active during and immediately after rainfall events. This was observed by the ESIA team during their site visit in June 2024 as shown in Figure 55. This semi-arid to arid region receives most of its precipitation during the winter months, with high variability. The topography, marked by hills and valleys, influences the rapid runoff and flash flood potential, leading to significant erosion and sediment transport. Water management practices in the area focus on harvesting runoff through structures like check dams and retention basins, while flood control measures include levees and flood channels to protect infrastructure. Surface water contributes to groundwater recharge and soil moisture, supporting local ecosystems and agriculture. However, the region faces challenges of water scarcity and infrastructure resilience, necessitating sustainable water management and continued investment in hydrological research to optimise resource use and mitigate risks.

Figure 55: Dry Wadi Within the OHTL Route

- **Hydrological Modelling**

AutoDesk SSA software played a pivotal role in the simulation of the hydrological processes within the defined catchment area by facilitating precise hydrological modelling, enabling a deeper understanding of the catchment's behaviour and response to various hydrological events. The comprehensive analysis incorporated several critical components. Initially, the determination of the weighted curve number for this specific catchment area was carried out meticulously, considering crucial factors such as the soil group classifications and the land use characteristics that prevailed within the catchment zone. The resultant weighted curve number was established at an appreciable value of 80, signifying a key parameter for subsequent hydrological calculations.

The rainfall distribution, a crucial parameter in hydrological modelling, was precisely derived from the Soil Conservation Service (SCS) Type IA 24-hour storm distribution and the extreme rainfall event with a 100-year return period. This distribution formed the basis for simulating precipitation patterns within the catchment area, serving as a fundamental input for the hydrological model.

The results of this detailed analysis provided significant insights. The time of concentration for the entire catchment area was calculated to be approximately 1.9 hours for catchment 4 and about 37 minutes for catchment 5. **This information is critical as it indicates the time required for runoff to travel from various points within the catchment to the outlet.** Furthermore, the peak flow values for each catchment were concisely summarised and are effectively illustrated in Figure 56, offering a visual representation of the hydrological characteristics under different scenarios.

Table 29: The Peak Flow Values for the Catchment Areas

Catchment ID	Peak Runoff (cubic metre second)	Time of Concentration (days Hour:Minutes:Seconds)
CAT-1	16.52	0 01:19:07
CAT-2	17.82	0 01:29:11
CAT-3	16.38	0 01:20:35
CAT-4	12.84	0 01:54:25
CAT-5	9.94	0 00:37:34

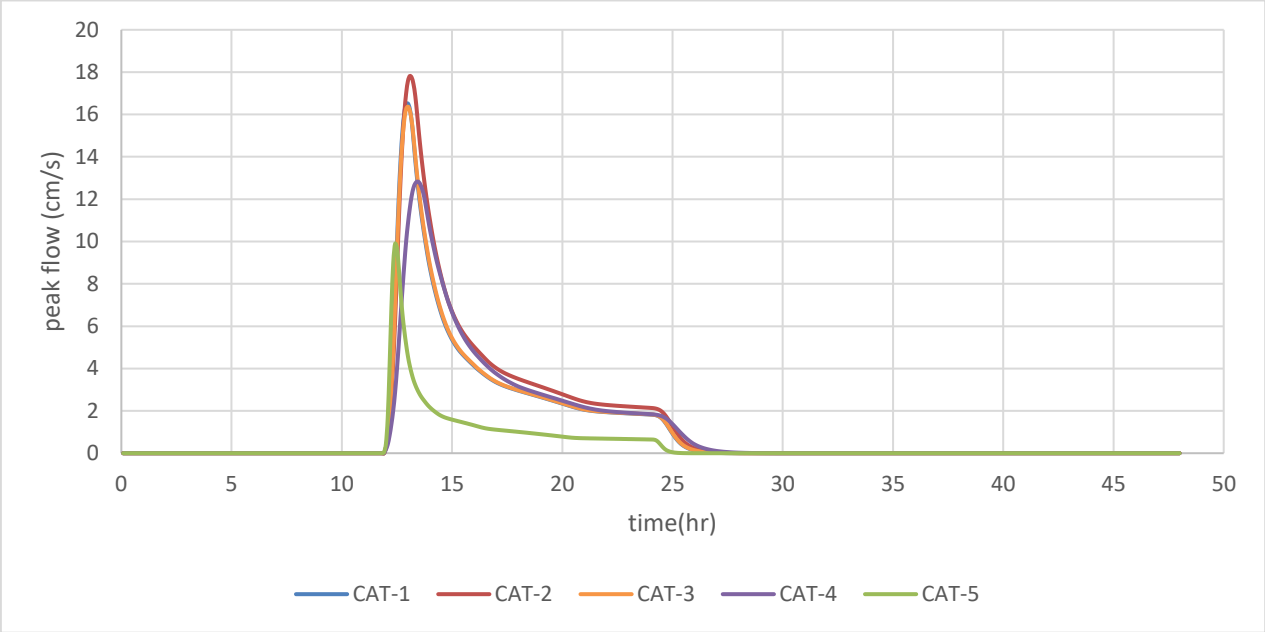


Figure 56: The Peak Flow for the Catchment Areas in 100-Yrs Return Periods

Given the substation's proximity to a natural wadi, a conceptual 2D hydraulic analysis was conducted using a Digital Elevation Model (DEM) extracted via Global Mapper. This analysis, combined with data from a 100-year return period rainfall event, aimed to assess the potentially hazardous conditions in the area. The results of the analysis indicate that flood depths within the wadi can range from 0.9 to 2.7m, with flow velocities reaching approximately 10 m/s.

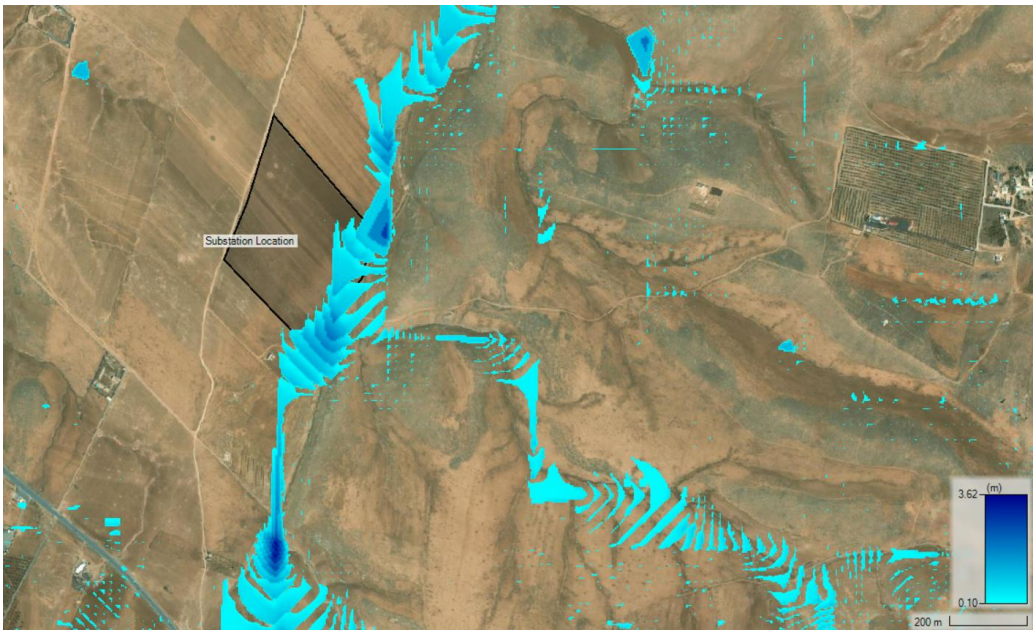


Figure 57: The Flood Depth at Substation Site

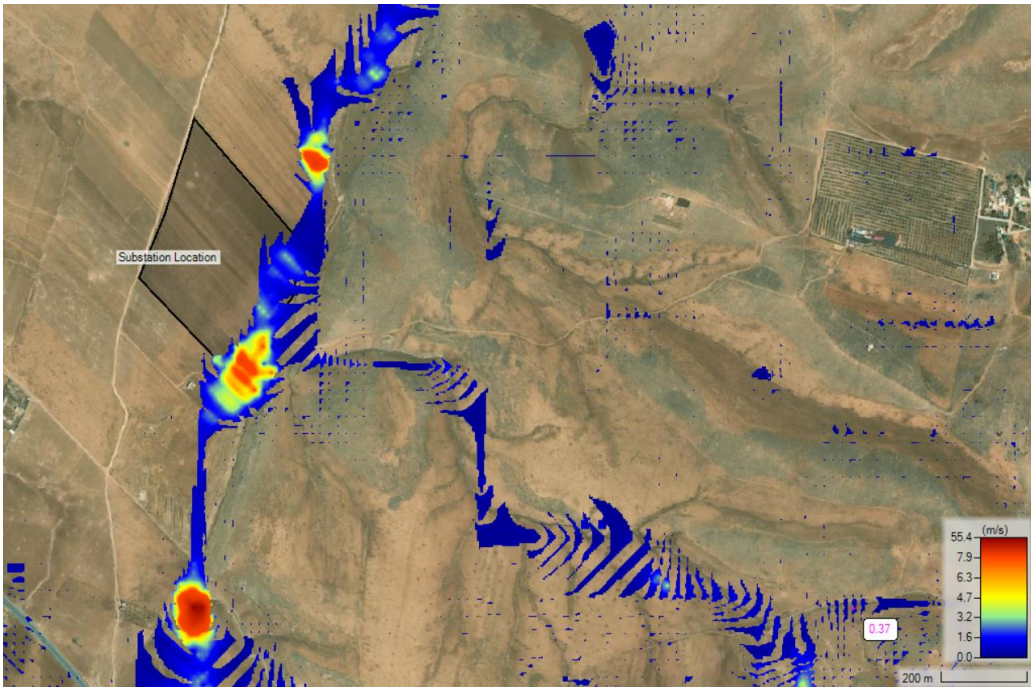


Figure 58: The Flood Flow Velocity at Substation Site

As for the OHTL, the results for the same exercise indicate that flood depths within the wadi can range from 0.7 to 4.1 m, with flow velocities reaching approximately 10 m/s at some stations. Figure 59 illustrates the flood hazard zones along the OHTL.

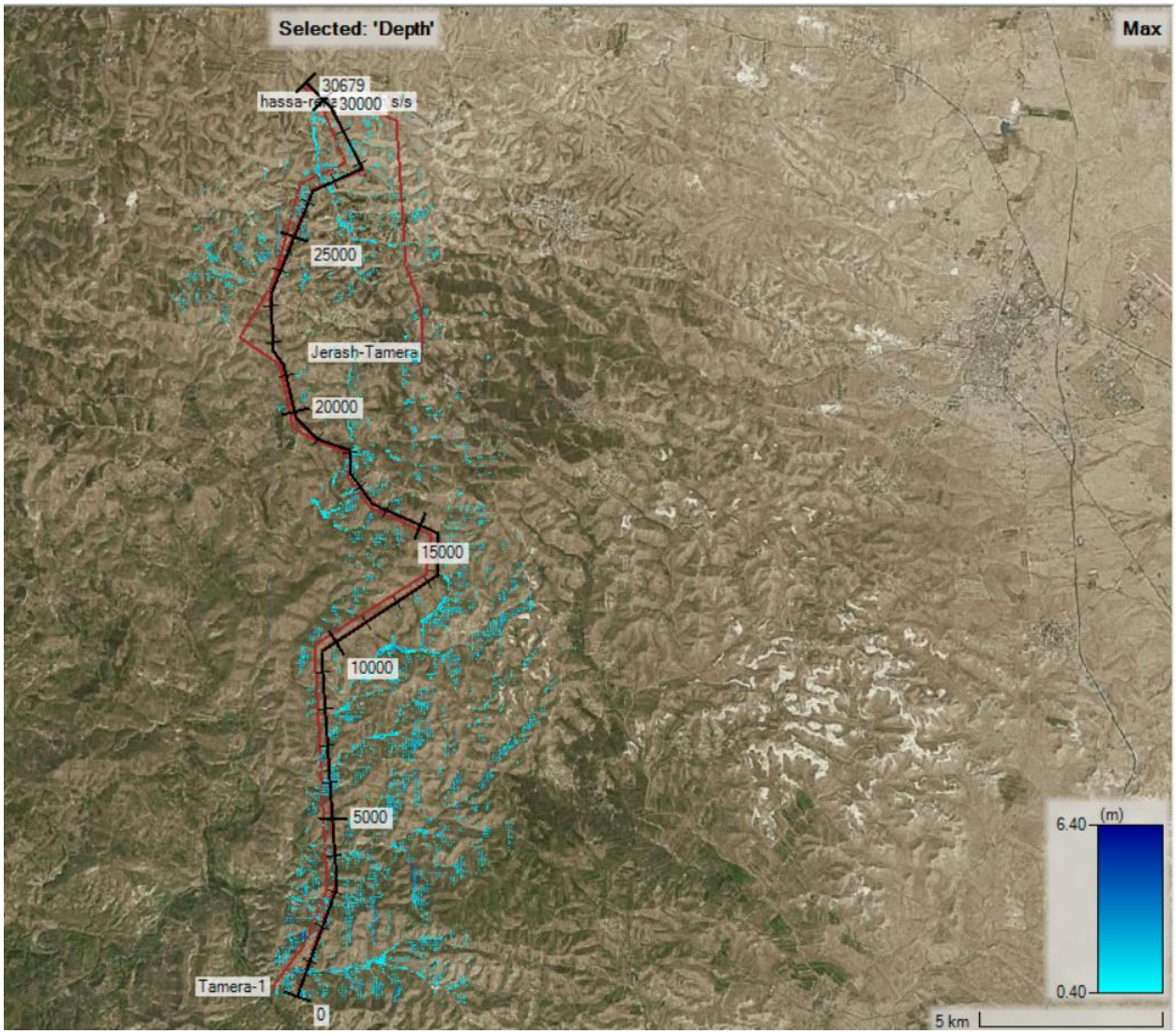


Figure 59: The Flood Depth Along OHTL Based on 100-yr Return Period

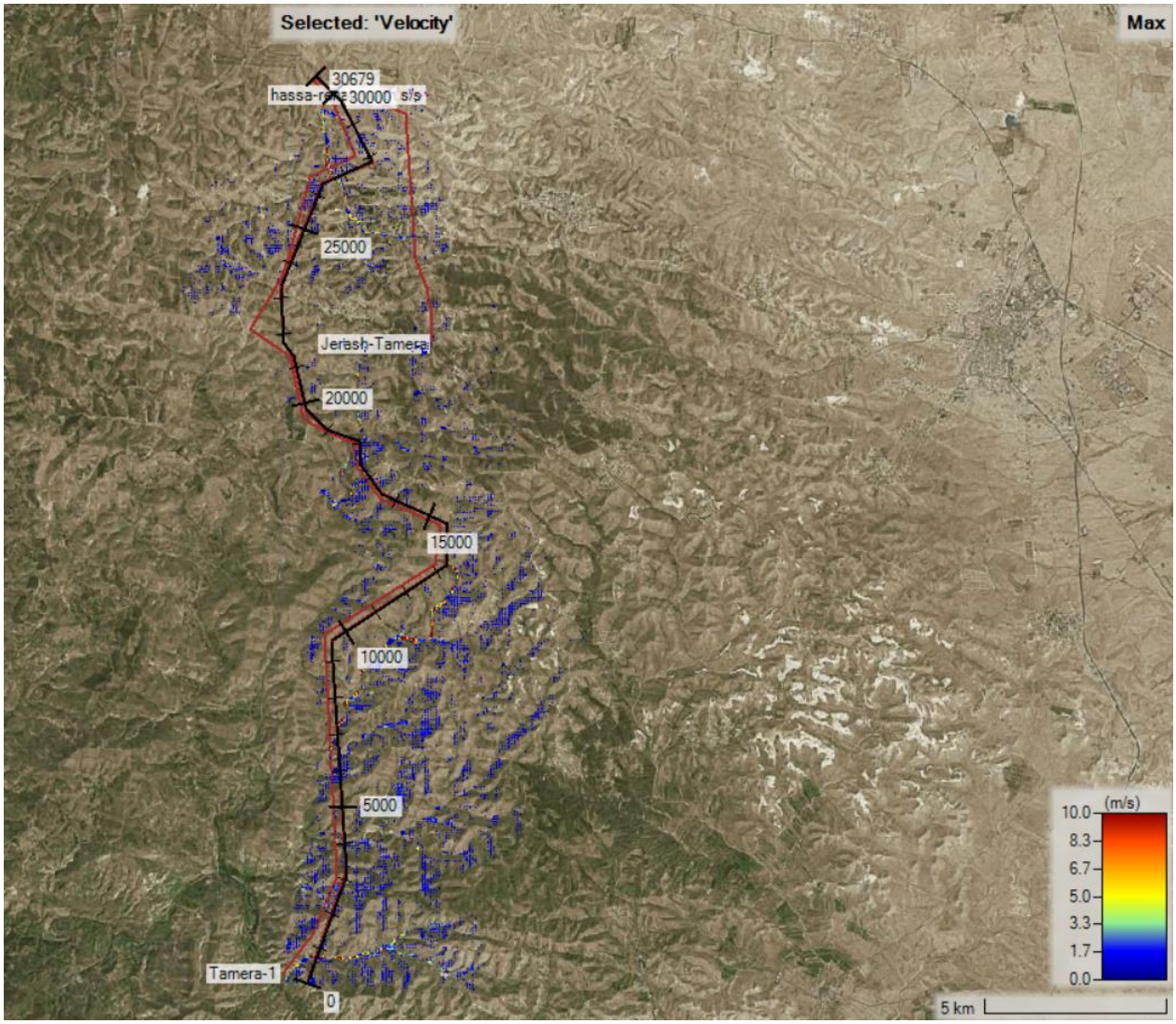
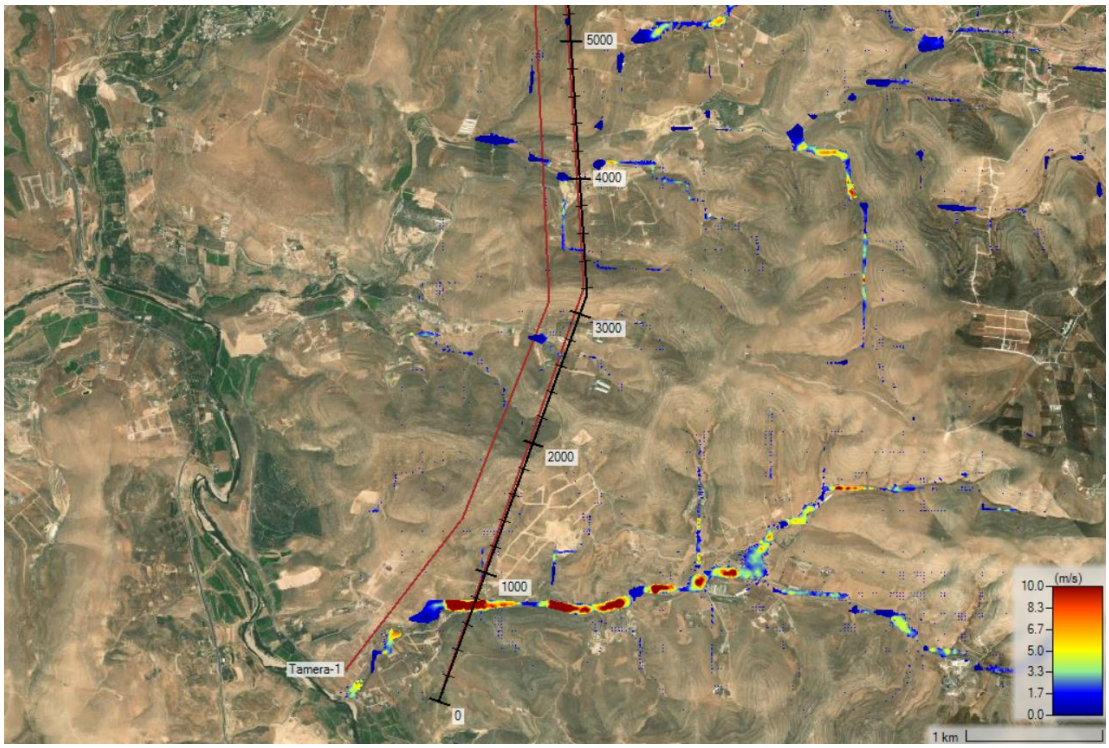
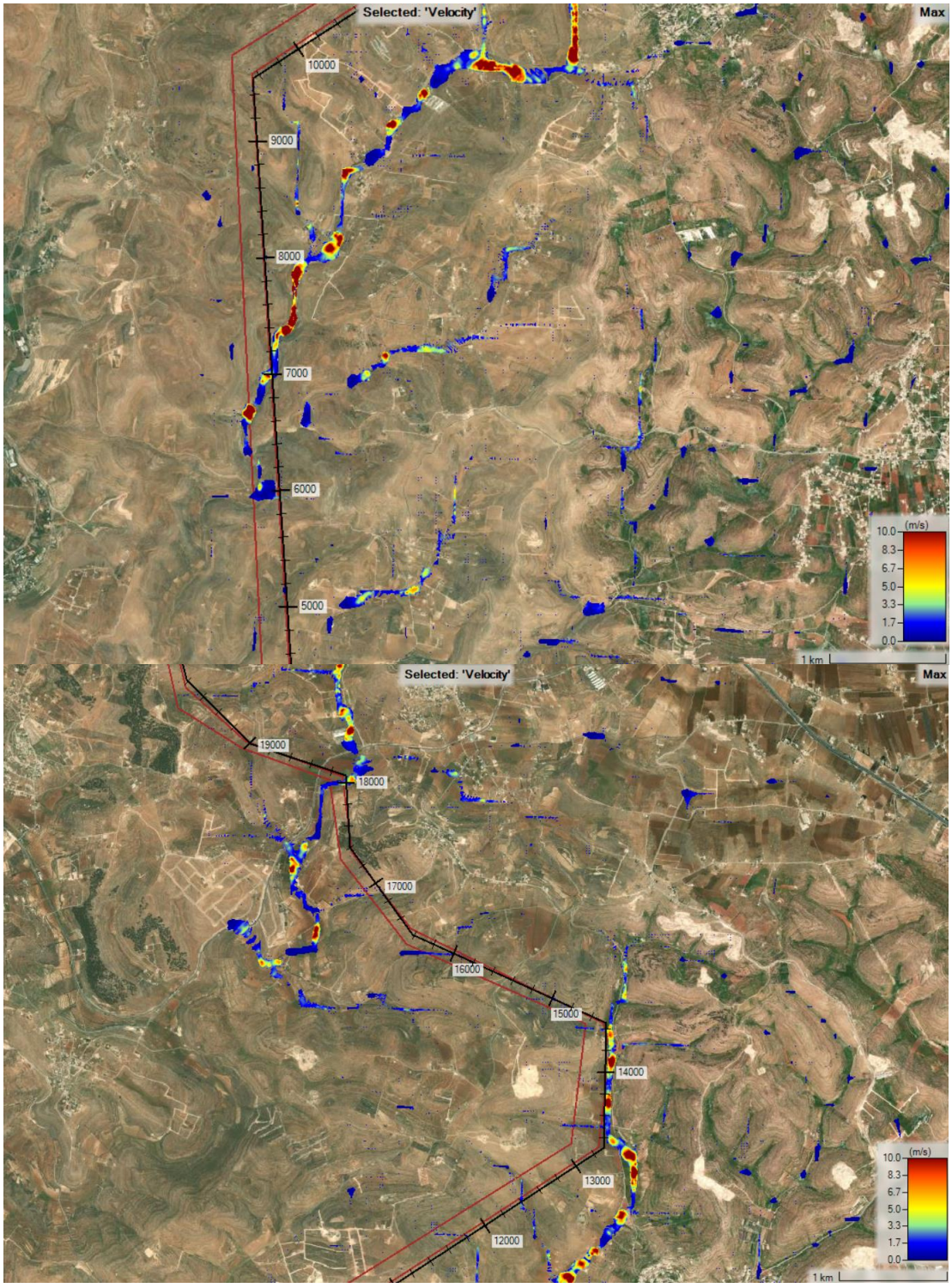


Figure 60: The Flood Velocity Along OHTL Based on 100-yr Return Period




Selected: 'Velocity'
Max
10000
9000
8000
7000
6000
5000
10.0
8.3
6.7
5.0
3.3
1.7
0.0
(m/s)
1 km
Selected: 'Velocity'
Max
19000
18000
17000
16000
15000
14000
13000
12000
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8.3
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0.0
(m/s)
1 km

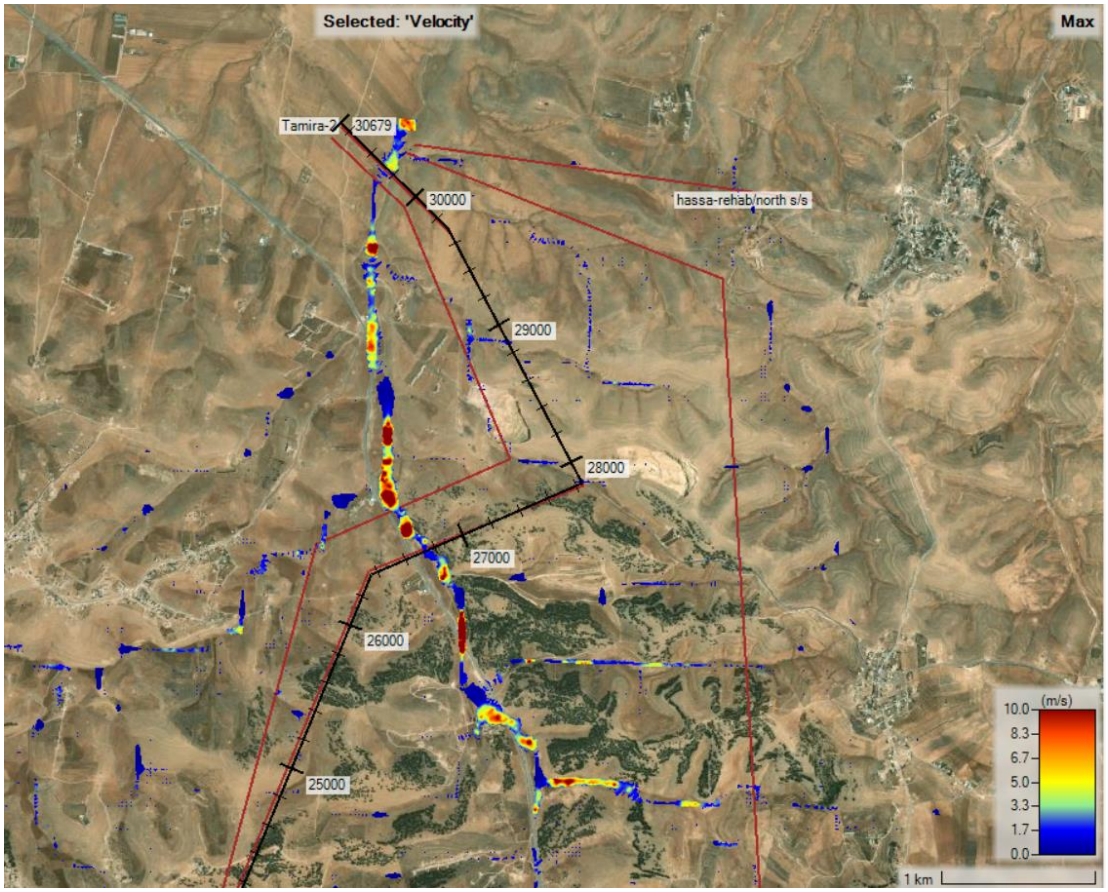


Figure 61: The Flood Velocity at OHTL Wadi Crossing

C. Hydrogeology

In Jordan, groundwater is an essential source of drinking water, crucial due to the country's arid climate and limited freshwater resources. This dry climate and lack of river systems create a severe surface water shortage, making Jordan heavily reliant on groundwater to meet its drinking water needs. The country has a complex network of aquifer systems that provide vital groundwater for both urban and rural communities.

However, the continuous extraction of groundwater is a significant concern in Jordan's water management. The high demand for water, especially in urban areas, is depleting some aquifers. Therefore, it is increasingly important to implement sustainable management practices and oversee groundwater use effectively.

Additionally, groundwater quality is an issue in some regions, with contamination from agricultural runoff and other pollutants. Addressing these challenges requires strict monitoring and treatment protocols to ensure that drinking water from these aquifers remains safe and uncontaminated. **Thus, while groundwater is a crucial drinking water source in Jordan, its sustainable management and quality protection are imperative to meet the country's growing water needs.**

- **Groundwater Basin and Aquifers**

As shown in Figure 62; 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. The Yarmouk Groundwater Basin, located in northern Jordan, is a critical water resource for the region. Covering approximately 1,420 km^2 within Jordan, it is part of the larger Yarmouk River Basin, which also spans Syria and Palestine. The basin comprises several aquifer systems, primarily the Upper Aquifer (Basalt Aquifer) and the Lower Aquifer (B2/A7 Aquifer). The Upper Aquifer, composed mainly of basaltic rock formations, is the most productive and widely utilised, while the Lower Aquifer, consisting of limestone and dolomitic rock, provides significant deep groundwater resources.

The primary recharge sources for the Yarmouk Basin include rainfall and surface water infiltration from rivers and streams, particularly the Yarmouk River. The average recharge rates vary annually but are estimated to be

around 20-50 million cubic meters per year[10]. Groundwater from the basin is primarily extracted for agricultural, domestic, and industrial uses, with historical extraction rates often exceeding natural recharge rates, leading to overexploitation.

The Yarmouk Basin faces several management challenges, including overextraction, water quality issues due to contamination from agricultural runoff and industrial activities, and complexities arising from its transboundary nature. Conservation and sustainability efforts are crucial, with the Jordanian government implementing regulations to control groundwater extraction and promote sustainable use. Initiatives such as artificial recharge through the construction of dams and recharge wells, along with public awareness programmes on water conservation, are also being pursued.

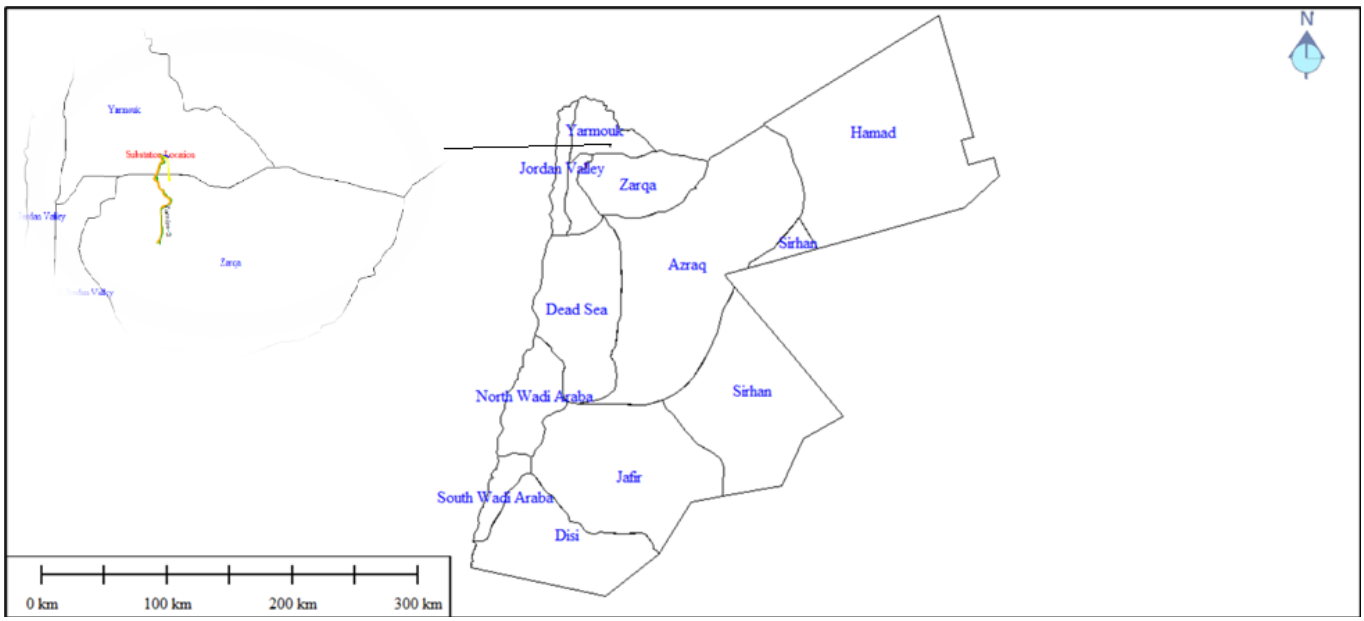


Figure 62: The Project Location Related to the Groundwater Basins in Jordan

[10] "Assessment of Groundwater Recharge in the Yarmouk Basin, Northern Jordan" El-Naqa, Ali, Ali; Hammouri, Nizar; Kuisi, Mahmoud; Abu-Hamatteh, Zeyad, Journal of Environmental Management.2007

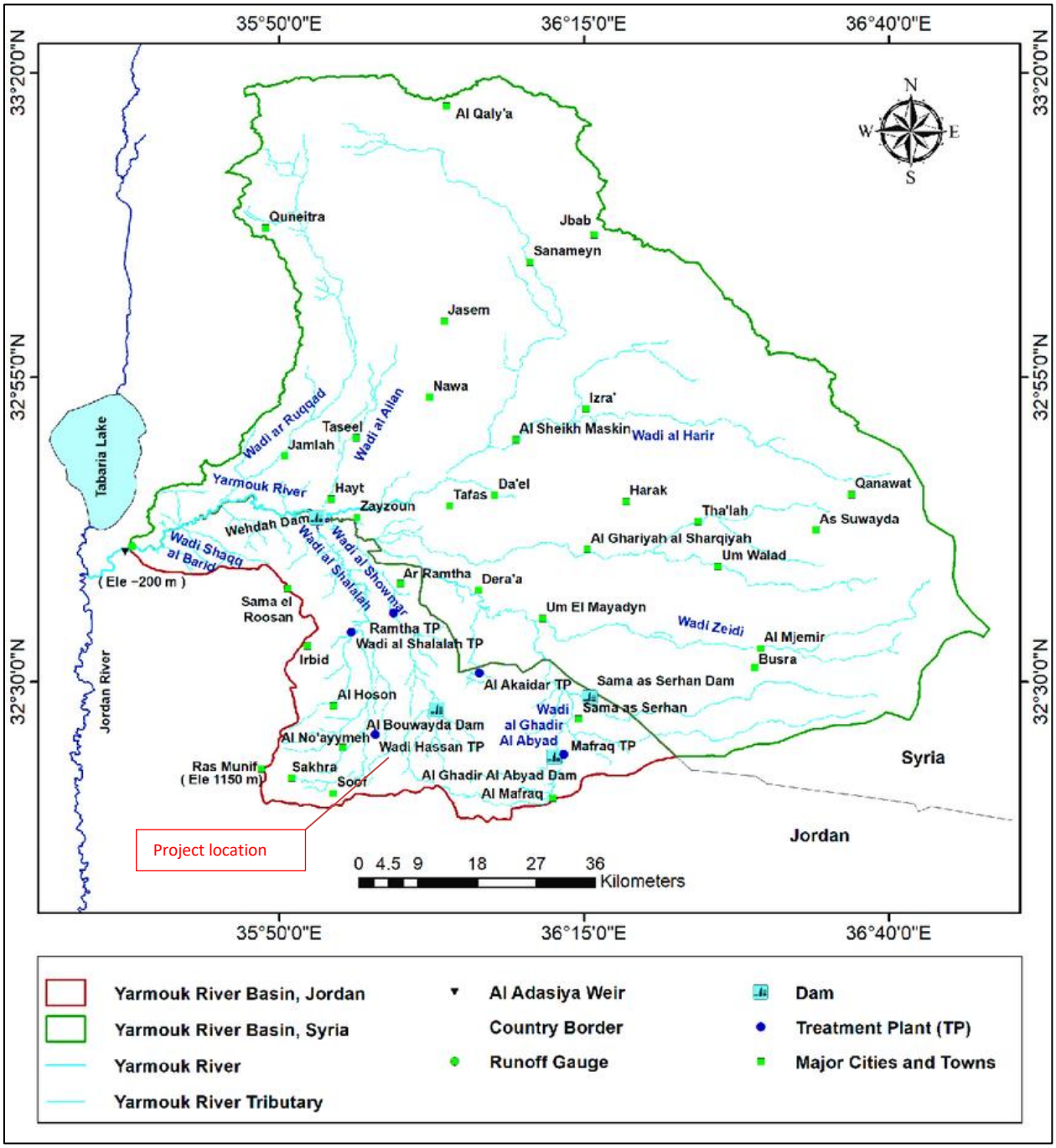


Figure 63: The Yarmouk River Basin Tributaries and the Yarmouk River, Treatment Plants, Dams, and Major Cities and Towns

The hydrogeology of the Yarmouk Groundwater Basin is characterised by several rock formations that are essential to its aquifer systems. Below is an overview of the main rock types and their importance in the basin:

- **Upper Aquifer (Basalt Aquifer)**

Composition: The Upper Aquifer primarily consists of basaltic rocks.

Formation: Basalt is an extrusive igneous rock formed from the rapid cooling of basaltic lava at or near the Earth's surface.

Hydrological Properties: Basaltic rocks are typically porous and fractured, which enhances their ability to store and transmit groundwater. The fractures and vesicles (small cavities) in basalt provide pathways for water movement, making it a highly productive aquifer.

Recharge and Storage: The porosity and permeability of basalt allow for significant groundwater recharge from precipitation and surface water infiltration. This aquifer is the most exploited due to its high productivity.

- **Lower Aquifer (B2/A7 Aquifer)**

Composition: The Lower Aquifer is mainly composed of limestone and dolomite.

Formation: Limestone is a sedimentary rock primarily composed of calcium carbonate ($CaCO_3$), often formed from the accumulation of marine organisms' skeletal fragments. Dolomite is similar but contains magnesium as well as calcium carbonate ($CaMg(CO_3)_2$).

Hydrological Properties: Limestone and dolomite can be highly permeable, especially when they are fractured or have undergone dissolution processes that create secondary porosity. Karst features such as caves and sinkholes can develop, significantly enhancing the rock's ability to store and transmit water.

Recharge and Storage: These carbonate rocks can store large amounts of groundwater in their fractures and dissolution cavities. However, they are less exploited compared to the basalt aquifer due to greater depth and variability in permeability.

Geological Context

Stratigraphy: The geological strata in the Yarmouk Basin consist of alternating layers of basaltic and sedimentary rocks, influenced by the region's complex tectonic history.

Aquifer Connectivity: The connectivity between different rock layers and aquifers can impact groundwater flow. In some areas, impermeable layers (such as clay or marl) may act as confining layers, affecting recharge and flow dynamics between the upper and lower aquifers.

Groundwater Discharge Wells

Groundwater discharge wells in the Yarmouk Basin are essential for extracting groundwater to meet various needs, including agricultural, domestic, and industrial uses. The majority of groundwater extracted from these wells is used for irrigation, supporting the region's agricultural activities. These wells also supply water for residential consumption and various industrial processes. The wells are of two main types: shallow wells, which tap into the upper aquifer composed primarily of basaltic rocks and are easier to construct and maintain, and deep wells, which access the lower aquifer made up of limestone and dolomite and require more advanced drilling technology due to their greater depths.

One of the primary challenges faced in the basin is overextraction, where the rate of groundwater withdrawal exceeds the natural recharge rate, leading to declining water levels and potential depletion of the aquifers. Additionally, contamination from agricultural runoff, industrial activities, and improper waste disposal can affect water quality in discharge wells, posing health risks and reducing the water's usability. Effective management of discharge wells involves stringent regulation and continuous monitoring to ensure sustainable extraction rates, with the Jordanian government implementing policies to control groundwater use and promote conservation.

Groundwater levels were declining in the Yarmouk groundwater basin, especially near pumping centres in the eastern part of the basin in Jordan. The maximum rate of groundwater-level decline was -3.7 m/yr. Figure 64 shows trends in groundwater levels at selected wells in the Yarmouk groundwater basin[11].

[11] Goode, D.J., Senior, L.A., Subah, Ali, and Jaber, Ayman, 2013, Groundwater-level trends and forecasts, and salinity trends, in the Azraq, Dead Sea, Hammad, Jordan Side Valleys, Yarmouk, and Zarqa groundwater basins, Jordan: U.S. Geological Survey Open-File Report 2013-1061, 80p.

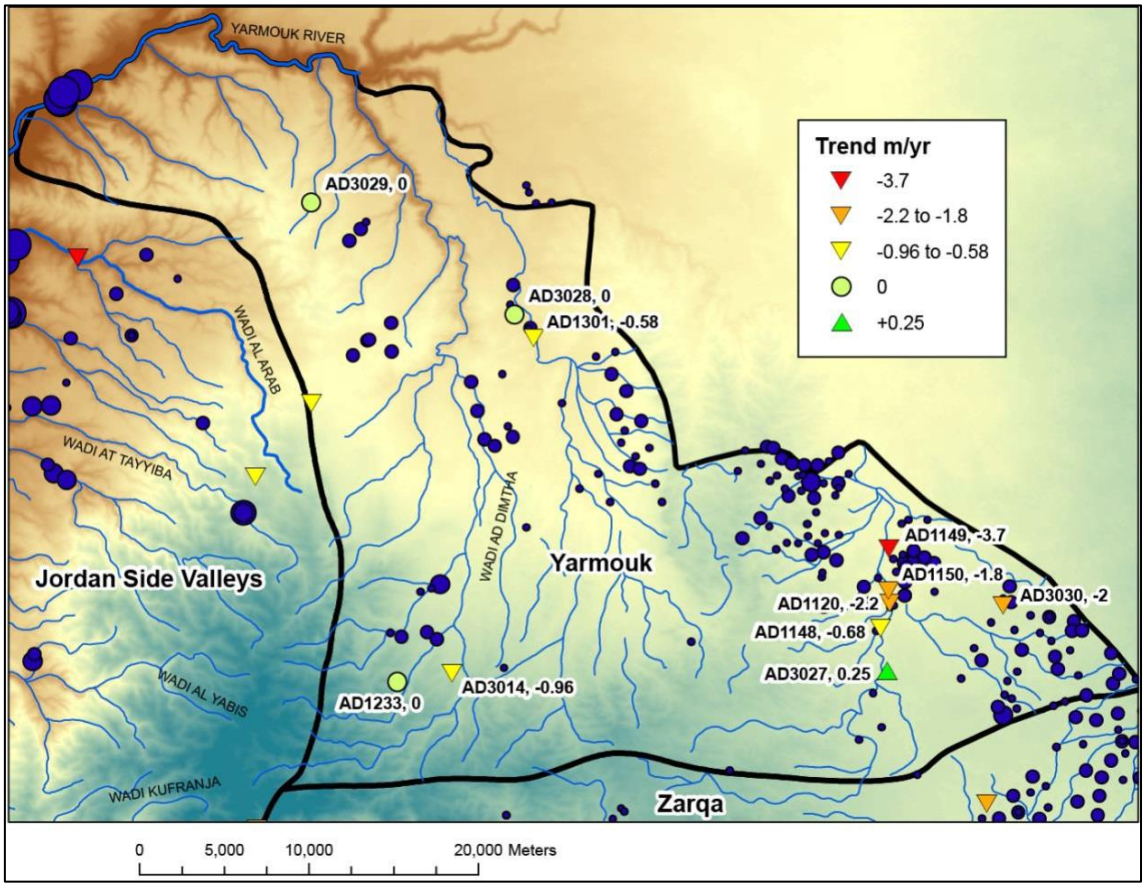


Figure 64: Trends in Groundwater Levels at Selected Wells in the Yarmouk Groundwater Basin

Groundwater quality

In the Yarmouk Basin, groundwater quality varies significantly across different areas and aquifer types. Generally, groundwater quality parameters include pH levels, electrical conductivity (EC), and concentrations of major ions such as calcium, magnesium, sodium, and chloride. Specific contaminants of concern often include nitrates from agricultural activities, pesticides, heavy metals from industrial sources, and organic pollutants from improper waste disposal.

The water quality of major springs in the Yarmouk Basin in northern Jordan has deteriorated due to rapid urbanisation and industrialisation. Based on many studies the concentrations of major cations and anions were found to be below permissible levels for potable water, with total dissolved solids measuring 617 mg/l or lower, indicating freshwater. The freshwater condition was further confirmed by moderate electrical conductivity (347-1234 µS/cm) and pH values lower than 8.09. Total iron concentrations ranged from 0.0 to 0.09 mg/l, well below the maximum permissible limit of 1 mg/l. The low SAR (0.5 to 1.34) and moderate electrical conductivity suggest medium salinity hazard and low sodium hazard, indicating that the water is generally suitable chemically for domestic, agricultural, and most industrial uses.[12]

11.2 Assessment of Potential Impacts, and Mitigation Measures During Construction and Operation Phases

This section identifies the anticipated impacts on geology, hydrology, and hydrogeology from the Project throughout its various phases. For each impact, a set of management measures (which could include mitigation measures, additional requirements, etc.) and monitoring measures have been identified to eliminate or reduce the impact to acceptable levels.

[12] Batayneh, A. (2011) Hydrochemical characteristics of the major water springs in the Yarmouk Basin, north Jordan. Natural Science, 3, 28-35

The potential impacts anticipated on geology, hydrology, and hydrogeology during construction and operation phases for the substation and the OHTL are presented in Table 30 and Table 31, respectively.

Table 30: Potential Flood and Erosion Impacts During Construction of the Substation and the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Floods and soil erosion impacts: - The topography within the catchment area, specifically in the western region of Mafraq, 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. - The western Mafraq 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	▪ Strategic Siting: - The EPC Contractor to avoid Wadi Construction: Avoid constructing any structures, including substation and power towers, within the natural wadi to prevent potential damage and to maintain the natural hydraulic characteristics of the wadi. Ensuring that the wadi's natural flow is unimpeded is essential for reducing flood risks and preserving the area's environmental integrity, Figure 65 shows the location to be considered as non-construction	▪ EPC Contractor to undertake a hydrodynamic analysis during the design phase. ▪ It is essential for 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. ▪ High-Resolution Modelling: 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. ▪ Digital Elevation Models (DEMs): EPC Contractor to employ DEMs to conduct detailed 2D hydraulic analyses, particularly for the substation area, to accurately evaluate flood depths and flow velocities. ▪ The EPC Contractor shall undertake a rigorous scrutiny and assessment of the infrastructure within this catchment area. Structural vulnerability assessments, including the evaluation of hydraulic structures like culverts, bridges, and drainage systems, should be conducted. Implementing erosion control measures and designing flood mitigation structures, such as retention basins or levees, tailored to the specific topographical and hydrological conditions, are critical. ▪ Additionally, the EPC Contractor shall undertake a detailed risk assessment incorporating GIS for spatial analysis to enhance the predictive capabilities and inform the design of robust flood management strategies. This approach ensures that the facilities for the project (Substation and OHTL) are adequately protected against the heightened flood risks posed by the region's topographical and hydrological dynamics. ▪ Erosion Control: the EPC Contractor shall implement slope stabilisation techniques at substation and other vulnerable areas to stabilise soil and reduce erosion.	▪ Review of final detailed design to ensure all flood risk mitigations are considered. ▪ The EPC Contractor is required to coordinate with NEPCO to provide the final detailed design to ensure they are aware of hydraulic designs required to be implemented for the Project and the associated costs. ▪ Inspection for flood control and erosion and runoff control to include inspections for implementation

	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.	area after a high-resolution hydraulic analysis is undertaken by the EPC Contractor. ▪ Setback Zones: - The EPC Contractor to establish buffer zones around wadis and other high-risk flood areas to maintain natural hydrological processes and protect infrastructure - No towers within 10 meters of water bodies.	▪ Timely (immediate) site restoration/ revegetation after construction completed ▪ Elevated Foundations: Where construction near wadis is unavoidable, EPC Contractor shall ensure structures are built on elevated foundations to minimise flood impact. ▪ It is expected that 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 greatest extent possible. ▪ Additional measures to be determined at a later stage, upon completion of the hydrological study.	of mitigation measures.
Type	Negative			
Duration	Long Term			
Magnitude	Medium			
Reversibility	Reversible			
Sensitivity	High			
Likelihood	Medium			
Significance	**Medium**			

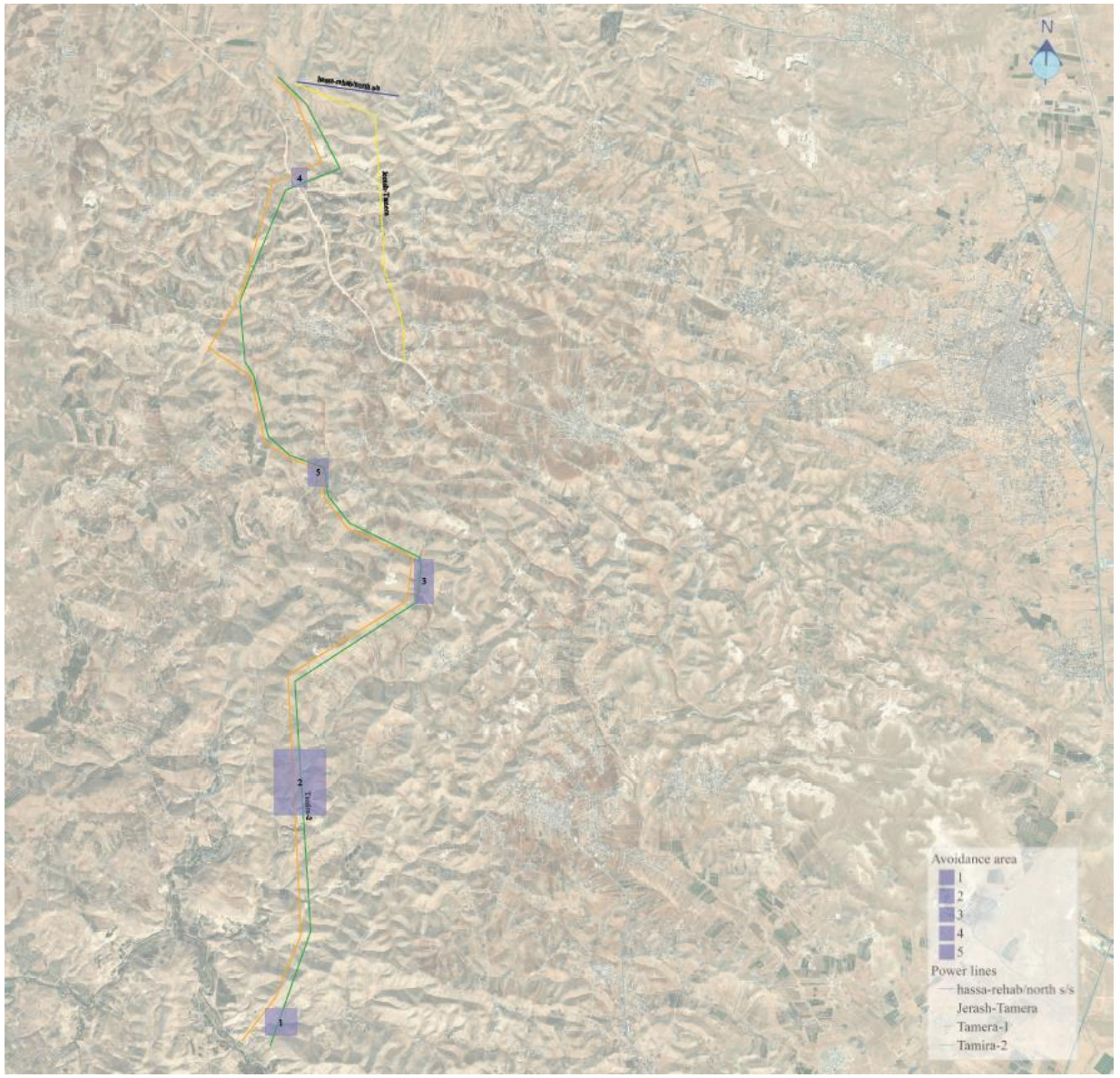


Figure 65:Locations to be Considered as Non-Construction Areas

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significance.

Table 31: Potential from Improper Management of Waste Streams during Construction and Operation of the Substation and the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase and Operation Phase				
Impact Description	▪ Given the generic nature of the impacts on soil and groundwater for both phases of the Project (construction and operation) those have been identified collectively. Generally, this includes potential impacts from improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and of hazardous material, etc.). ▪ Improper housekeeping practices during construction and operation (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). Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures which are expected to be implemented by the EPC Contractor throughout construction phase and Project Operator during the operation phase. ▪ Solid Waste: - Solid waste is expected to be generated from construction and operational activities. Solid waste generated will likely include construction waste (such as debris) and municipal solid waste (during	▪ 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	The following identifies the mitigation measures to be applied by all involved entities to include the EPC Contractor during the construction phase and the Project Operator (NEPCO) during the operational phase unless stated otherwise: ▪ Solid Waste: - 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" - EPC Contractor only - during construction, distribute a sufficient number of properly contained containers clearly marked as "Construction Waste" for the dumping and disposal of construction waste. - EPC Contractor only – during construction, it is recommended that recycling measures are implanted including separation and disposal of recyclables in a separate container (cardboard, paper, glass, metal, etc.); and separation and disposal of non-recyclable materials in a separate container (e.g. food waste). Each container must be clearly marked. In addition, EPC Contractor must seek ways to reduce construction waste by reusing materials (for example through recycling of concrete tower bases - 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	▪ Solid Waste: - Inspection of waste streams (waste, wastewater, hazardous waste) and hazardous material management practices onsite - Review of records and manifests for volume of waste streams (waste, wastewater, hazardous waste) generated to ensure consistency - Regular environmental reporting on implementation of the waste (waste, wastewater, hazardous waste) management practices onsite.

	construction and operation such as cardboard, plastic, food waste, etc.). - Municipal solid waste generated will likely be collected and stored onsite and then disposed to the closest municipal approved dumpsite; whereas the construction waste will be stored onsite and then disposed at the closest approved demolition waste landfill or, if possible, reused in the construction activities. ▪ Wastewater Generation - Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, showers, etc.) generated from workers during the construction and operation phase. Wastewater quantities are expected to be minimal. It is expected that wastewater will be collected and stored in fully contained septic tanks and then collected and transported by transportation tankers to be disposed at the closest Wastewater Treatment Plant (WWTP). ▪ Hazardous Waste Generation - Hazardous waste is expected to be generated throughout both the construction and operation phase and this could include consumed oil, chemicals, paint cans, etc. Hazardous waste generated will likely be collected and stored onsite and then disposed at the 'Swaqa Hazardous Waste Treatment Facility' which is managed by the MoEnv. - Routine tasks at the substation like maintenance, equipment servicing, and cleaning generate various waste		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. - 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. ▪ Wastewater Generation - 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. - 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. - EPC Contractor only - ensure that constructed septic tanks during construction and those to be used during operation are well contained and impermeable to prevent leakage of wastewater into soil. - 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. ▪ Hazardous Waste Generation - 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	▪ hazardous materials - Inspection for storage of hazardous materials to include inspections for potential spillages or leakages - Report any spills and the measures taken to minimise the impact and prevent from occurring again.

	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 - The nature of construction and operational activities entail the use of various hazardous materials such as oil, chemicals, and fuel for the various equipment and machinery. 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. - The construction and operation of substations can impact groundwater in various ways. One major concern is the risk of contamination. 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		sumps and pits). Contaminated drainage must be orderly disposed of as hazardous waste - Ensure that 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. - Regular maintenance of all machinery to prevent engine oil and fuel leaks - Minimise works near rivers/surface water bodies/wadis in wet weather - 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. ▪ Hazardous Material - 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 (such as oil, fuel, etc.) - Any new transformers at the substation should use polychlorinated biphenyls (PCB) free oil - Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as	

	hazardous materials used in maintenance and operations can lead to groundwater contamination if not properly managed. Effective spill response plans and regular maintenance checks are essential to mitigate these risks.		refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material. - Ensure that a minimum of 1,000 litters 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 - 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.	
Type	Negative			
Duration	Short Term during Construction Long Term during Operation			
Magnitude	Medium			
Reversibility	Reversible			
Sensitivity	Low			
Likelihood	Medium			
Significance	**Minor**			

Following the implementation of the mitigation measures, the residual significance can be reduced to not significant.

12 ARCHAEOLOGY AND CULTURAL HERITAGE

This section presents the baseline assessment of the Project site in relation to archaeology and cultural heritage as well as an assessment of potential impacts during various Project phases. For each impact, a set of avoidance and mitigation measures were identified.

12.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to Archaeology and cultural heritage and presents the outcomes and results of the assessment.

12.1.1 Methodology for Assessment

The assessment of baseline conditions was based on literature review undertaken by the ESIA team and a desktop assessment undertaken by the Department of Antiquities (DoA), both of which are discussed below.

(i) Literature Review

This included a comprehensive review of archives, publications, and studies on previous archaeological work and surveys undertaken in the area, and which are available at the DoA database. This database is registered in the Middle Eastern Geodatabase for Antiquities (MEGA) – Jordan. MEGA Jordan is a database, prepared by the Getty Conservation Institute in collaboration with DoA, that encompasses and registers all the known archaeological sites in Jordan based on previous surveys undertaken.

(ii) Desktop Assessment by the Department of Antiquities

The ESIA Team sent an official letter to DoA (Number 03/66/دائرة الآثار العامة/NEPCO 24-18) dated 10 June 2024 to request DoA expert opinion regarding the substation area and the OHTL route and identify whether there are any archaeological sites or remains that should be considered in the ESIA.

The DoA is the official governmental entity in Jordan responsible for the protection, conservation, and preservation of antiquities in accordance with the “Antiquities Law No. 21 for the year 1988”.

12.1.2 Results and Outcomes

Jordan is home to numerous archaeological sites and tourist attractions as shown in Figure 66. However, none of these sites are within the Project area.

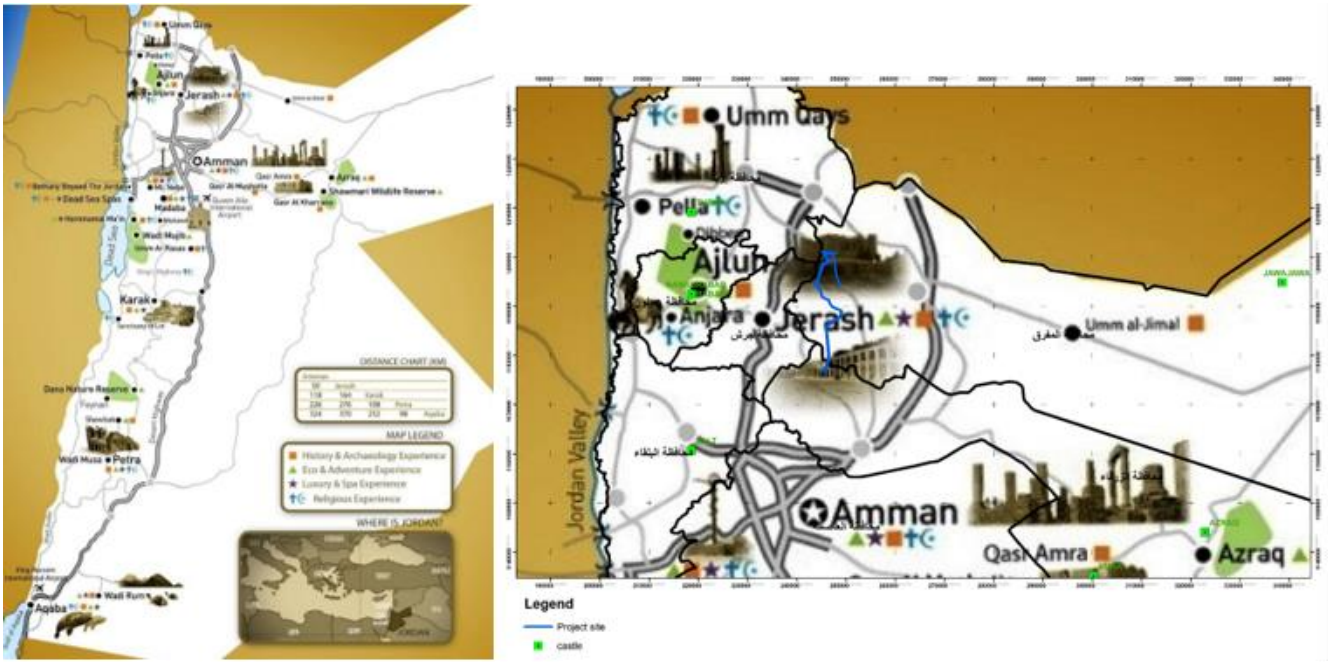


Figure 66: Archaeological Sites in Jordan

Based on an analysis of secondary data from Middle Eastern Geodatabse for Antiquities (MEGA) - Jordan, the Substation Site is situated within an area that was surveyed by DoA in 2022, known as the "Bureiqa Survey." There are no further details on MEGA Jordan which identify the results of the survey or whether there are any key archaeological sites within the Substation site. However, based on MEGA Jordan, there are several archaeological sites within the vicinity and proximity of the Substation site as shown in Figure 67 below.

The MEGA - Jordan is an official website managed by the DoA. The points displayed on the website represent registered archaeological sites and remains that have been studied and surveyed by the DoA. It also identifies potential sites that have not been fully explored archaeologically or those identified as potential archaeological sites through review of aerial images for example but could be of archaeological importance and require an archaeological survey to verify their importance or dismiss it. Some of the points are regularly updated as new archaeological sites and remains are discovered as a result of DoA site surveys. Some of the points on MEGA Jordan are indicative and require a site assessment by the DoA to verify the importance of these sites and the presence of others not registered in the system.

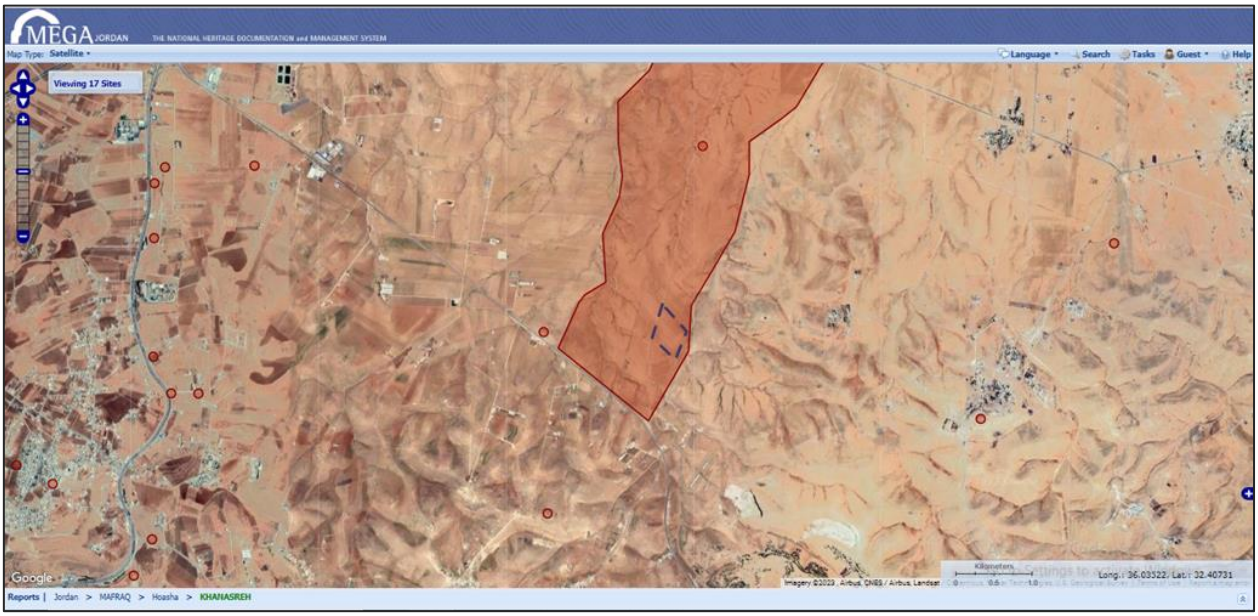


Figure 67: MEGA Jordan Archaeological Sites Within or in the Proximity of the Substation Site

Further review of secondary data from MEGA Jordan indicates the presence of several archaeological sites in the vicinity and along the proposed route of the OHTL. The figures below illustrate these findings, with a blue dotted area representing a 500-meter buffer zone around each OHTL.

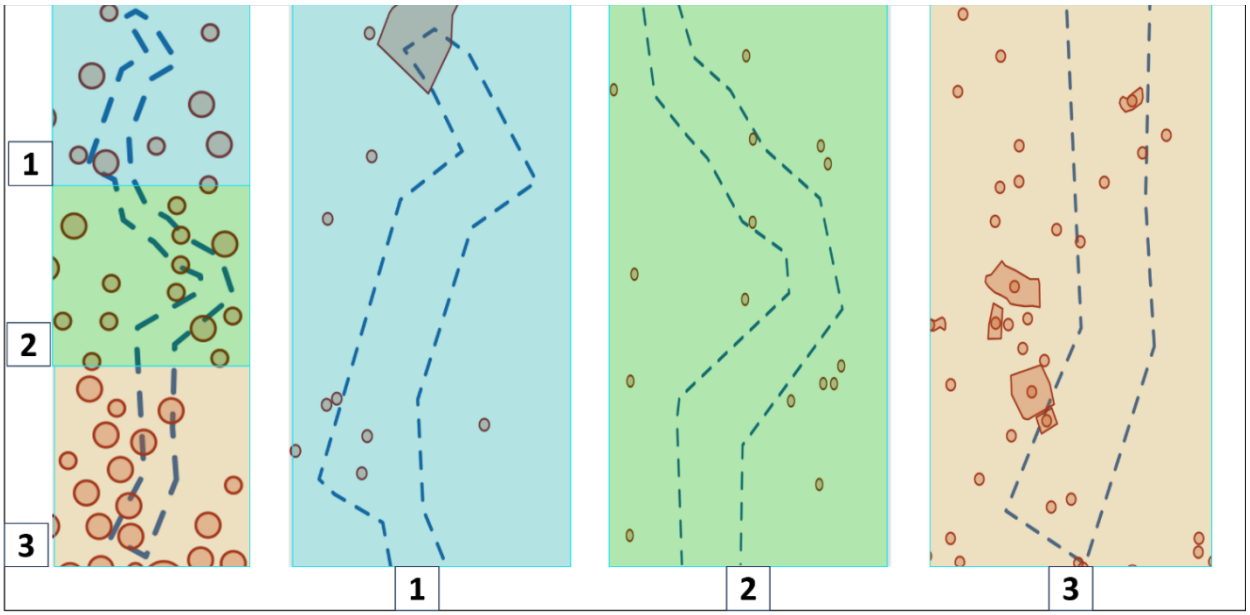


Figure 68: MEGA Jordan Archaeological Sites Within or in the Proximity of the 400 kV OHTL Route

As indicated above, these sites require a survey by the DoA to assess the sites and verify whether they are actually archaeological sites and determine their significance.

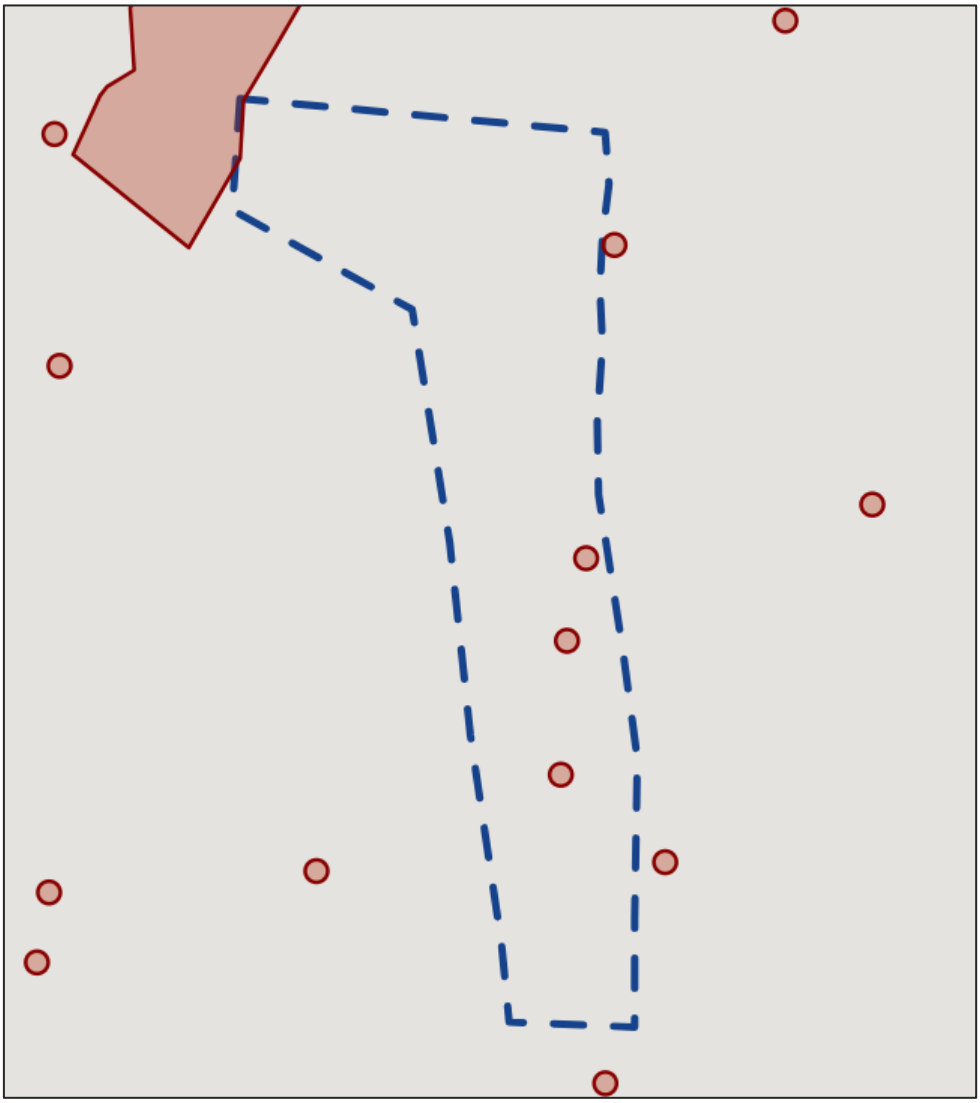
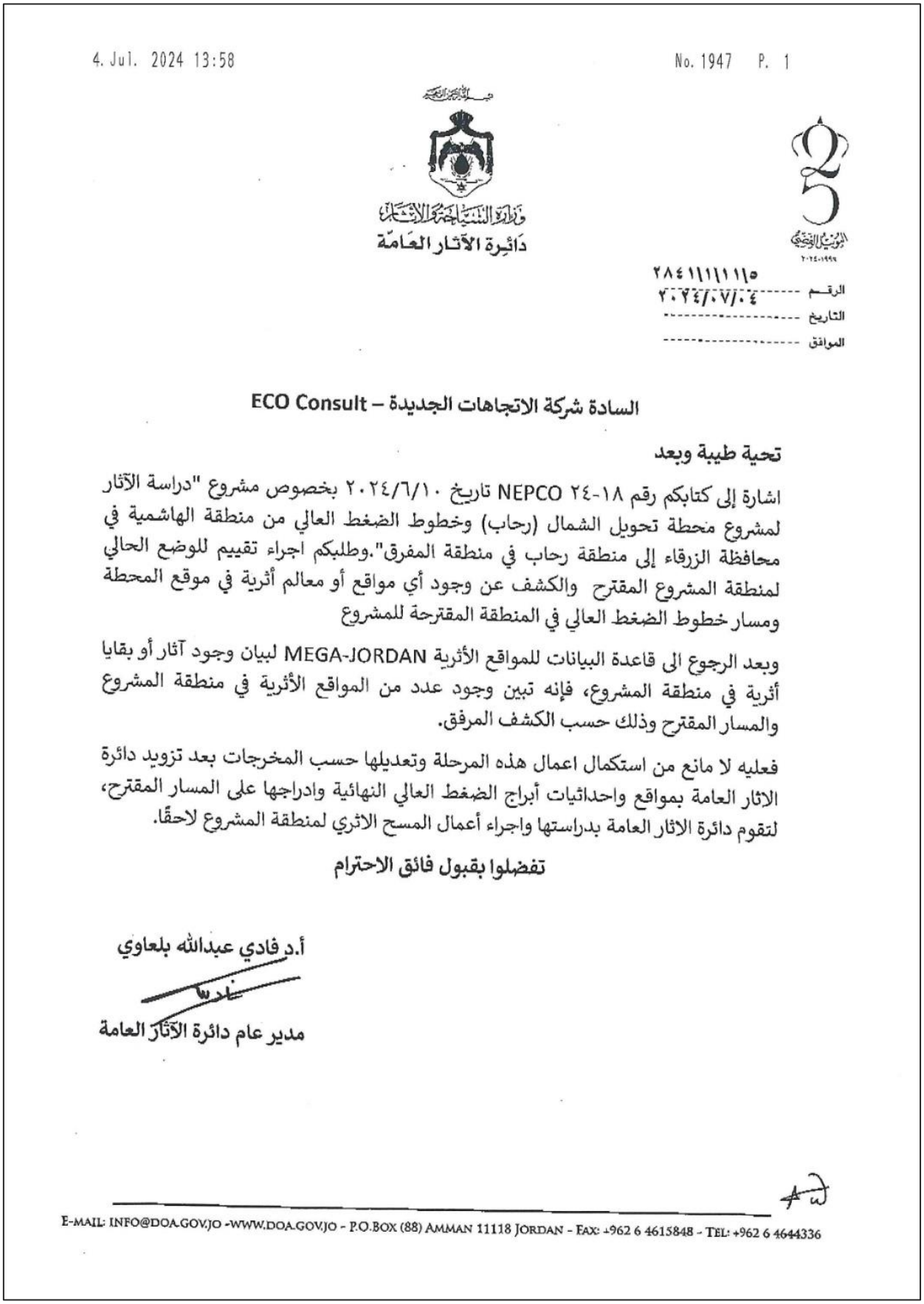


Figure 69: MEGA Jordan Archaeological Sites Within or in the Proximity of the 132 kV OHTL Route

The DoA assessment concluded that there could be 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 and site investigation. Refer to DoA's response in Figure 70 below.

Moreover, before commencing any construction works and as part of the Project environmental license/permit, an application should be submitted to the DoA to obtain a no-objection certificate prior to any work commencement. The DoA will require undertaking a detailed archaeological survey for the Project (under the footprint of the towers and any other foundations as well as the access routes).



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وزارة السياحة والآثار
دائرة الآثار العامة

الرقم ٢٨٤١١١١١١٥
التاريخ ٢٠٢٤/٧/٤
الموافق

السادة شركة الاتجاهات الجديدة – ECO Consult

تحية طيبة وبعد

اشارة إلى كتابكم رقم NEPCO ٢٤-١٨ تاريخ ٢٠٢٤/٦/١٠ بخصوص مشروع "دراسة الآثار لمشروع محطة تحويل الشمال (رحاب) وخطوط الضغط العالي من منطقة الهاشمية في محافظة الزرقاء إلى منطقة رحاب في منطقة المفرق".وطلبكم اجراء تقييم للوضع الحالي لمنطقة المشروع المقترح والكشف عن وجود أي مواقع أو معالم أثرية في موقع المحطة ومسار خطوط الضغط العالي في المنطقة المقترحة للمشروع

وبعد الرجوع الى قاعدة البيانات للمواقع الأثرية MEGA-JORDAN لبيان وجود آثار أو بقايا أثرية في منطقة المشروع، فإنه تبين وجود عدد من المواقع الأثرية في منطقة المشروع والمسار المقترح وذلك حسب الكشف المرفق.

فعليه لا مانع من استكمال اعمال هذه المرحلة وتعديلها حسب المخرجات بعد تزويد دائرة الاثار العامة بمواقع واحداثيات أبراج الضغط العالي النهائية وادراجها على المسار المقترح، لتقوم دائرة الاثار العامة بدراستها واجراء أعمال المسح الاثري لمنطقة المشروع لاحقًا.

تفضلوا بقبول فائق الاحترام

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Figure 70: DoA Findings Letter

12.2 Assessment of Potential Impacts, and Mitigation Measures

The potential impacts anticipated on archaeology during construction and operation phases for the substation and the OHTL are presented in Table 32 and Table 33, respectively.

Table 32: Potential Impacts on Archaeology During Construction and Operation of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ As discussed in the baseline section, 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. ▪ Throughout the construction phase, and as the case with any Project development that entails such construction activities, there is a chance that potential archaeological remains in the ground might be discovered.	▪ Coordinate with DoA to determine any additional requirements needed (such as an archaeology survey) and obtain the exact locations of archaeological sites that might be present within or in proximity to the land. Based on the response from the DoA, avoidance measures will be identified and incorporated in the detailed design.	▪ Based on the response from the DoA, mitigation measures will be identified and incorporated in the detailed design. The archaeology survey will be required as part of the ESIA to be submitted to the MoEnv to obtain the required environmental permit. ▪ It is expected that appropriate measures for such chance find procedures are implemented which are standard requirements by the DoA as required by the "Antiquities Law No. 21 for 1988 and its amendments No. 23 for 2004". Those mainly require that construction activities be halted, and the area fenced, while immediately notifying the DoA. No additional work will be allowed before the Department assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply ▪ Prepare and implement chance find procedure.	▪ For chance find procedures, inspection of actions taken in case of new discoveries, including fencing, limiting access to site, and contacting the DoA. Report should be prepared and submitted to the DoA in such a case which details the above.
Type	Negative			
Duration	Short Term			
Magnitude	High			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Moderate**			
Operation Phase				
Impact Description	▪ There are no anticipated impacts on archaeology and cultural heritage during the operation phase.	----	----	
Type	Not Applicable			
Duration	Not Applicable			
Magnitude	Not Applicable			
Reversibility	Not Applicable			
Sensitivity	Not Applicable			
Likelihood	Not Applicable			
Significance	**Not Applicable**			

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Table 33: Potential Impacts on Archaeology During Construction and Operation of the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Several archaeological sites were identified along the OHTL route which might be impacted by the construction of the OHTL towers. ▪ Moreover, construction activities could potentially damage or disturb any buried archaeological remains that might be present.	▪ 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.	▪ Based on the response from the DoA, mitigation measures will be identified and incorporated in the detailed design. The archaeology survey will be required as part of the ESIA to be submitted to the MoEnv to obtain the required environmental permit. ▪ It is expected that appropriate measures for such chance find procedures are implemented which are standard requirements by the DoA as required by the "Antiquities Law No. 21 for 1988 and its amendments No. 23 for 2004". Those mainly require that construction activities be halted, and the area fenced, while immediately notifying the DoA. No additional work will be allowed before the Department assesses the found potential archaeological site and grants a clearance to resume the work. Construction activities can continue at other parts of the site if no potential archaeological remains were found. If found, same procedures above apply ▪ Prepare and implement chance find procedure.	▪ For chance find procedures, inspection of actions taken in case of new discoveries, including fencing, limiting access to site, and contacting the DoA. Report should be prepared and submitted to the DoA in such a case which details the above.
Type	Negative			
Duration	Short Term			
Magnitude	High			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Moderate**			
Operation Phase				
Impact Description	▪ There are no anticipated impacts on archaeology and cultural heritage during the operation phase.	----	----	
Type	Not Applicable			
Duration	Not Applicable			
Magnitude	Not Applicable			
Reversibility	Not Applicable			
Sensitivity	Not Applicable			
Likelihood	Not Applicable			
Significance	**Not Applicable**			

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

13 AIR QUALITY AND NOISE

13.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to air quality and noise and presents the outcomes and results of the assessment.

13.1.1 Methodology for Assessment

The assessment of baseline conditions was based on literature review undertaken by the ESIA team and identification of sources of air emissions and noise during the site visit.

13.1.2 Results and Outcomes

Mafraq, located in northern Jordan, is a governorate characterised by its diverse population, comprising a mix of urban and rural communities. Agriculture plays a crucial role in the local economy, with residents engaging in crop cultivation and livestock rearing, leveraging the region's semi-arid climate and fertile lands. The area is particularly known for producing wheat, barley, olives, and various fruits and vegetables.

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. 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 that could cause pollution or noise. 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).

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. Based on the site assessment and the nature of land use in the area, there are no key sources of air emissions and noise in the area. The area could be considered of rural settings.

The ESIA Team did not undertake any air quality or noise measurements as part of the baseline assessment. The air quality and noise measurements will be required as part of the ESIA to be submitted to the MoEnv to obtain the required environmental permit. Coordination with the MoEnv will be required to identify the required measurement programme in terms of locations, duration, parameters, and others.

13.2 Assessment of Potential Impacts, and Mitigation Measures

The potential impacts anticipated on air quality and noise during construction and operation phases for the substation and the OHTL are presented in Table 34 and Table 35, respectively.

Table 34: Potential Impacts on Air Quality and Noise During Construction and Operation of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ During construction, activities such as excavation, grading, and operation of machinery and equipment can generate dust and air pollutants (such as sulphur dioxide, nitrogen dioxide, carbon monoxide, etc.), along with increased noise levels.	▪ High noise level construction activities should not be carried out between 8pm - 6am.	▪ Implement basic dust control and suppression measures, which may include: - Regularly watering active construction areas to suppress dust. - Planning dust-generating activities to occur simultaneously to reduce dust incidents over the construction period. - Managing stockpiles and excavated material properly by watering, containing, covering, or bundling them. - Covering trucks transporting aggregates and fine materials with tarpaulins. - Enforcing a speed limit of 15 km/h for trucks on the construction site. - Conducting regular inspections and maintenance of vehicles, machinery, and equipment used during the construction phase to detect issues early and prevent unnecessary pollutant emissions. ▪ 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.	▪ Inspection and visual monitoring of the works should be carried out at all times. In addition, periodic inspections should be conducted at nearby sensitive receptors to determine whether high levels of dust from construction activities exist ▪ Reporting of any excessive levels of pollutants/dust and the measures taken to minimise the impact and prevent it from occurring again ▪ Submission and handling of any grievances related to the above.
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Reversible			
Sensitivity	Medium			
Likelihood	High			
Significance	**Minor**			
Operation Phase				
Impact Description	▪ Air quality impacts from substations are very minimal, primarily stemming from occasional emissions from backup generators or maintenance	▪ The EPC Contractor to include and implement measures to control operation noise in the substation.	▪ 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.	▪ Monitoring to ensure compliance and no noise complaints. ▪ In case of complaints, undertake investigation to identify the source

	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 (CO_2) 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.		▪ Implement emission control technologies, such as particulate filters, to minimise emissions from diesel-powered equipment. ▪ For SF6 in substation: - 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 continuously monitor and detect any leaks in SF6 equipment - Handling of hazardous material to be performed as mentioned within the accompanying l 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. This documentation serves to track the history of SF6 equipment and past leak incidents. - 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 - 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.	and cause of the issue and implement measures to rectify. ▪ Report if any noise measurements exceed standards, and any mitigation needed ▪ Audit reports every 6 months during the construction process ▪ NEPCO to monitor proper implementation

	▪ 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.		- Contractor to prepare and submit a SF6 leakage detection and management plan	
Type	Negative			
Duration	Long Term			
Magnitude	Medium			
Reversibility	Reversible			
Sensitivity	Medium			
Likelihood	Low			
Significance	**Minor**			

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

Table 35: Potential Impacts on Air Quality and Noise During Construction and Operation of the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Site preparation activities for the OHTL towers and various Project components, including foundations, cables, access roads, etc., will involve land clearing, levelling, excavation, and grading. These activities are confined to the relatively small individual footprints of the facilities, resulting in	▪ There are no avoidance measures to be considered.	▪ Implement basic dust control and suppression measures, which may include: - Regularly watering active construction areas to suppress dust. - Planning dust-generating activities to occur simultaneously to reduce dust incidents over the construction period. - Managing stockpiles and excavated material properly by watering, containing, covering, or bundling them. - Covering trucks transporting aggregates and fine materials with tarpaulins. - Enforcing a speed limit of 15 km/h for trucks on the construction site.	▪ Monitoring to ensure compliance and no dust and/or noise complaints. ▪ In case of complaints, undertake investigation to identify the source and cause of the issue and implement measures to rectify. ▪ Report if any noise measurements exceed

	a minimal overall area of disturbance. However, such activities will likely generate increased levels of dust and particulate matter emissions, temporarily impacting ambient air quality. ▪ Additionally, the use of vehicles, machinery, and equipment (such as generators, compressors, etc.) during construction is expected to emit pollutants (such as SO_2, NO_2, CO, etc.), which will have minimal direct impacts on ambient air quality. ▪ Furthermore, the operation of machinery and equipment like generators, hammers, and compressors is expected to produce noise and vibrations affecting the Project site and its surroundings.		- Conducting regular inspections and maintenance of vehicles, machinery, and equipment used during the construction phase to detect issues early and prevent unnecessary pollutant emissions. ▪ 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 to detect issues early and avoid unnecessary elevated noise levels. ▪ 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.	standards, and any mitigation needed ▪ Audit reports every 6 months during the construction process ▪ NEPCO to monitor proper implementation
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Reversible			
Sensitivity	Medium			
Likelihood	Low			
Significance	**Minor**			
Operation Phase				
Impact Description	▪ High-voltage transmission lines can generate small amounts of ozone due to corona discharge, which occurs when the electrical field around the conductors	▪ NEPCO to measure existing EMF levels at the applicable distances according to instructions from 'Sanitary rules to ensure	▪ NEPCO to implement measures to control operation noise: - On-demand monitoring in case of complaint or request by resident or other affected persona - Implementation of mitigation if noise exceeds standards	▪ Monitoring to ensure compliance and no noise complaints. ▪ In case of complaints, undertake investigation to identify the source

	ionises the surrounding air. However, the amount of ozone produced is typically very low and does not significantly impact air quality. ▪ With regards to noise, OHTLs can produce a low-level hissing or crackling noise due to corona discharge, especially during wet weather conditions. This noise is generally not loud and tends to be more noticeable in very quiet environments.	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: - Engineering measures (e.g., rubber footings) to suppress operational noise at substations		and cause of the issue and implement measures to rectify. ▪ Report if any noise measurements exceed standards, and any mitigation needed ▪ Audit reports every 6 months during the construction process ▪ NEPCO to monitor proper implementation
Type	Negative			
Duration	Long Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			

Following the implementation of these mitigation measures, the significance of the residual impact can be reduced to not significant.

14 BIODIVERISTY

This section presents the baseline assessment of the Project site in relation to biodiversity as well as an assessment of potential impacts during the various project phases. For each impact, a set of avoidance and mitigation measures were identified.

14.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to biodiversity and presents the outcomes and results of the assessment.

14.1.1 Methodology for Assessment

The study was accomplished in July 2024 over two field working days using maps generated from Google Earth and processed by GIS software type ESRI ArcView 10.1. All locations were recorded using the Geographical Positioning System (GPS) type Garmin Etryx with an accuracy of +/- five meters. The following methods were used for the survey.

- Desktop Survey

As the project progresses, this method will entail obtaining available information about faunal and floral diversity within the Mediterranean and the Irano-Turanian biogeographical zones. The review included similar projects on power lines' effects on species diversity and ecosystems. Materials reviewed include historical and present information from published books, articles, reports for either published or unpublished, and internet sources.

- Site Assessment

The field survey followed routes established along the proposed project area, targeting the species diversity of fauna and flora. The route included stops to survey the location and record the species present. Additionally, any incidental observations outside the systematic methods were recorded, including sightings of reptiles, mammals, birds, and plant species.

14.1.2 Results and Outcomes

A. <u>Project Location Characteristics</u>

The site is extensively utilised and degraded, with the proposed OHTL route passing through diverse landscapes including agricultural areas, forests, residential zones and areas occupied by households, farms and nomads (Figure 71). Numerous agricultural dirt roads crisscross the region, and paved roads also link the villages, and although an OHTL originates in the south, it diverges from the proposed route as it heads north. Electric service is evident from the presence of lighting poles.

Figure 71: Different Landscape View Along the Study Area

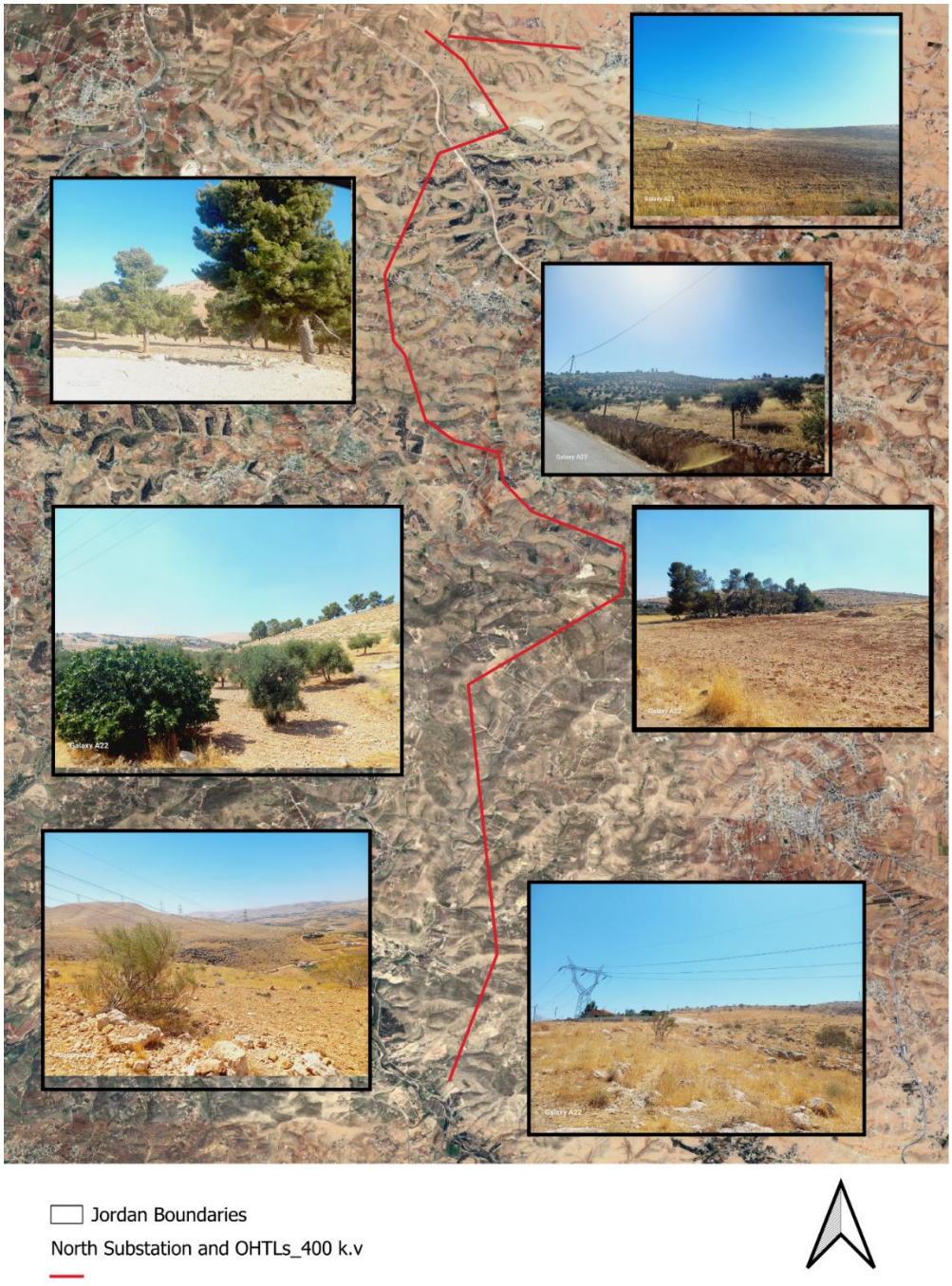

Figure 72: Site Location and Different Landscape Views

An important consideration is the presence of four forested areas along the proposed route (Figure 73 and Figure 74). In the first three locations the route passes through sparsely forested regions, providing flexibility for the contractor to manage tower placements. However, the fourth area consists of dense forests that should be avoided during construction to minimise environmental impact and comply with regulatory requirements.

Figure 73: Aleppo Pine Forest Location Along the Proposed Route

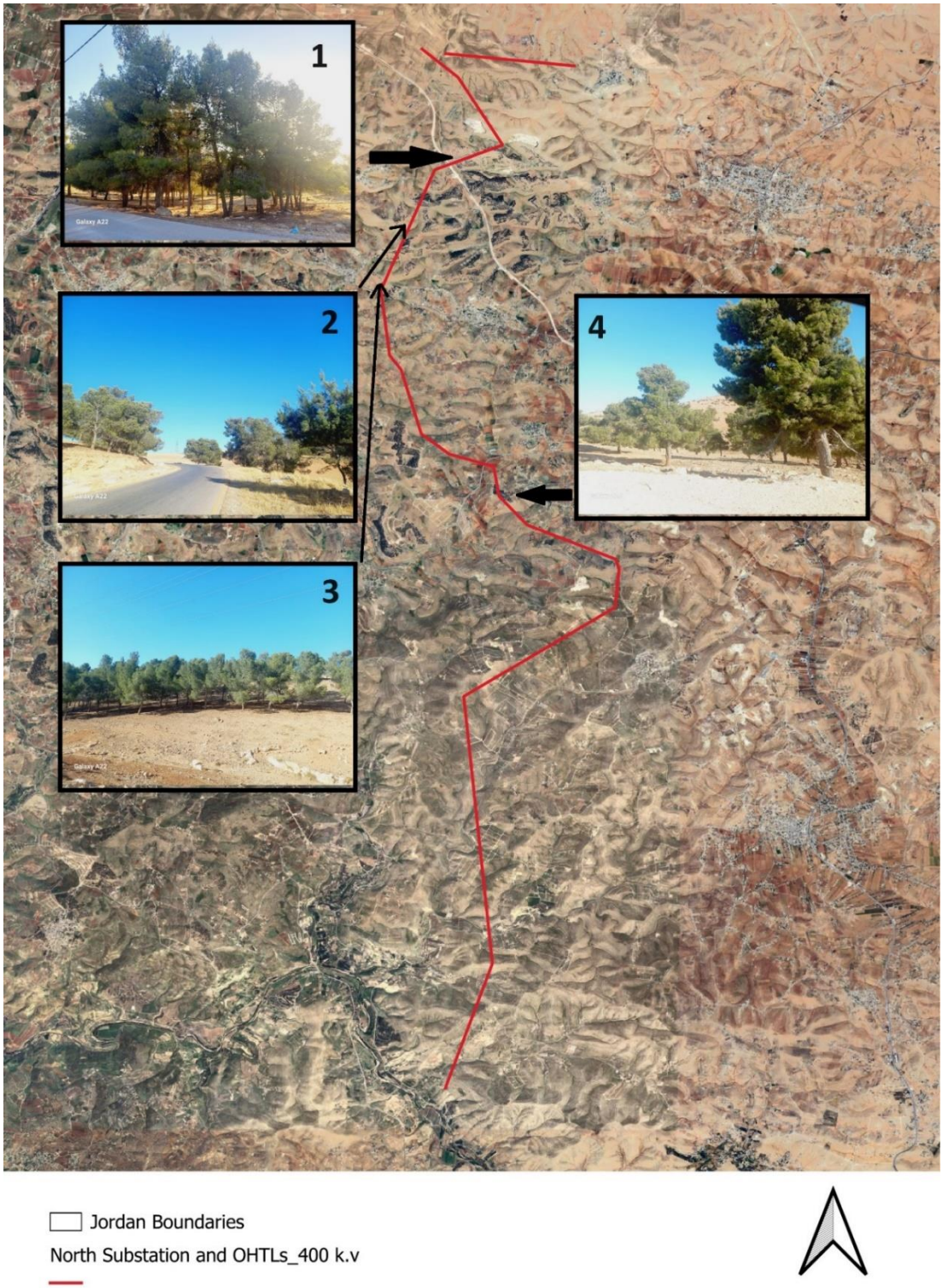

Figure 74: Locations of the Forested Regions Along the Proposed Route

According to the Instruction for Organising the Management of Government Forests and Forest Trees Growing on Treasury and Forest Lands No. 1 Z of 2017 issued by MoA:

- It is prohibited to cut certain types of forest trees.
- Construction works are not allowed on forest lands (Haraj) that contain trees with a density of more than 10% of the land area.
- In the cases that trees in the forest lands (Haraj) are allowed to be cut, some penalties and compensation measures are requested by MoA.

However, based on discussions with the MoA, they have an agreement with NEPCO that allows the latter to extend OHTLs within forest (haraj) land conditional that cutting forest trees is prevented to the maximum extent possible. In case cutting of some trees is required as a last resort, an official communication should be

undertaken by NEPCO with MoA to indicate the areas where trees need to be cut and the number, type, and age of the trees. MoA would then communicate to NEPCO whether any penalties or compensation measures would be imposed.

Given that the proposed route will traverse pine forests and will require road access for staff and equipment during construction, maintenance, and repairs, it is crucial to avoid routes that could lead to forest fragmentation or significant habitat disruption. To minimize pollution impacts (both liquid and solid), forested areas should be avoided as outlined in the design and planning phase. If avoiding forested areas proves challenging, especially in sparsely vegetated forests, permission must be obtained from the Ministry of Agriculture's Forestry Department. Additionally, any damage to the forest must be mitigated through reforestation or planting initiatives.

Figure 45 shows an example of a location along the proposed OHTL route which intersects with Haraj, along with proposed tower locations indicated by circles. This example demonstrates how to avoid tree cutting by positioning the towers in clear spots and maintaining an approximate span of 300 m between them.

- **Project Location to Bio-geographical Zones of Jordan**

Jordan encompasses four biogeographical zones: i) Mediterranean, ii) Irano-Turanian, iii) Saharo-Sindian-Arabian, and iv) Saharo-Sindian-Nubo-Sindian (Taifour et al., 2022; Al-Eisawi, 1996). This project spans the Mediterranean and the Irano-Turanian. The Mediterranean zone, confined to Jordan's highlands at altitudes from 700 to 1850 meters above sea level, experiences a temperate climate with hot, dry summers and mild, wet winters. Annual temperatures range from 5 to 10º C (minimum) and 20 to 30º C (maximum). Rainfall varies between 300 and 600 mm but is irregular and fluctuates. The soil, dominated by red Mediterranean soil (terra rossa) and yellow Mediterranean soil (rendzina), represents the most fertile part of the Kingdom, supporting forest formation. The Irano-Turanian zone covers approximately 141 km² of the study area, mainly located in the eastern parts of Al-Ramtha. This zone features a dry continental climate with hot summers and cold winters. Annual minimum temperatures range from 2 to 5ºC, while maxima range from 15 to 25º C. Rainfall varies between 150 and 300 mm, and altitudes range from 500 to 700m. The soils are primarily calcareous or wind-transported, supporting predominantly steppe vegetation. It is crucial to note that while the project maps indicate encroachment into the Irano-Turanian region, the area's climate is primarily Mediterranean, making it a transitional zone. Therefore, the project can be viewed as entirely within the Mediterranean region and its transitional zones (Figure 75 and Figure 76).

Figure 75: Landscape View of the Homogenous Habitats in the Study Area

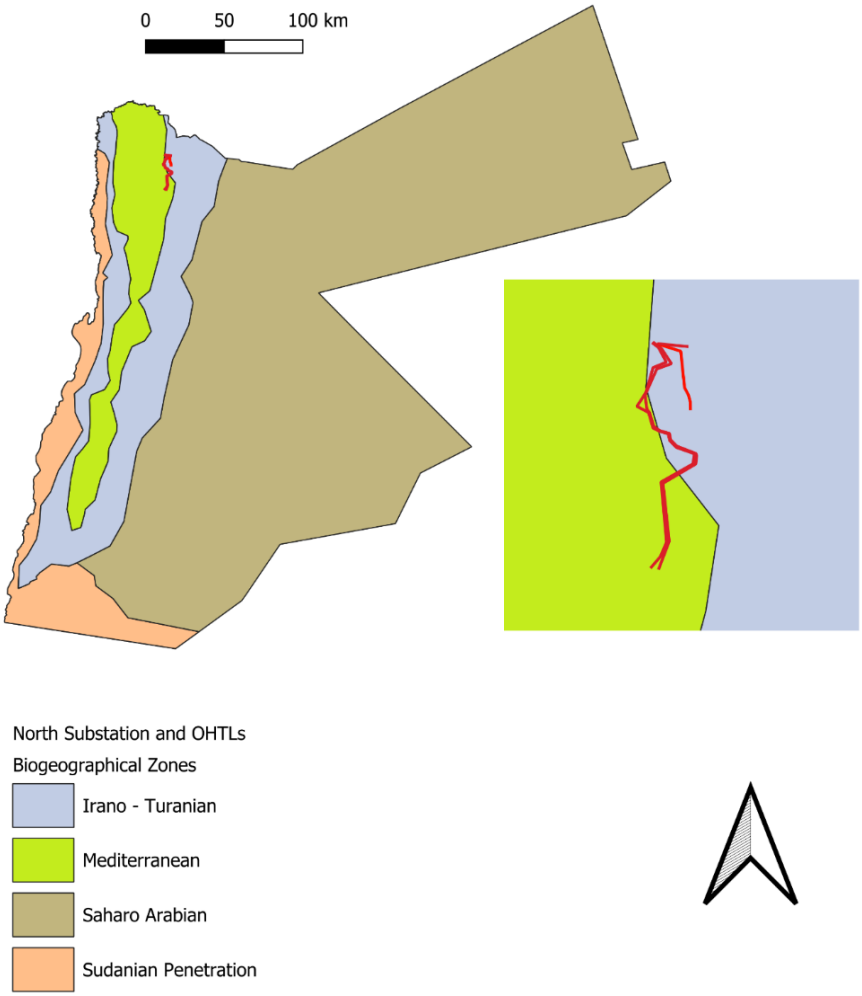

Figure 76: Project Location within Jordan's Biogeographical Zones

- **Project Location to Vegetation Types of Jordan**

The project is situated entirely within Jordan's garrigue and batha vegetation types, both of which are forms of Mediterranean shrubland. These ecosystems are dominated by low-growing shrubs and herbs that are drought-adapted, crucial for controlling soil erosion and providing habitat for various animals. They typically thrive on sloping or rocky terrain with limited soil depth. Given the current physical and climatic conditions, these ecosystems do not support forest formation. The predominant plant communities include *Sarcopoterium spinosum* and other small shrubs. The northern boundary of the project area where the station will be established lies within the steppe vegetation zone, which transitions between the Arabian desert and the Mediterranean biogeographical regions. This zone is characterised by arid grasslands with low-growing vegetation, primarily grasses, herbs, and shrubs adapted to dry climates with less than 250 mm annual rainfall. Plant species within this vegetation exhibit various adaptations to survive harsh environments, including deep root systems for efficient water uptake, spiny or hairy leaves to reduce water loss, efficient seed dispersal mechanisms for rapid colonisation of new areas, and the ability to tolerate prolonged drought periods

Figure 77: Garrigue and Batha Vegetation Types Dominant Along the Proposed Route

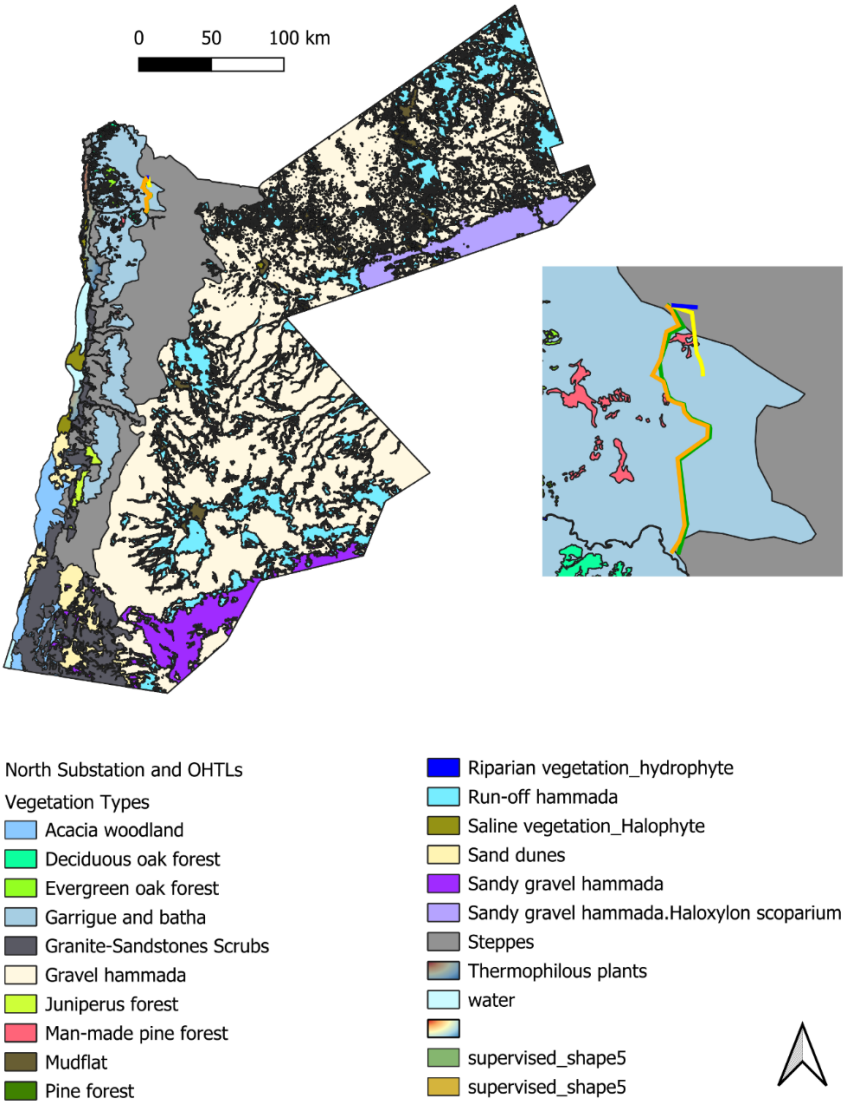

Figure 78: Project Location within Jordan's Vegetation Types

- **Project Location to Jordan's Network of KBAs**

KBAs are nationally identified sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems. These sites are identified based on a Global Standard[13] published by the International Union for the Conservation of Nature (IUCN) for the Identification of KBAs providing criteria under which an area can be quantitatively assessed for inclusion as a KBA, with the thresholds being applicable and comparable across taxonomic groups. KBA identification builds off the existing network of KBAs, which includes: 1. Important Bird and Biodiversity Areas (IBAs); 2. Important Plant Areas (IPAs); 3. Important Sites for Freshwater Biodiversity; and 4. Alliance for Zero Extinction (AZE) sites (Global list of sites containing 95% or more of the remaining population of one or more species listed as endangered or critically endangered on the IUCN Red List of Threatened Species). In addition, there are also Natural Reserves (protected areas) which are presented in Figure 79. Figure 80 shows an environmental sensitivity map showing KBAs and protected areas in Jordan. KBAs may qualify as Critical Habitat where mitigation is needed.

The MoEnv has the responsibility of establishing natural reserves, national parks, and any site of special environmental significance for protection and management. However, the MoEnv delegates such responsibilities to the RSCN.

[13] IUCN, 2016 (portals.iucn.org/library/sites/library/files/documents/2016-048.pdf)

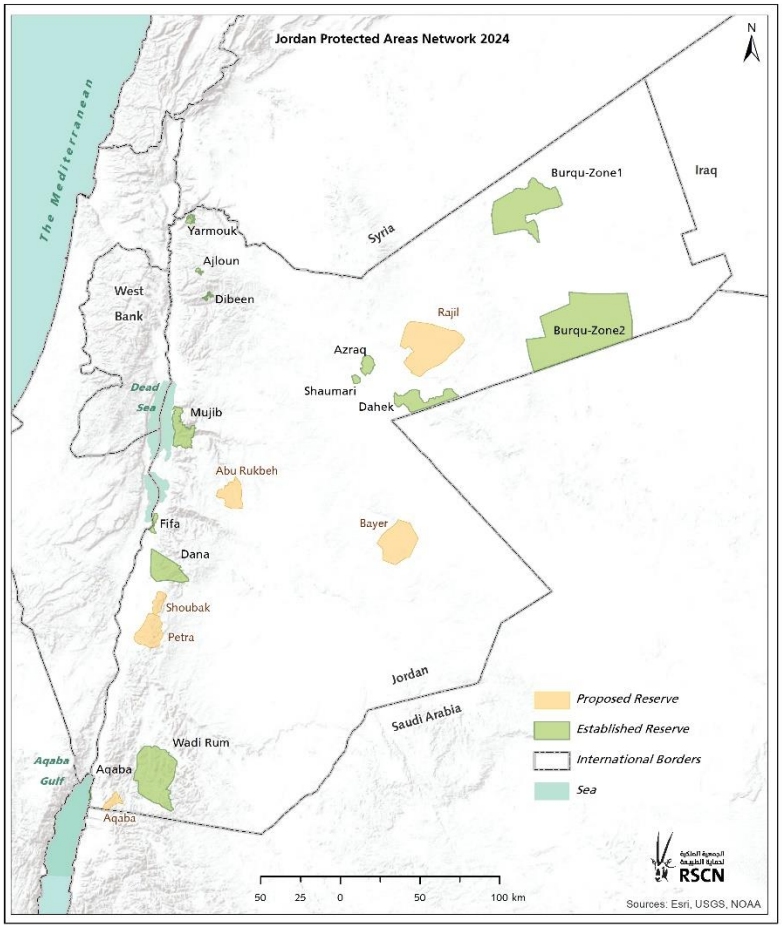

Figure 79: Established and Proposed Protected Areas in Jordan

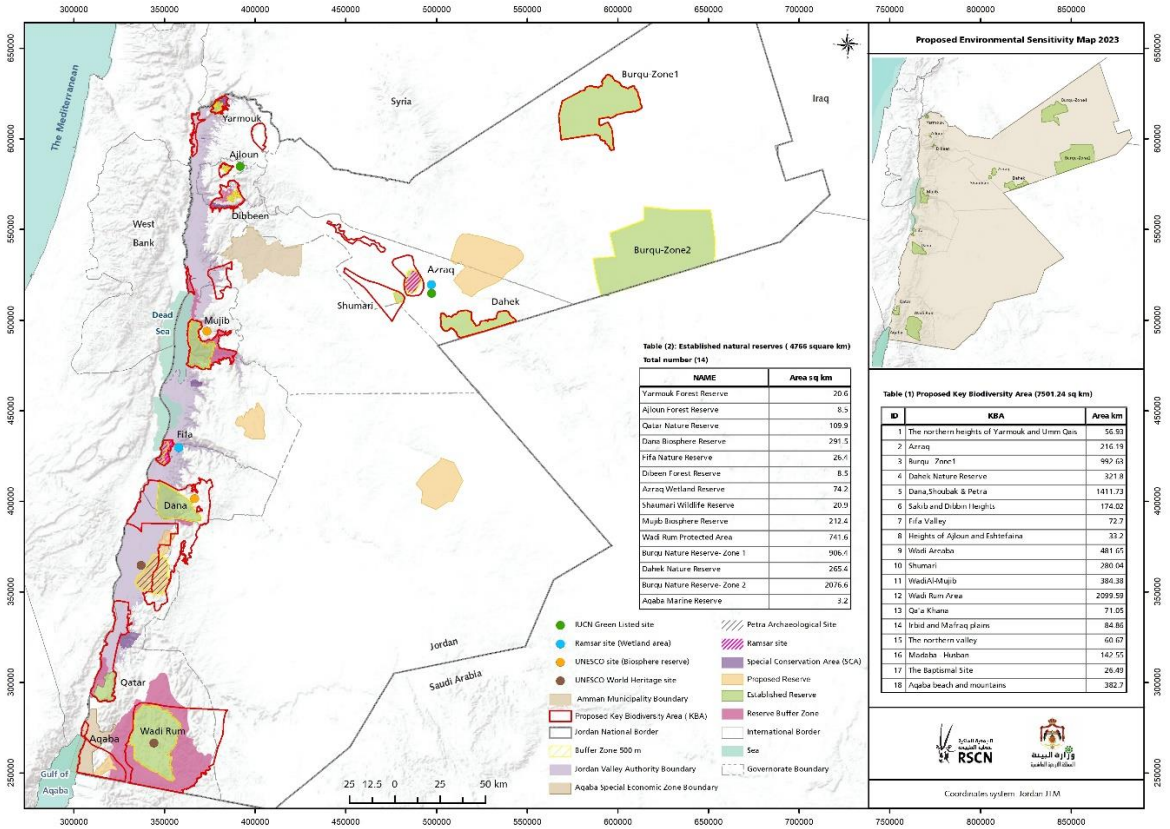

Figure 80: Proposed Environmental Sensitivity Map showing KBAs and Protected Areas

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 81, 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).

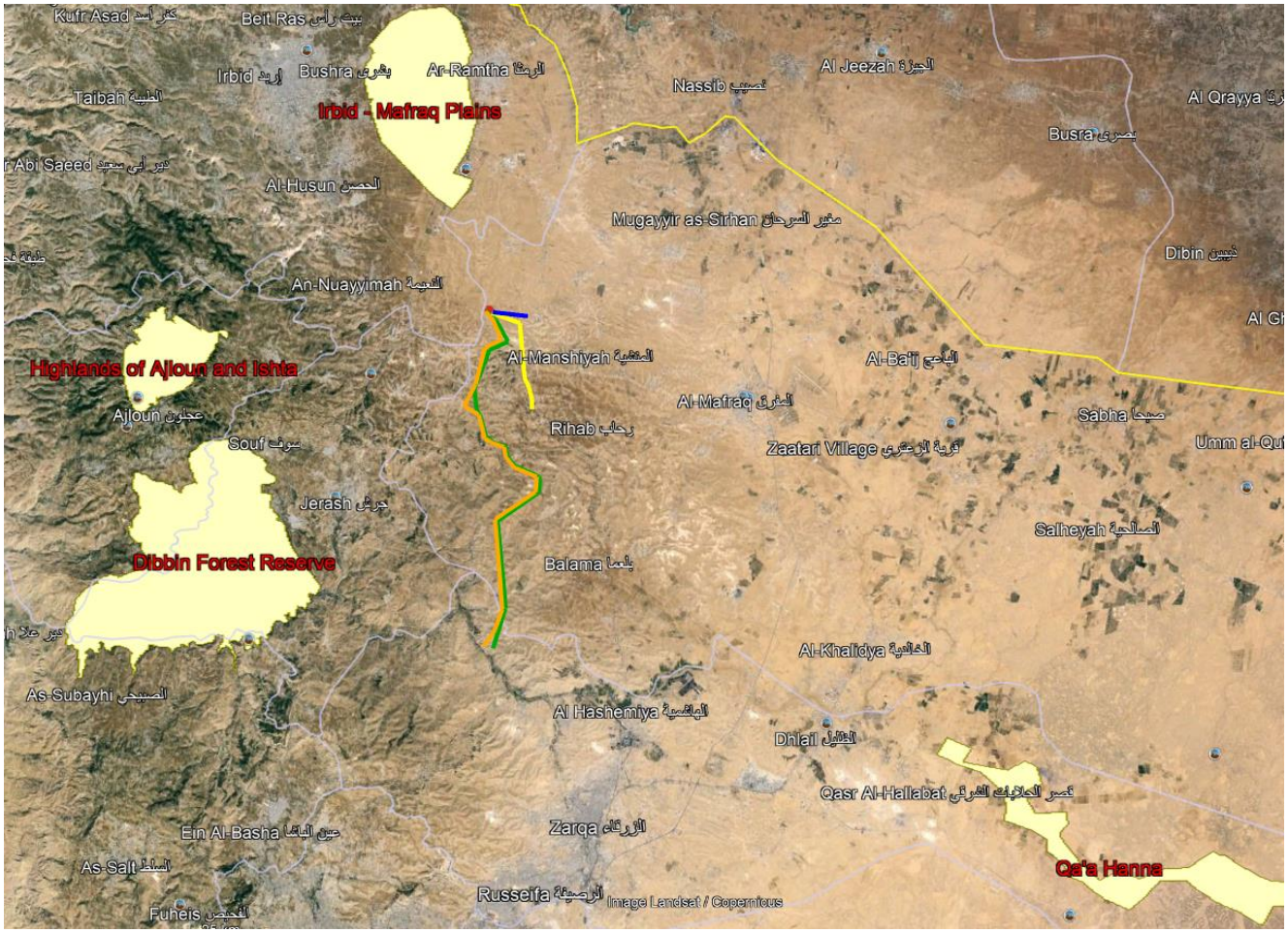

Figure 81: The Project Location in Relation to the Irbid-Mafraq Plains, Highlands of Ajloun and Dibbin Forest KBAs

To this extent, it can be concluded that no conflict exists between the Project site and any Protected Areas or KBAs. The Project site is not located within established/ planned Protected Areas/KBAs.

Samra Treatment Water Pool, located 13km east of the start of the OHTL route, qualifies under criteria A4i, B1i, B1iv, and B2 (2000). The site covers 500 hectares. Samra Treatment Water Pool consists of a large area of open, artificial pools in a broad depression near Wadi Dhulayl, a tributary of the Zarqa River. A sparse limestone desert surrounds him. The pools, part of Amman's main sewage works, range from sludge to 'fresh' water with rocky shores and minimal natural vegetation. The water from these pools is used to irrigate olive groves. Samra Treatment Water Pool is an artificial wetland highly attractive to migrant birds in autumn. It is the only permanent water body in a vast surrounding area, especially since Azraq oasis has nearly dried up. The site is significant for the large numbers of White storks (*Ciconia Ciconia*) that regularly rest and roost during autumn migration. Breeding species at the site include Black-winged stilt (*Himantopus himantopus*) (possibly), Spur-winged lapwing (*Vanellus spinosus*) (minimum 14 pairs), Spectacled warbler (*Sylvia conspicillata*), and possibly the ringed plover (*Charadrius dubius*), Kentish plover (*Charadrius alexandrines*), Citrine wagtail (*Motacilla citreola*), and the Desert finch (*Rhodopechys obsolete*). Other notable passage migrants include Garganey (*Anas querquedula*) (230 in September), Little stint (*Calidris minuta*) (500 in August), Green sandpiper (*Tringa ochropus*) (110 in July), White-winged tern (*Chlidonias leucopterus*) (150 in August), and the Cretzschmar's bunting (*Emberiza caesia*).

Irbid-Mafraq Plains qualifies under criteria A1 and B2 (2000). The area forms part of the Irbid-Mafraq plains, encompassing 29,200 hectares. The site comprises agricultural plains between Irbid and Mafraq, characterised by dry and irrigated cereal cultivation. Mafraq is home to several key bird species. Breeding species include the

greater sand plover (*Charadrius leschenaultia*) while wintering species include the common crane (Grus grus) and probably the Eurasian dotterel (*Eudromias morinellus*).

Highlands of Ajloun and Ishta KBA qualifies under criteria A1, B2, and B3 (2000). The area spans 21,000 hectares. Located in the hill country of the Jerash-Ajlun mountains, Zubia covers elevations between 500 and 900m and features some steep slopes. The landscape is dominated by dense Mediterranean woodland, consisting of evergreen Quercus and Pistacia, with an understory of Arbutus, Juniperus, Crataegus, Prunus, Rhamnus, and Ceratonia. The reserve is part of Jordan's largest remaining tract of undisturbed oak woodland. It is closely surrounded by villages and farmland, with scattered patches of cultivation, including grapes, olives, wheat, and barley. Zubia hosts a representative assemblage of woodland species characteristic of the Mediterranean hills in the north-west. Key breeding species include the Syrian woodpecker (*Dendrocopos syriacus*) and, probably, Eurasian blue tit (*Parus caeruleus*) (with one record of 8+ individuals in November).

Dibeen Forest Reserve: Dibeen qualifies under criterion A3 (2000). The area covers 4,700 hectares and is Jordan's best remaining region of mature, natural Aleppo Pine forests (Pinus halepensis). Situated on limestone slopes of the highest hill range in northern Jordan, the forest spans 550 to 1,000m. The understory includes *Arbutus* and evergreen oak *Quercus* species. Parts of the forest are remote from human habitation, though there are some agricultural pockets. The surrounding landscape features oak and olive groves. The center of the site is a heavily used recreational area equipped with parking spaces, barbecue sites, a restaurant, and playgrounds. Dibeen is home to a representative bird assemblage of Mediterranean pine woodland, a rare and diminishing habitat in Jordan. Key species include the Syrian woodpecker (*Dendrocopos syriacus*), Western Bonelli's warbler (*Phylloscopus bonelli*), and Eurasian blue tit (*Parus caeruleus*), with the latter being known to breed only in Dibeen within Jordan. Other species observed during the breeding season in suitable habitats include Short-toed snake eagle (*Circaetus gallicus*), Eurasian sparrowhawk (*Accipiter nisus*), Eurasian hobby (*Falco subbuteo*), and Palestine sunbird (*Nectarinia osea*). The Woodlark (*Lullula arborea*) winters in small numbers. Additionally, many migrating raptors were reported in the spring, though specific details are unavailable.

B. ***Species Diversity and Survey Results***

The survey results showed minimal floral species diversity, represented by 23 Least Concern species, according to the Royal Botanic Garden's Red List Assessment of floral species (Table 36).

Table 36: Floral Species Recorded During the Survey

Species name	Common name
Acacia cyanophylla	Golden Wreath Wattle
Anagallis arvensis	Pimpernel
Anchusa strigosa	Prickly alkanet
Asphodelus ramosus	while Asphodelus
Avena sterilis	Wild oat
Ballota undulata	ballota
Bromus sterilis	Barren Brome
Capparis spinosa	Egyptian caper
Carlina hispanica	corymb carline
Carthamus tenuis	slender safflower
Centaurea cyanoides	Syrian Cornflower
Dianthus strictus	Wild pink
Evax contracta	Cudweed
Hordeum vulgare	Common barley
Nerium oleander	Oleander
Notobasis syriaca	Syrian thistle
Onopordon Palaestinum	Palestine cotton thistle
Phragmites australis	common reed
Pinus halepensis	Aleppo pine
Retama raetam	White Broom
Rhamnus lycioides	Palestine Buckthorn
Rostraria obtusiflora	Hair-grass

Stipa capensis	Twisted-Awned Spear-Grass
Urginea maritima	Squill
Verbascum sinaiticum	Mullein
Sarcopoterium spinosum	Thorny Burnet

In addition, faunal diversity was low over the route distance, represented by the five least concern species of mammals (Table 37) according to the mammal's red list of Jordan (Eid et al. 2020). Seven herpetofauna species, including one amphibian and five reptiles, are all of least concern according to the global red list assessment, and eight bird species are all of least concern globally.

Table 37: Mammalian Species Recorded During the Survey

Species name	Common name
Erinaceus concolor	European Hedgehog
Acomys dimidiatus	Egyptian Spiny Mouse
Spalax ehrenbergi	Mole Rat
Vulpes Vulpes	Red Fox

Table 38: Reptiles and Amphibian Species Recorded During the Survey

Species name	Common name
Buffo viridis	Green Toad
Hemidactylus dawodi-azraqi	House Gecko
Ptyodactylus guttatus	Spotted Fan-footed Gecko
Laudakia stellio	Starred Agama
Mesalina guttulata	Small spotted Desert Racer.
Ophisops elegans	Snake-eyed Lizard
Testudo graeca	Common Tortoise

Table 39: Birds Species Recorded During the Survey

Species name	Common name
Streptopelia decaocto	Collared dove
Turdus merula	Blackbird
Pycnonotus xanthopygos	Yellow-vented Bulbul
Falco tinnunculus	Kestrel
Passer domesticus	House Sparrow
Upupa epops	Hoopoe
Galerida cristata	Crested Lark
Oenanthe hispanica	Black-eared Wheatear

Retama Ratem plant was observed in some locations in the proximity and/or within the OHTL. Plants of the genus Retama (Fabaceae) are used in traditional medicine of the Mediterranean Basin as a nauseant, laxative/cleansing, and vermifuge. Certain Retama species are also employed to treat a multitude of disorders, including diabetes, hepatitis, jaundice, sore throat, skin diseases, joint pain, rheumatism, fever, and inflammation.

Figure 82: Retama Ratem Plant was Observed in Some Locations in the Proximity and/or within the OHTL

- **Critical Habitats Assessment**

This Critical Habitat Assessment (CHA) assesses critical habitat applicable to the proposed project. This section was developed based on the rapid assessment survey results. A set of criteria and conditions have been considered for identifying priority biodiversity features and critical habitats (EBRD 2023) as follows:

- Priority ecosystems (Threatened ecosystems)
- Priority species and their habitats, including
  - Threatened species
  - Range-restricted species
  - Migratory and congregation species

The assessment is as follows:

Criteria 1

One natural habitat occurs within the proposed project area, the Aleppo Pine forests. Although planted, they represent high value for Jordan in light of the limited forested areas and their range restrictions. All other habitats present along the proposed project have been heavily modified by various anthropogenic activities, including, but not limited to, farms and households. These habitats are generally degraded in terms of biological diversity and are not threatened within Jordan. Without a red list of ecosystems in Jordan, we can assume that the natural and modified habitats along the proposed project area do not meet the criteria. Therefore, the critical habitat is not triggered under this criterion, but it is required that the contractor follows the recommendations set in the mitigation measures, especially in the forested lands.

Criteria 2

- Threatened species

According to the IUCN global red list, the species identified during the survey have the Least Concern status. No endemic species were recorded in the study area, so there are no critical habitats for threatened species in the study area.

- Range-restricted species

We recorded no range-restricted species in the study area. It is also important to highlight that Jordan holds no range-restricted species, meaning there will be no critical habitats over the study period.

- Migratory and congregation species

Despite the absence of any record for migratory or congregator species during the survey, the site is located within four Important Birds Areas (Section 3.1.3 above). Despite the outdated information on the IBAs of Jordan, some migratory bird species might use the study area's sky during their migration. None of these have been recorded (or are likely to be present) in numbers that represent greater or equal to one percent of the global population. This assumption is based on the main migration route in Jordan, represented by the Jordan Valley, which is far from the project study area. In addition, all species are classified as IUCN Least Concern with increasing population trends. Based on that, the site contains no critical habitat for migratory species.

14.2 Assessment of Potential Impacts, and Mitigation Measures

The survey results showed minimal floral species diversity, represented by 23 Least Concern species, according to the Royal Botanic Garden's Red List Assessment of floral species.

The potential impacts anticipated on biodiversity during construction and operation phases for the substation and the OHTL are presented in Table 40 and Table 41, respectively.

Table 40: Potential Impacts on Biodiversity During Construction and Operation of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Activities such as excavation, levelling, and land clearing during site preparation are expected to alter the habitat of the site, potentially disturbing existing habitats. However, as previously mentioned, the land designated for the substation is arid and of low ecological importance, with no endangered flora or fauna species or sensitive habitats, except for a few strips of vegetation (Anabasis) which are not deemed highly significant. ▪ 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.	▪ 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 with regards to the requirements for bird surveys (mainly for the OHTL but may also be required for the substation – based on consultation with RSCN) and the suitable methodology and for the required mitigation and management measures to be integrated in the designs. The ESIA may include preconstruction bird/avi-fauna surveys and assessment to be verified based on consultation with the MoEnv and RSCN during the ESIA to obtain the environmental permit. Moreover, mitigation measures included in the ESIA shall be transposed into the design, tender documents, management plans, and other procedures as applicable. ▪ During detailed design stage, undertake field surveys at the Substation site and along the OHTL route, the surveys should include: - Nest search survey during the suitable period - Bird monitoring survey which includes vantage points during periods of intensive migration for at least 2 weeks, in areas that attract birds within the project area such as	▪ 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.	▪ Inspection of the works should be carried out at all times. ▪ Regularly monitor the site for invasive species and remove them promptly.

	▪ Noise and human activity during construction and maintenance can disturb bird populations and other wildlife, potentially leading to behavioural changes and displacement. ▪ Furthermore, the land is situated away from critical environmental areas, including protected zones and important bird and biodiversity habitats. ▪ Other impacts on the biodiversity of the site could be caused by improper management of the site which could include improper practices by workers (i.e. hunting of animals, discharge of hazardous waste to land, etc.).	(water bodies, landfills, important nesting sites for hovering birds) - Special surveys for rare or threatened species and birds on nesting periods. - Survey of bird species that overwinter at the project site. ▪ Surveys should be undertaken according to the "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022 issued by the RSCN. ▪ Preserve existing vegetation as much as possible during site preparation. ▪ Use existing roads and tracks and do not establish new roads ▪ Any planning for new roads must avoid sensitive habitats (forested regions) and minimise ecological disruption. ▪ Plan the route to avoid significant forest areas and restrict clearings to the minimum required width for safety and maintenance. ▪ No construction camps allowed onsite. ▪ Avoid scheduling constriction activities during critical breeding, nesting, and migration periods.		
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			
Operation Phase				
Impact Description	▪ Potential avi-fauna fatalities due to electrocution	▪ 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 with regards to the requirements for birds (mainly for the OHTL but may also be required for the substation – based on consultation with RSCN). ▪ 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	----	▪ Monitoring of the substation and the OHTL to inform the actual impact caused on resident and migratory birds. ▪ Mortality rate surveys must be undertaken through carcass search surveys covering the substation and the OHTL. The carcass search will work as a complementary survey for
Type	Negative			
Duration	Long Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			

		100% electrocution and minimise collision risk		the above-mentioned monitoring. ▪ As part of the avi-fauna carcass search programme bats fatalities must be monitored. ▪ Inspection of the works should be carried out at all times.

Table 41: Potential Impacts on Biodiversity During Construction and Operation of the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ 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 potentially disturb existing habitats and on haraj areas and forest trees as explained in this ESIA. ▪ 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	▪ 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. ▪ During detailed design stage, undertake field surveys at the Substation site and along the OHTL route, the surveys should include: - Nest search survey during the suitable period - Bird monitoring survey which includes vantage points during periods of	▪ 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. ▪ Establish and train workers on an appropriate code of conduct including no hunting at any time and under any condition.	▪ Inspection of the works should be carried out at all times. ▪ Inspection and maintenance of power lines should be conducted regularly to ensure their integrity and safety. ▪ Monitor the ecological impacts of the OHTL on local flora and fauna continuously. ▪ Regularly monitor the site for invasive species and remove them promptly.

	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 ▪ Other impacts on the biodiversity of the site are mainly from 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.).	intensive migration for at least 2 weeks, in areas that attract birds within the project area such as (water bodies, landfills, important nesting sites for hovering birds) - Special surveys for rare or threatened species and birds on nesting periods. - Survey of bird species that overwinter at the project site. ▪ Surveys should be undertaken according to the "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022 issued by the RSCN. ▪ Preserve existing vegetation as much as possible during site preparation. ▪ The final OHTL alignment shall take into consideration the following design factors to avoid impacts on biodiversity: - 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.		
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	High			
Significance	**Minor**			

Operation Phase				
Impact Description	▪ 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 electromagnetic radiation (EMF) from high voltage power lines on wildlife is varied and an area of ongoing research. EMFs may interfere with birds' navigation abilities, particularly those relying on the Earth's magnetic field for migration. Evidence of long-term effects from EMFs alone is limited. Studies on mammals show mixed results, with some research suggesting potential behavioural changes and stress responses, while others find minimal or no significant effects. Insects, especially those relying on magnetoreception, may experience disrupted navigation and communication due to EMFs. The impact on plant growth and development is inconclusive, with some studies indicating potential effects. Overall, the impact of EMFs on ecosystems and biodiversity remains uncertain, requiring further research to draw definitive conclusions. ▪	▪ 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. ▪ The final OHTL alignment shall take into consideration the following design factors to avoid impacts on biodiversity: - 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. A proper design may reduce 100% electrocution and minimise collision risk.	▪ Moreover, mitigation measures included in the ESIA shall be transposed into the design, tender documents, management plans, and other procedures as applicable. ▪ According to findings of the preconstruction surveys and the avi-fauna surveys and after consultation with the RSCN/BirdLife, install bird diverters at suitable spacing where collision is a risk, and mainly on approximately 60% of the line between two pylons (from the centre out, as the pylons are fairly obvious and most collisions occur in the centre of the span between the pylons) to reduce risk of collision as per expert advice and RSCN requirements. Other measures may also be required for the substation and the OHTL based on request from MoEnv and RSCN and based on expert advice. These will also be included in the project details. ▪ The BFDs installed will be ones that glow or light up at night and are dynamic (e.g. move with the wind) to increase visibility for diurnal and nocturnal migrants. BFDs shall meet the required long-term guarantee (e.g. of ten years or more). Installation of earthing wire and attached BFDs will be completed at the same time (within 1 week). BFDs will be installed to the manufacturer's guidance and assessment of the OHTL, taking into consideration number and spacing.	▪ Monitoring of the OHTL to inform the actual impact caused on resident and migratory birds. ▪ Mortality rate surveys must be undertaken through carcass search surveys covering the OHTL. The carcass search will work as a complementary survey for the above-mentioned monitoring. ▪ As part of the avi-fauna carcass search programme bats fatalities must be monitored. ▪ Inspection of the works should be carried out at all times. ▪ BFDs should be checked every 6 months before the spring and autumn migration seasons so that they are in place and operational for higher risk periods. Any damaged or defective BFDs will need to be replaced within 2 months of being reported as faulty. However, the need for and extent of replacing damaged / defective BFDs will be undertaken following consultation with RSCN. Non-replacement of BFDs in areas of demonstrable low collision risk will be agreed with the lenders and other relevant stakeholders. In absence of demonstrable data, the default position is however that all BFDs will be replaced as and where necessary. ▪ Undertake regular (at least annual) monitoring of the transmission line for signs of bird nesting on the towers. If nesting occurs, anti-perching and nesting devices will be
Type	Negative			
Duration	Long Term			
Magnitude	High			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			

Significance	**Moderate**		▪ 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. ▪ Use isolated poles to prevent electrical shocks to birds through contact.	installed to minimise bird visits to these structures. These devices will be replaced if necessary.

15 INFRASTRUCTURE AND UTILITIES

This section first provides an assessment of baseline conditions within the Project site and surrounds in relation to infrastructure and utilities and then assesses the anticipated impacts from the Project throughout its various phases. For each impact, a set of avoidance and management measures (which could include mitigation measures, additional requirements, etc.) have been identified to eliminate and reduce the impact to acceptable levels.

15.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of the baseline conditions in relation to infrastructure and utilities as well as the outcomes and results. The components discussed in relation to infrastructure and utilities include the following: (i) water resources; (ii) wastewater services; (iii) solid waste services; (iv) hazardous waste services;(v) road networks.

15.1.1 Baseline Assessment Methodology

The baseline assessment was based on collection of secondary data and plans available as well as obtaining information from various governmental authorities, as discussed throughout this section.

15.1.2 Results and Outcomes

A. Water Resources

The water sector in Jordan is generally governed by the Ministry of Water and Irrigation (MWI) and the Water Authority of Jordan (WAJ). MWI is the official body responsible for the overall monitoring of the water sector, water supply and wastewater system, and the formulation of national water strategies and policies.

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.

The Contractor shall contact the relevant water utility company to obtain information about existing water supply and water network in the area.

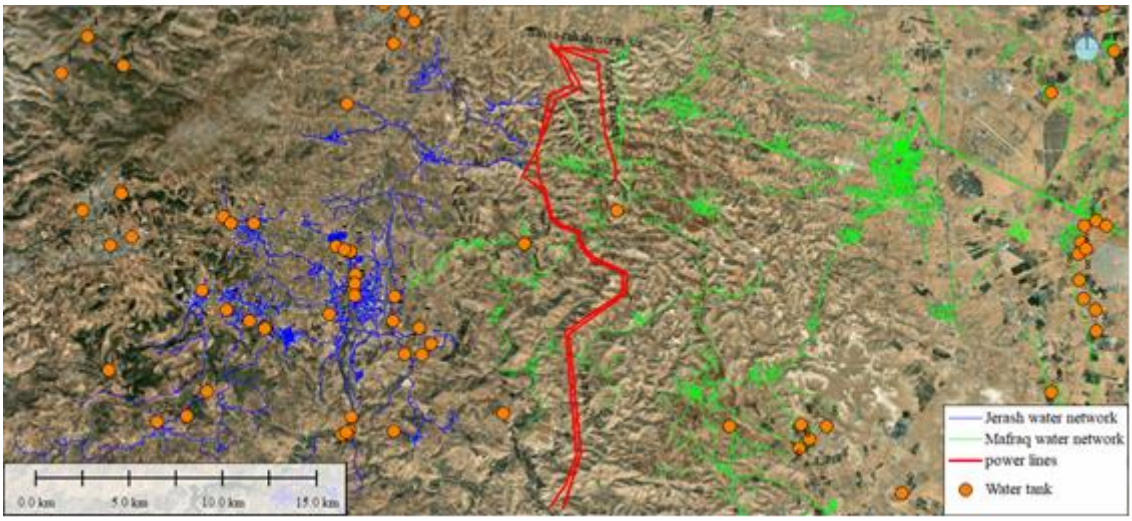

Figure 83: Water Supply Network in the Project Area from 2015 – Requires Update

B. Wastewater Services

According to the 'National Water Strategy 2023 – 2024'[14] There are 31 wastewater treatment plants (WWTPs) across Jordan managed by the sector entities, six of which are septage plants. The current capacity of the

[14] https://www.mwi.gov.jo/EBV4.0/Root_Storage/AR/EB_List_Page/national_water_strategy_2023-2040.pdf

WWTPs is around 600,000 m^3/d, which is expected to be expanded to 800,000 m^3/d over the next five years after completing ongoing and committed projects. As Samra WWTP has the largest hydraulic capacity of 365,000 m^3/d, followed by South Amman WWTP with a capacity of 52,000 m^3/d. As Samra WWTP which is in Zarqa serves both Amman and Zarqa. In 2021, As Samra absorbed nearly 68% of the wastewater flowing across the country.

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 (See Figure 84 below).

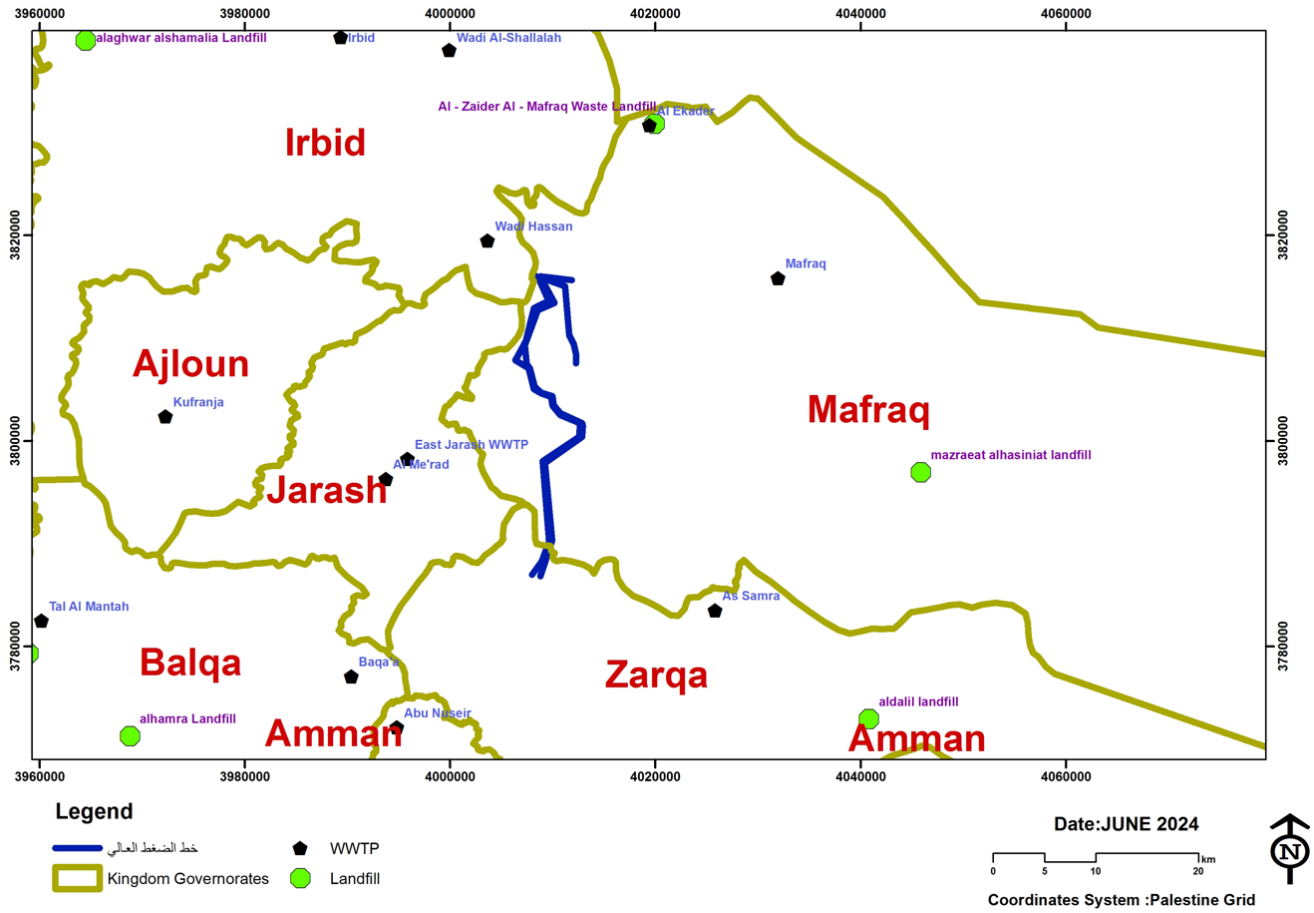

Figure 84: Location of WWTP and Landfills in Relation to the Project

C. *Solid Waste Services*

In Jordan, solid waste management is undertaken primarily by the municipalities. Solid waste is collected and transported by municipalities to disposal sites. The only sanitary landfill in Jordan is the Ghabawi Landfill operated by Greater Amman Municipality and located in Ghabawi and the Ekaider landfill in the north of Jordan. Other landfills are currently being rehabilitated and upgraded to become sanitary landfills.

The nearest landfill to the project is the 'Al Ekaider dumpsite' as shown in Figure 84, located approximately 15 km northeast of the Project.

The EPC Contractor shall coordinate with the local relevant municipality for the collection of waste and transfer to the designated landfill.

D. *Hazardous Waste Services*

In accordance with the MoEnv requirements, hazardous waste must be transported and disposed at landfills which are approved by the MoEnv.

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.

E. Road Network

The MPWH and municipalities share responsibility for planning, organising, and constructing road networks in Jordan. The MPWH is responsible for the 'connecting' roads, including, those across municipal boundaries, while municipalities are responsible for road network located within the municipal boundaries.

The MPWH is responsible for the planning, development, maintenance, and operations of the inter-urban road transport network infrastructure but not for public transport and freight operation. It develops and maintains public transport facilities such as terminals or depots in coordination with other competent local authorities. Its roles include policy making and regulation of road safety as well as addressing road safety in terms of road alignment, widening, and black spots (locations where road traffic accidents have historically been concentrated) (World Bank Group, 2022)[15].

The Law for Roads No. 24 for 1986 and its amendments thereof[16] states the responsibilities of the MPWH in terms of roads. MPWH's responsibilities include, but are not limited to, road planning, design, supervision and maintenance. The Ministry can implement any measures it deems necessary for the improvement of the road under their responsibility, such as signage. The Law further states that MPWH's approval should be granted for setting up shops or any other formal establishment on roadsides and adds that the Ministry is authorised to enforce any measures on such shops and establishments to ensure that they cause no disturbances to road functions and the public safety. The Law defines types of roads and states actions prohibited on the ROW as well as the penalties associated to the violation of any of the provision of this Law. Issues related to signage are also addressed within the provisions of this Law.

Based on the Local Administration Law No. (22) of 2021[17] municipalities are responsible for planning, designing, opening, and preparing roads within their jurisdictions and boundaries in addition to establishing related sidewalks and undertaking measures to protect roads and prevent any non-compliances and infringement.

It is most possible that the roads delineated on the Figure 85 are MPWH roads given they are mostly located outside municipal boundaries.

The EPC Contractor shall verify this and coordinate with the entity responsible as well as the Traffic Department for any required measures or works on the roads.

Access to the substation site is primarily via highway #25 as shown in Figure 85. From this main road, the site can be reached by a secondary unpaved road, as illustrated in Figure 86 below. 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.

[15] https://documents1.worldbank.org/curated/en/099825106052213281/pdf/P17389502814af03b0a85e0a27bbbbaa260.pdf

[16] http://mpwh.gov.jo/ebv4.0/root_storage/ar/eb_list_page/%D9%82%D8%A7%D9%86%D9%88%D9%86_%D8%A7%D9%84%D8%B7%D8%B1%D9%82_%D9%88%D8%AA%D8%B9%D8%AF%D9%8A%D9%84%D8%A7%D8%AA%D9%87.pdf

[17] https://www.mola.gov.jo/EBV4.0/Root_Storage/AR/EB_Info_Page/%D9%82%D8%A7%D9%86%D9%88%D9%86_%D8%A7%D9%84%D8%A7%D8%AF%D8%A7%D8%B1%D8%A9_%D8%A7%D9%84%D9%85%D8%AD%D9%84%D9%8A%D8%A92021.pdf

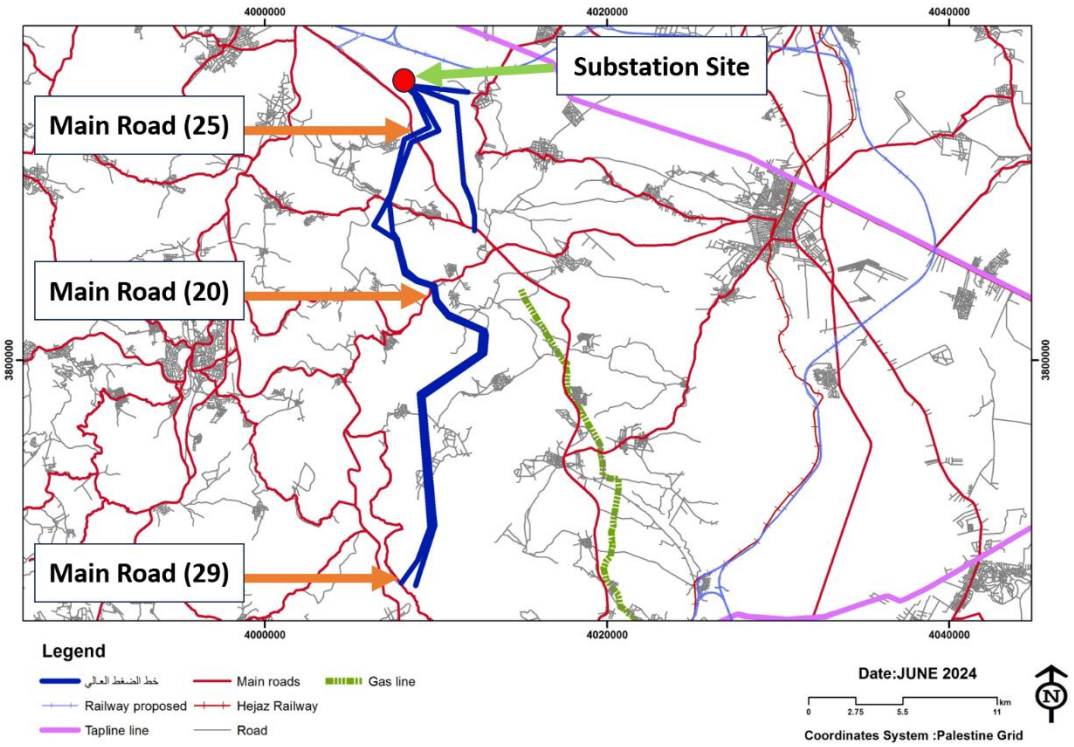

Figure 85: Existing Road Network

Figure 86: Existing Unpaved Road that Leads to the Substation Site

The proposed OHTL route shall intersect with existing main roads at multiple points as depicted in Figure 85. The proposed route for the majority of the OHTL traverses various types of land, including agricultural fields, undeveloped land and some residential properties, which is detailed in Section 10.1.2.

15.2 Assessment of Potential Impacts, and Mitigation Measures

The potential impacts anticipated on infrastructure and utilities during construction and operation phases for the substation and the OHTL are presented in Table 42.

Table 42: Potential Impacts on Infrastructure and Utilities during Construction and Operation of the Substation and the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ 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.	▪ 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 consultations will include formal communications.	▪ 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 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	▪ Submission of formal letter from relevant entities ▪ Submission of final detailed design ▪ Submission of water management plan ▪ Submission of waste management plan ▪ Submission of traffic and transport management plan ▪ Inspection and monitoring
Type	Negative			
Duration	Short Term			
Magnitude	Low			
Reversibility	Reversible			
Sensitivity	Medium			
Likelihood	Low			
Significance	**Minor**			
Operation Phase				
Impact Description	▪ Maintenance activities are projected to increase water demand and generate waste and	▪ There are no avoidance measures to be considered.	▪ There are no mitigation measures to be considered.	

	wastewater. However, during the operational phase, both water demand and the production of waste streams are expected to be minimal, posing negligible strain on existing facilities.			
Type	Not Applicable			
Duration	Not Applicable			
Magnitude	Not Applicable			
Reversibility	Not Applicable			
Sensitivity	Not Applicable			
Likelihood	Not Applicable			
Significance	**Not Applicable**			

16 OCCUPATIONAL HEALTH AND SAFETY

This section presents the assessment of potential impacts during the various Project phases on occupational health and safety. For each impact, a set of avoidance and mitigation measures were identified.

16.1 Assessment of Baseline Conditions

Assessment of baseline conditions with regards to occupational health and safety is considered irrelevant.

16.2 Assessment of Potential Impacts, and Mitigation Measures

The potential impacts anticipated on occupational health and safety (OHS) during construction and operation phases for the substation and the OHTL are presented in Table 43 and Table 44, respectively.

Table 43: Potential Impacts on OHS during Construction and Operation of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Throughout the construction phase there will be generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents. The following risks are generally associated with the construction of substations: - Potential injuries from handling heavy equipment, tools, and materials. - Danger of electrical shocks and burns when working near high-voltage equipment. - Working in confined spaces and excavations - Exposure to hazardous chemicals, solvents, and construction materials - Prolonged exposure to high noise levels from machinery and equipment. - Heat-related illnesses from high temperatures and cold stress from exposure to cold weather conditions. - Exposure to chemicals, hazardous or flammable materials - Slips and falls.	▪ There are no avoidance measures to be considered.	▪ Develop an Occupational Health and Safety (OHS) Plan prior to commencement of work that ensures compliance with national legal labour requirements. ▪ Allocate specific personnel responsible for health & Safety management on site. ▪ Provide adequate and appropriate training of all workers on the contractor's OHS policies and procedures. ▪ Have fire extinguishers. ▪ Establish a grievance mechanism to receive and facilitate resolution of workers grievances. ▪ Ensure all workers are equipped with proper Personal Protective Equipment (e.g., masks, eye	▪ Inspection to ensure the implementation of the provisions of the Occupational Health and Safety Plan and assess compliance with its requirements ▪ Regular Reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again ▪ Inspection on workers accommodation to ensure its compliance with the requirements of "EBRD/IFC's Guidance Note – Workers' accommodation: process and standards".

	- Accidents involving construction vehicles and equipment. - Risks of fires and explosions from flammable materials and electrical faults. - Exposure to dust and gases generated from activities such as excavation, and vehicle exhaust.		goggles, breathing equipment, gloves, etc.). ▪ Carry out daily site inspections to verify the proper implementation of safety measures. ▪ Prepare an Emergency Preparedness and Response Plan that takes into account a series of organisational, operational and preventive measures in case of an emergency.	
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor – generally controlled**			
Operation Phase				
Impact Description	▪ Operation and maintenance of a substation involves various OHS considerations due to the nature of the activities and the equipment involved. These impacts include: - 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).	▪ 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.). ▪ Carry out site inspections to during maintenance activities to	▪ Inspection to ensure the implementation of the provisions of the Occupational Health and Safety Plan and assess compliance with its requirements ▪ Regular Reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again
Type	Negative			
Duration	Long Term			
Magnitude	Medium			

Reversibility	Irreversible		verify the proper implementation of safety measures. ▪ Prepare an Emergency Preparedness and Response Plan that takes into account a series of organisational, operational and preventive measures in case of an emergency.	
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor – generally controlled**			

Table 44: Potential Impacts on OHS during Construction and Operation of the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Throughout the construction phase there will be generic occupational health and safety risks to workers, as working onsite increases the risk of injury or death due to accidents. The following risks are generally associated with the construction of OHTLs: - Potential injuries from handling heavy equipment, tools, and materials. - Danger of electrical shocks and burns when working near high-voltage equipment. - Exposure to hazardous chemicals, solvents, and construction materials - Prolonged exposure to high noise levels from machinery and equipment. - Heat-related illnesses from high temperatures and cold stress from exposure to cold weather conditions. - Exposure to chemicals, hazardous or flammable materials - Slips and falls. - Accidents involving construction vehicles and equipment. - Exposure to dust and gases generated from activities such as excavation, and vehicle exhaust.	▪ There are no avoidance measures to be considered.	▪ Develop an Occupational Health and Safety (OHS) Plan tailored to the nature of the operation and maintenance activities. ▪ Allocate specific personnel responsible for health & Safety management on site. ▪ Provide adequate and appropriate training of all workers on the contractor's OHS policies and procedures. ▪ Have fire extinguishers. ▪ Establish a grievance mechanism to receive and facilitate resolution of workers grievances. ▪ Ensure all workers are equipped with proper Personal Protective Equipment (e.g., masks, eye goggles, breathing equipment, gloves, etc.). ▪ Workers engaged in tasks at elevated heights must wear full-body harnesses and be equipped with lanyards or lifelines. ▪ Carry out regular site inspections to verify the proper implementation of safety measures. ▪ Prepare an Emergency Preparedness and Response Plan that takes into account a series of organisational, operational and preventive measures in case of an emergency.	▪ Inspection to ensure the implementation of the provisions of the Occupational Health and Safety Plan and assess compliance with its requirements ▪ Regular Reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again ▪ Inspection on workers accommodation to ensure its compliance with the requirements of "EBRD/IFC's Guidance Note – Workers' accommodation: process and standards".

Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor – generally controlled**			
Operation Phase				
Impact Description	▪ Operation and maintenance of OHTLs involves various OHS considerations due to the nature of the activities and the equipment involved. These impacts include: - 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).	▪ Replace hazardous substances (e.g., toxic oils or gases) with safer alternatives where feasible to eliminate potential exposure 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 are equipped with proper Personal Protective Equipment (e.g., masks, eye goggles, breathing equipment, gloves, EMF shielding clothing, etc.). ▪ Workers engaged in tasks at elevated heights must wear full-body harnesses and be equipped with lanyards or lifelines. ▪ Carry out regular site inspections during maintenance activities to verify the proper implementation of safety measures. ▪ Prepare an Emergency Preparedness and Response Plan that considers a series of organisational, operational and preventive measures in case of an emergency.	▪ Inspection to ensure the implementation of the provisions of the Occupational Health and Safety Plan and assess compliance with its requirements ▪ Regular Reporting on the health and safety performance onsite in addition to reporting of any accidents, incidents and/or emergencies and the measures undertaken in such cases to control the situation and prevent it from occurring again
Type	Negative			
Duration	Long Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor – generally controlled**			

17 SOCIOECONOMIC CONDITIONS

This section presents the baseline assessment of the Project site in relation to socio-economic conditions and assessment of potential impacts during the various Project phases. For each impact, a set of avoidance and mitigation measures were identified.

17.1 Assessment of Baseline Conditions

The socio-economic conditions of the local communities have been established based on the review of secondary data available mainly from the Department of Statistics (DoS).

However, it is important to note that the majority of the socio-economic data is mainly available at the Governorate or district level; little or no data is available specifically for the local communities near the Project area. Therefore, as part of the consultation session undertaken with local community representatives (refer to 'Section 7.3'), the ESIA team aimed to obtain additional insights and information on socio-economic conditions within the local communities.

17.1.1 Results and Outcomes

A. Demographics

The selected location of the North Substation is in Rihab Locality within Mafraq Qasabah district. Socioeconomic data below for Al-Mafraq Governorate:

- Jordan's population in 2023 was 11,516,000[18], with a 1.9% national increase from 2022.
- Al-Mafraq governorate has approximately 663,400[19] residents, with 166,505 in Mafraq Alkubrah and 31,600 in Rhad Aljadedah.
- Females: 321,400, Males: 342,000
- Population density is 25 people/km² in the governorate and 155 people/km² in Rihab locality.
- Industry and Commerce forms an important part of the employment sector in Al-Mafraq governorate. There is one major industrial city in Al-Mafraq governorate. Al-Mafraq Industrial Estate was established in 2016 and it consists of an area of 1847 Dunums.
- Public service employs 37.7%[20] of the working population in Jordan, with 63% in Al-Mafraq governorate.
- Industry and commerce are significant in employment, supported by Al-Mafraq Industrial Estate.
- Around 11% of the working population in Al-Mafraq is in agriculture.
- Economic challenges include a large influx of Syrian refugees and lower average income.
- The average family annual income in Al-Mafraq Governorate is 9,138.7 JOD.
- Unemployment in Al-Mafraq governorate is 8%[21], with higher rates among females.
- Poverty affects 19.2%[22] of the population in Al-Mafraq.

The OHTL starts from an area outside municipal boundary between the Al-Hashimeyeh municipality to the east and Birein municipality to the west, which is located in Zarqa and passes through several districts and localities and ends at the selected location for the North Substation in Rihab Locality. Socio-economic data below provided for Zarqa Governorate:

- Population, as per data from DOS at End-year 2023, is as follows[23]:

[18] https://dosweb.dos.gov.jo/DataBank/Population/Population_Estimares/PopulationEstimates.pdf
[19] https://dosweb.dos.gov.jo/DataBank/Population/Population_Estimares/Municipalities.pdf
[20] http://www.dos.gov.jo/owa-user/owa/emp_unemp_y.show_tables1_y?lang=E&year1=2023&t_no=83
[21] https://dosweb.dos.gov.jo/DataBank/Population/Population_Estimares/Municipalities.pdf
[22] https://jorinfo.dos.gov.jo/Databank/pxweb/en/Poverty/Poverty__Poverty-Indicators/Table1.px/table/tableViewLayout2/
[23] https://dosweb.dos.gov.jo/DataBank/Population/Population_Estimares/PopulationEstimates.pdf

- Males: 870,500; Females:776,100
- Population Density: 345.8 people/km2

- The employment distribution of Jordanian individuals aged 15 and above by sector, as per data from DOS in 2023, is as follows[24]:
  - Public Sector: 37.7%
  - Private Sector: 61.4%
  - International Organisations: 0.8%
  - Work at Home: 0.1%
- Industry and Commerce (2018)[25]:
  - Active Establishments: 25,781
  - Inactive Establishments: 2,945
  - Under Preparation: 338
  - Government Administration: 853
  - Support Unit: 4,282
  - Vacant: 9,417
- Agriculture:
  - Percentage of working population in agriculture: 3%
  - Percentage of total cultivated lands: 7%
  - Percentage of total livestock herded: 11%
- The average family annual income in Zarqa Governorate is 9,562.6 JOD.

B. Population, Infrastructure and Land Use Overview

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.

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.

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.

17.2 Public Health and Safety

Key impacts on public health and safety are related to potential exposure of Electric and Magnetic Fields (EMF) during the operation of the OHTL. EMF is radiation associated with the use of electric power such as household wiring, electric appliances and also from OHTL.

[24] http://www.dos.gov.jo/owa-user/owa/emp_unemp_y.show_tables1_y?lang=E&year1=2023&t_no=83
[25] https://dosweb.dos.gov.jo/DataBank/Census_Establishment2018/En/table1.pdf

The EHS Guidelines for Electric Power Transmission and Distribution issued by the IFC also states that although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment. However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern. The IFC EHS Guideline also requires that exposure level limits to the public should remain below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) limits.

IFC EHS Guidelines for Electric Power Transmission and Distribution (2007), states that the servitude width for transmission lines ranges from 15 to 100m depending on voltage and proximity to other servitudes, but typical range is between 15 and 30m. Refer to Section 3.2.2 for more information on Sanitary Protection Zone instructions to ensure safety for populations living near high voltage power lines.

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.

17.3 Labour and Working Conditions

Inappropriate management of the workforce during both the construction phase could entail several human right risks and violations by employing entities such as the EPC Contractor. This could include but not limited to violations against core labour standards (e.g. engaging child workers, confiscation of passports of foreign workers, unsuitable working hours, and other), including gender related issues such as Gender Based Violence and Harassment (GBVH) or Sexual Exploitation, Abuse and Harassment (SEAH).

The workforce will include a team from various backgrounds, ethnicities, nationalities and cultures. Therefore, there could be risks and impacts within the workforce related to discrimination, harassment, abuse and other based on ethnicities, cultures, and nationalities.

In addition, inappropriate behaviour of workforce within local community settlements could also entail similar risks and impacts. This could be related to worker accommodation within local communities (if applicable to the Project) or as part of worker time-off / leisure trips to local community areas.

17.4 Assessment of Potential Impacts, and Mitigation Measures

17.4.1 Socioeconomics

The potential impacts anticipated on socio-economic conditions during construction and operation phases for the substation and the OHTL are presented in Table 45.

Table 45: Potential Impacts on Socio-Economic Conditions during Construction and Operation of the Substation and OHTL

Project	Summary	Avoidance Measures	Benefit Enhancement
Construction Phase			
Impact Description	▪ 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 activities and impact certain sectors, such as wholesale/retail trade.	▪ There are no avoidance measures to be considered.	▪ 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 ▪ Ensure contractors and all subcontractors implement the EBRD/IFC Worker accommodation Guidelines and undertake monthly audits to ensure compliance with these on NEPCO team and on contractor working for the Company. Accommodation on the construction site shall not be allowed. ▪ EPC Contractor to prepare a Recruitment Plan for working with the local community members. The Plan must include the key requirements listed below. - Project Updates Procedure - Local Recruitment Procedure - Local Procurement Procedure
Type	Positive		
Duration	Not Applicable		
Magnitude	Not Applicable		
Reversibility	Not Applicable		
Sensitivity	Not Applicable		
Likelihood	Not Applicable		
Significance	**Not Applicable**		
Operation Phase			
Impact Description	The project 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.	▪ There are no avoidance measures to be considered.	▪ There are no mitigation measures to be considered.
Type	Positive		
Duration	Not Applicable		
Magnitude	Not Applicable		
Reversibility	Not Applicable		
Sensitivity	Not Applicable		
Likelihood	Not Applicable		
Significance	**Not Applicable**		

17.4.2 Public Health and Safety

The potential impacts anticipated on public health and safety during construction and operation phases for the substation and the OHTL are presented in Table 46 and

Table 47, respectively.

Table 46: Potential Impacts on Public Health and Safety during Construction and Operation of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Risk of exposure of community members to construction-related health risks such as, falls, electric shocks, and equipment-related incidents which could lead to injury or death. ▪ Movement of heavy machinery and vehicles to and from the site and the risk of traffic accidents that may affect passing public. ▪ Construction activities can generate dust and emissions from machinery, potentially affecting air quality in the surrounding area. ▪ Construction activities, including heavy machinery and equipment operation, can create excessive noise levels.	▪ Develop security measures to prevent unauthorised access to the construction site. Such measures could include installing a fence around the construction site. ▪ High noise level construction activities should not be carried out between 8 pm – 6 am.	▪ Implement basic dust control and suppression measures, which may include: - Regularly watering active construction areas to suppress dust. - Planning dust-generating activities to occur simultaneously to reduce dust incidents. - Managing stockpiles by watering, containing, covering, or bundling them. - Covering trucks transporting aggregates and fine materials with tarpaulins. ▪ 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. ▪ Implement a GRM to receive and facilitate resolution of affected communities' concerns and grievances. ▪ Develop and implement a TMP.	▪ Regular inspection on fence around the facility. ▪ Reporting of any trespassing incidents and the measures undertaken in such cases to control the situation and prevent it from occurring again.
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			

			▪ 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 to control vehicles and truck movement. ▪ Ensure that the number of traffic signs, their characteristics and distance among them is placed according to local legal requirements. ▪ Ensure that vehicles adhere to a speed limit of 15km/h within the construction site. ▪ EPC Contractor to implement and update the SEP and GRM as required during construction	
Operation Phase				
Impact Description	▪ Trespassing of unauthorised personnel into the substation may result in exposure to electric shocks. ▪ Other issue of concern includes the exposure of nearby residents to EMF. It is important to note that the intensity of a 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. In general, the strongest EMF around the outside of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substation fence or wall, the EMF produced by the substation equipment is typically indistinguishable	▪ 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 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: - 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 EMF at houses/buildings within 150m of substation and OHL and apply appropriate mitigation if needed to reduce potential exposure

	from background levels (Electric and Magnetic Fields Associated with the Use of Electric Power NIEHS). Considering that the nearest receptor is a farmhouse approximately 80 meters from the nearest boundary of the land, there will be no impacts in this regard.			
Type	Negative			
Duration	Long Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			

Table 47: Potential Impacts on Public Health and Safety during Construction and Operation of the OHTL

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Construction Phase				
Impact Description	▪ Risk of exposure of community members to construction-related health risks such as, falls, electric shocks, and equipment-related incidents which could lead to injury or death. ▪ Movement of heavy machinery and vehicles to and from the site and the risk of traffic accidents that may affect passing public. ▪ Construction activities can generate dust and emissions from machinery, potentially affecting air quality in the surrounding area. ▪ Construction activities, including heavy machinery and equipment operation, can create excessive noise levels.	▪ Develop security measures to prevent unauthorised access to the construction site. Such measures could include a fence around each construction site. ▪ High noise level construction activities should not be carried out between 8pm - 6am.	▪ Implement basic dust control and suppression measures, which may include: ▪ Regularly watering active construction areas to suppress dust. - Planning dust-generating activities to occur simultaneously to reduce dust incidents. - Managing stockpiles by watering, containing, covering, or bundling them. - Covering trucks transporting aggregates and fine materials with tarpaulins. ▪ 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	▪ Regular inspection and reporting ▪ Regular inspection on fence around the facility. ▪ Reporting of any trespassing incidents and the measures undertaken in such cases to control the situation and prevent it from occurring again.
Type	Negative			
Duration	Short Term			

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Magnitude	Medium		machinery, and establishing a regular maintenance schedule for all vehicles, machinery, and equipment. ▪ Implement a GRM to receive and facilitate resolution of affected communities' concerns and grievances. ▪ Develop and implement a TMP. ▪ Ensure that all trucks and vehicles accessing the facility are operated by licensed operators. ▪ Ensure that the number of traffic signs, their characteristics and distance among them is placed according to local legal requirements. ▪ Ensure that vehicles adhere to a speed limit of 15km/h within the construction site. ▪ EPC Contractor to implement and update the SEP and GRM as required during construction	
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			
Impact Description	▪ The construction of the OHTL may lead to influx of workers who may exhibit inappropriate behaviour towards local communities, potentially causing hostilities and resentment and could have risks of gender-based violence and harassment	▪ No workers camps or accommodation will be allowed onsite.	▪ Medical examination programme ▪ Details and procedures for ensuring and maintaining hygienic conditions onsite at all times specifically related to toilet and washing facilities, eating areas, etc. ▪ Development of a code of conduct for workers which considers appropriate behaviour by workers at all times, religious customs, traditional cultures and social norms in the area. In addition, it must include specifically requirements for social vices including gender-based violence, sexual harassment, alcoholism, drug abuse, etc. ▪ Induction training and awareness raising sessions on risks associated to the most common contagious diseases (e.g. influenza virus), communicable diseases,	▪ Prepare and implement a Worker Influx Plan and Labor Employment Plan that must take into account the following: - Workers sleep offsite; no onsite accommodation provided. - Prioritize hiring Jordanian and local workers; use expatriates if local skills are lacking - Medical examination programme; - Details and procedures for ensuring and
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
			general measures for hygiene, code of conduct expected to be implemented and other as appropriate.	maintaining hygienic conditions onsite; - Development a code of conduct for workers; and - Requirements for induction training, awareness-raising, and other applicable measures.
Operation Phase				
Impact Description	▪ 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. ▪ 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	▪ 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: - 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	▪ NEPCO to measure EMF at houses/buildings within 150m of substation and OHL and apply appropriate mitigation if needed to reduce potential exposure

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
	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).		reflected in the tender for the EPC contractor.	
Type	Negative			
Duration	Long Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			

17.4.3 Labour and Working Conditions

The potential impacts anticipated on labour and working conditions during construction and operation phases for the substation and the OHTL are presented in Table 48 below.

Table 48: Potential Impacts on Labour and Working Conditions during Construction and Operation of the Substation

Project	Summary	Avoidance Measures	Mitigation Measures	Monitoring and Reporting Requirements
Impact Description	▪ Inappropriate management of the workforce during both the construction and operation phase could entail several human right risks and violations	▪ There are no avoidance measures to be considered.	▪ Provide an overview of the labour use on the project throughout the construction phase. ▪ Prepare a Human Resources policies and procedures, inclusive of equal opportunities and non-discrimination policies. This is to be done in accordance with Jordanian Labour Laws, EBRD PR 2 and International Labour Organisation (ILO) standards. ▪ Ensure contractors and all subcontractors implement the EBRD/IFC Worker accommodation Guidelines and undertake monthly audits to ensure compliance with these on NEPCO team and on contractor working for the Company. Accommodation on the construction site shall not be allowed. ▪ Setup and implement the practices that allow NEPCO employees and Contractor workers to have grievances addressed and monitor contractor grievance mechanism.	▪ Submission of signed GBVH Code of Conduct for all workers. ▪ Documentation of submitted grievances related to GBVH and SEAH as part of the SEP and worker grievance mechanism and measures undertaken to resolve such grievances.
Type	Negative			
Duration	Short Term			
Magnitude	Medium			
Reversibility	Irreversible			
Sensitivity	Medium			
Likelihood	Medium			
Significance	**Minor**			

			▪ Submit employment terms form to include a summary of employment terms for workers including employment duration, benefits, allowances, etc. Such forms should be explained to workers through appropriate means (e.g. as part of induction training) and should be signed by all employees retained. ▪ Prepare a supply chain declaration form to be signed by all major equipment suppliers to the Project. The form must state that the supplier complies with EBRD PR for supply chain and EHSS Policy prepared as part of the EHSS-MS. ▪ Submit and implement labour employment plan. The plan should provide details on number of workers required for the project with breakdown (skilled and unskilled), labour histogram, contract services required for the Project, and a local community labour /contractor recruitment strategy. Plan should be according to local employment requirements for local communities and should be implemented through appropriate local platforms (e.g. local District office / local Municipality). ▪ Prepare Security staff employment plan to be guided by international best practice requirements (such as the Voluntary Principles on Security and Human Rights). ▪ All workers should be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct should prohibit be subject to disciplinary action and should prohibit harassment, gender-based violence and abuse of any kind. ▪ All workers should be provided with a copy of the Gender Based Violence and Harassment (GBVH) Code of Conduct and will be required to sign it.	

18 SUMMARY OF ANTICIPATED IMPACTS

Table 49 and Table 50 below present a summary of the anticipated impacts that are studied throughout the ESIA to include the planning and construction, and operation phase of the Project.

Table 49: Summary of Anticipated Impacts during Planning and Construction Phase

E&S Attribute	Potential Impact		Type	Duration	Magnitude	Reversibility	Sensitivity	Likelihood	Significance
Landscape and Visual	Substation	Construction of the substation will temporarily affect the site's visual quality, featuring typical construction elements like excavators, trucks, loaders, and compactors.	Negative	Short Term	Low	Reversible	Low	Medium	Minor
	OHTL	Site preparation for OHTL towers will involve land clearing, levelling, excavation, and grading, temporarily affecting the site's visual quality with typical construction machinery.	Negative	Short Term	Low to Medium	Reversible	Low to Medium	High	Minor
Land Use, Land Ownership, and Resettlement	Substation	The acquisition of the substation land will cause permanent economic displacement, impacting those who rely on the land for their livelihoods, particularly affecting agricultural activities.	Negative	Medium Term	High	Irreversible	High	High	Major
	OHTL	The construction of the OHTL may lead to economic displacement of agricultural activities, impacting registered landowners, informal land users, and tenants. It may also disrupt roads, utilities, forested areas, and other communal lands, affecting property values and potentially interfering with beekeeping due to EMF.	Negative	Medium Term	High	Reversible	High	High	Major
Geology, Hydrology and Hydrogeology	Substation	Potential for local flooding, particularly during rainy seasons and flash floods.	Negative	Long Term	Medium	Reversible	High	Medium	Minor
		Improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and hazardous material, etc.) could contaminate soil and groundwater.	Negative	Short Term	Medium	Reversible	Low	Medium	Minor
	OHTL	Potential for local flooding, particularly during rainy seasons and flash floods.	Negative	Long Term	Medium	Reversible	High	Medium	Minor
		Improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and hazardous material, etc.) could contaminate soil and groundwater.	Negative	Short Term	Medium	Reversible	Low	Medium	Minor

Archaeology and Cultural Heritage	Substation	The land might include several archaeological sites that might be affected by the construction activities. Moreover, construction activities could damage potential archaeological remains which could be buried in the ground.	Negative	Short Term	High	Irreversible	Medium	Medium	Moderate
	OHTL	Several archaeological sites were identified along the OHTL route which might be impacted by the construction of the OHTL towers. Moreover, construction activities for the OHTL towers could damage potential archaeological remains which could be buried in the ground (if any).	Negative	Short Term	High	Irreversible	Medium	Medium	Moderate
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.	Negative	Short Term	Medium	Reversible	Medium	High	Minor
	OHTL	Site preparation for OHTL will temporarily increase dust and particulate emissions, impacting air quality. Additionally, noise and vibrations from construction activities, will affect surrounding environment.	Negative	Short Term	Medium	Reversible	Medium	Low	Minor
Biodiversity	Substation	Construction activities as well as improper practices by workers (i.e. hunting of animals, discharge to land, etc.) may disturb habitats.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor
	OHTL	Construction activities for the OHTL towers as well as improper practices by workers (i.e. hunting of animals, discharge to land, etc.) may disturb habitats.	Negative	Short Term	Medium	Irreversible	Medium	High	Minor
Infrastructure and Utilities	Substation	The construction activities are anticipated to raise water demand and produce waste and wastewater, potentially straining existing facilities. Additionally, transportation activities necessary for the construction phase might impact current road networks, traffic flows, and existing users.	Negative	Short Term	Low	Reversible	Medium	Low	Minor

	OHTL	The construction activities are anticipated to raise water demand and produce waste and wastewater, potentially straining existing facilities. Additionally, transportation activities necessary for the construction phase might impact current road networks, traffic flows, and existing users.	Negative	Short Term	Low	Reversible	Medium	Low	Minor
Occupational Health and Safety	Substation	During the construction of OHTLs, workers face various occupational health and safety risks, such as injuries from heavy equipment, electrical shocks, exposure to hazardous chemicals, prolonged noise, slips and falls, exposure to high noise levels, dust and gases and accidents.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor – generally controlled
	OHTL	During the construction of OHTLs, workers face various occupational health and safety risks, such as injuries from heavy equipment, electrical shocks, exposure to hazardous chemicals, prolonged noise, slips and falls, exposure to high noise levels, dust and gases and accidents.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor – generally controlled
Socio-economic	Substation	The Project is anticipated to generate temporary employment opportunities and stimulate local economic growth.	Positive	N/A					
	OHTL	The Project is anticipated to generate temporary employment opportunities and stimulate local economic growth.	Positive	N/A					
Public Health and Safety	Substation	▪ 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.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor
	OHTL	▪ 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.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor

		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.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor

Table 50: Summary of Anticipated Impacts during the Operation Phase

E&S Attribute	Potential Impact		Type	Duration	Magnitude	Reversibility	Sensitivity	Likelihood	Significance
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.	Negative	Long Term	Low	Irreversible	Medium	High	Minor
	OHTL	OHTL towers' visual impacts involve their colour, height, number, and how they blend with the landscape and visual surroundings. However, these structures are usually not imposing enough to drastically change the area's visual character.	Negative	Long Term	Low	Irreversible	Low to Medium	High	Minor
Geology, Hydrology and Hydrogeology	Substation	Improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and hazardous material, etc.) could contaminate soil and groundwater.	Negative	Long Term	Medium	Reversible	High	Medium	Minor
	OHTL	Improper housekeeping practices (e.g. improper management of waste streams, improper storage of construction material and hazardous material, etc.) could contaminate soil and groundwater.	Negative	Long Term	Medium	Reversible	High	Medium	Minor
Archaeology and Cultural Heritage	Substation	There are no anticipated impacts on archaeology and cultural heritage during the operation phase.	N/A						
	OHTL	There are no anticipated impacts on archaeology and cultural heritage during the operation phase.	N/A						
Air Quality and Noise	Substation	▪ High voltage substations pose significant environmental concerns due to sulphur hexafluoride (SF6) emissions. ▪ Transformer and voltage changes may have noise impacts.	Negative	Long Term	Medium	Reversible	Medium	Low	Minor

	OHTL	▪ High-voltage transmission lines can generate small amounts of ozone due to corona discharge, which occurs when the electrical field around the conductors ionises the surrounding air. ▪ With regards to noise, OHTLs can produce a low-level hissing or crackling noise due to corona discharge, especially during wet weather conditions.	Negative	Long Term	Medium	Irreversible	Medium	Medium	Minor
Biodiversity	Substation	Potential avi-fauna fatalities due to electrocution	Negative	Long Term	Medium	Irreversible	Medium	Medium	Minor
	OHTL	▪ The presence of the OHTLs poses risks to birds and bats due to potential collisions with towers during migration or flight paths, leading to injuries or fatalities. ▪ EMF has variable effect on wildlife with concerns primarily around interference with bird's navigation.	Negative	Long Term	High	Irreversible	Medium	Medium	Moderate
Infrastructure and Utilities	Substation	The construction activities are anticipated to raise water demand and produce waste and wastewater, potentially straining existing facilities.	N/A						
	OHTL	The construction activities are anticipated to raise water demand and produce waste and wastewater, potentially straining existing facilities.	N/A						
Occupational Health and Safety	Substation	During operation and maintenance of substations, workers face various occupational health and safety risks, such as injuries from heavy equipment, electrical shocks, exposure to hazardous chemicals, prolonged noise, slips and falls, exposure to high noise levels, dust and gases and accidents.	Negative	Long Term	Medium	Irreversible	Medium	Medium	Minor – generally controlled
	OHTL	During operation and maintenance of substations, workers face various occupational health and safety risks, such as injuries from heavy equipment, electrical shocks, exposure to hazardous chemicals, prolonged noise, slips and falls, exposure to high noise levels, dust and gases and accidents.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor – generally controlled

Socio-economic	Substation	The project 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.	Positive	N/A					
	OHTL	The project 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.	Positive	N/A					
Public Health and Safety	Substation	▪ Risk of exposure of community members to construction-related health risks such as, falls, electric shocks, and equipment-related incidents which could lead to injury or death. ▪ Movement of heavy machinery and vehicles to and from the site and the risk of traffic accidents that may affect passing public. ▪ Construction activities can generate dust and emissions from machinery, potentially affecting air quality in the surrounding area. ▪ Construction activities, including heavy machinery and equipment operation, can create excessive noise levels.	Negative	Short Term	Medium	Irreversible	Medium	Medium	Minor
	OHTL	▪ Risk of Exposure of nearby residents to EMF generated from the OHTL.	Negative	Long Term	Medium	Irreversible	Medium	Medium	Minor

19 ASSESSMENT OF CUMULATIVE IMPACTS

At this stage, the known development projects in the area 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 by maintaining voltage levels within standard values according to the grid code, particularly during peak load periods under contingencies. It also seeks to 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 while allowing for the development of up to 600 MW of additional solar PV generation capacity in the Rihab-Mafraq area.

20 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This section presents the Environmental and Social Management Plan (ESMP) for the various Project phases and the overall requirements for the Environmental, Health, Safety, and Social Management System (EHSS MS).

20.1 Institutional Framework and Procedural Arrangements

Generally, two main pillars govern the successful implementation of any Environmental and Social Management Plan (ESMP) as well as the Environmental, Health, Safety, and Social Management System (EHSS MS) for the project that will be developed at a later stage (as discussed in further details in below). These pillars include:

- Proper identification of roles and responsibilities for the entities involved; and
- Effective control of the process.

All management practices are interlinked, and this section describes how these two pillar criteria could be fulfilled, which in turn helps ensure that the overall objectives are met.

Staffing Requirements

Defining the roles and responsibilities of entities involved in an ESMP specifies their engagement locations, timings, degrees of involvement, and expected tasks, preventing jurisdictional overlaps and ensuring effective communication and management of ESMP components. Control measures primarily include training and awareness for involved entities and managing any non-conformities that may arise. The goal is to ensure practical implementation of ESMP recommendations during construction and operation, and to evaluate their impact on environmental resources. Table 51 provides an overview of the proposed institutional and procedural framework for ESMP implementation, while Table 52 details the roles and responsibilities of each entity involved in the process.

Table 51: Proposed Institutional and Procedural Arrangement for ESMP Implementation

Issue	Entity responsible for Compliance	Entity responsible for Review and Monitoring	Monitoring Results to be shared with
Construction Phase			
Compliance with ESMP Requirements	EPC Contractors	NEPCO/E&S ESAP Implementation Consultant or Third-party	MoEnv and EBRD
Compliance with environmental and social legislations	EPC Contractors	NEPCO/E&S ESAP Implementation Consultant or Third-party	MoEnv and EBRD
Operation Phase			
Compliance with ESMP Requirements	NEPCO	Third-party	MoEnv and EBRD
Compliance with environmental and social legislations	NEPCO	Third-party	MoEnv and EBRD

Table 52: Roles and Responsibilities of Entities Involved in ESMP

Project Role	Entity	Environmental and Social Responsibilities	Staffing Requirements
Project Developer and Operator	NEPCO	▪ Selection of EPC contractors for the substation and the OHTL. ▪ Implement mitigation requirements as detailed in the ESMP. ▪ NEPCO to prepare, adopt, and implement an Environmental, Health and Safety, and Social management system (EHSS-MS) for the construction and operation phases of the Project (substation) and the Associated Facilities (OHTL) to be aligned with the national legislations, EBRD's ESP (2019) (and the incorporated PRs), and relevant EU requirements and based on ISO system	▪ Assign competent E&S Manager ▪ Assign a community liaison officer (CLO) ▪ Appoint a person to be the primary point of contact within NEPCO regarding the land acquisition and compensation programme.

Project Role	Entity	Environmental and Social Responsibilities	Staffing Requirements
		(9001:2015/ 14001:2015 and 45001:2018) requirements. ▪ Undertake monitoring to ensure that the EPC Contractors conform to the requirements of the ESMP during construction and that NEPCO operation staff comply with the requirements during operation. Monitoring is to be undertaken monthly during the construction phase and on a bi-annual basis during the operation phase. NEPCO will be supported by the E&S ESAP Implementation Consultant to be assigned by EBRD. ▪ Ensure overall compliance of EPC Contractor and NEPCO Operation team with the requirements of the ESMP and EHSS MS ▪ Reporting to EBRD ▪ Implement corrective action measures in case of non-compliance incidents and submit non-conformance report to the MoEnv.	▪ Operation to be undertaken by internal NEPCO staff
EPC Contractors	To be Determined	▪ Appoint a competent HSE team responsible for implementing the ESMP. ▪ Implement mitigation and monitoring requirements as detailed in the ESMP. ▪ Prepare and submit a project and site-specific EHSS-MS in line with local legislations, EBRD ESP 2019 and according to ISO system (9001:2015/ 14001:2015 and 45001:2018) requirements. Contractors EHSS-MS will demonstrate how requirements are transferred to all subcontractors. ▪ Prepare and submit reporting requirements to NEPCO as detailed in the ESMP. ▪ Implement corrective action measures in case of non-compliance incidents and submit non-conformance report to NEPCO whom in turn will submit to MoEnv.	▪ Appoint an E&S officer ▪ Appoint Community Liaison Officer(s) ▪ Appoint Emergency response team (doctor, nurse, firefighters, etc.)
Environmental Regulator	Ministry of Environment	▪ 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. ▪ Undertake compliance monitoring ▪ Receive monitoring results and reports.	▪ NA
Funding Entity	EBRD	▪ The Project financier and responsible for the monitoring of E&S safeguard compliance. ▪ Receive environmental and social performance report. ▪ Ensuring environmental and social compliance ▪ Appoint the E&S ESAP Implementation Support Consultant	▪ NA
E&S ESAP Implementation Consultant	TBD	▪ Is the E&S Consultant 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.	▪ Appoint competent E&S team of experts to support NEPCO in the implementation of the ESAP requirements

Training and Awareness

An EHSS training plan must be developed and maintained onsite which identifies the type of training that is required for each worker onsite. The plan will ensure that each worker is competent in relation to the tasks to be performed. In addition, signed attendance sheets and training material must be maintained onsite at all times. This should be completed by the EPC Contractor and Project Operator as applicable.

Training should include the following as applicable.

- Basic visitor EHSS induction training;
- Worker EHSS induction training for all workers onsite to include for example EPC Contractor and subcontractor crew;
- Emergency response training for all workers onsite to include for example EPC Contractor and subcontractor crew;
- Specialised training: there are other specific training requirements that must be adhered to, and which are related to specific topics as applicable. This includes for example specific training for Occupational Health and Safety (OHS), waste, drivers, security workers, etc.; and
- Toolbox Talks (TBT): regular TBT meetings must be undertaken with for example EPC Contractors respective crews and subcontractor crew. Topics and frequency are developed and distributed regularly.

Inspection and Monitoring

EHSS inspection and monitoring must be undertaken to ensure compliance of involved entities with the mitigation and monitoring requirements as detailed in the ESMP and EHSS MS requirements. This should be completed by the NEPCO during construction and operation and EPC Contractor during construction as applicable.

Inspection and monitoring should include the following as applicable and as highlighted in the table that follows.

- Daily HSE inspection and monitoring at the site and preparation of a daily observation report stating therein the corrective measures on observed safety deficiencies, unsafe acts and conditions;
- Weekly site inspections to be carried out using the weekly site inspection checklists template based on requirements of the ESMP and EHSS MS; and
- EHSS and Labour & Working conditions to be undertaken by Developer on EPC Contractor to ensure compliance with ESMP requirement and EHSS MS. EHSS and labour/working conditions audits should be undertaken quarterly during the construction phase.

Meetings

Regular EHSS meetings must be undertaken to discuss EHSS performance onsite, outstanding issues, key issues of concern and other as applicable. Signed attendance sheets and Minutes of Meeting (MoM) must be maintained onsite at all times. This should be completed by the NEPCO during construction and operation and EPC Contractor during construction as applicable.

Meetings should include the following as applicable and as highlighted in the table that follows.

- Weekly EHSS meetings
- Monthly EHSS meeting
- Quarterly management EHSS reviews

Reporting

EHSS reporting will be required to summarise the following:

- Progress in implementing the ESMP and EHSS MS plans as required;

- Findings of the monitoring programmes, with emphasis on any breaches of the control standards, action levels or standards of general site management;
- Outstanding incident report forms;
- Relevant changes or possible changes in legislation, regulations and international practices;
- Reporting on Key Performance Indicators (KPI);
- Grievances (worker and stakeholder); and
- Security incidents.

Reporting should be submitted to NEPCO by the EPC Contractor during construction and prepared by NEPCO during operation as applicable by the relevant entities.

20.2 Environmental, Social, Health, and Safety Management System (EHSS-MS)

The ESIA is considered a key document in assessing and managing the environmental and social risks associated with the Project. Its primary output, the Environmental and Social Management Plan (ESMP), offers comprehensive mitigation strategies and guidelines for addressing the anticipated environmental and social risks.

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.

Summarised below is the overall framework, structure and key requirements for the EHSS MS for the key entities involved in the Project.

NEPCO as the Project Developer

- ESIA including ESMP
- EHSS Manual that should include: (i) EHSS Policy; (ii) Human Resources Policy and Procedures; (iii) EHSS Organisational Structure and Responsibilities; (iv) EHSS Monitoring and Reporting Requirements; (v) EHSS Meeting Requirements; (Vi) EHSS Training Requirements.
- Stakeholder Engagement Plan (SEP) including stakeholder grievance mechanism;
- Resettlement Plan;
- Occupational Health and Safety Plan
- Emergency Preparedness and Response Plan
- ESAP.

EPC Contractors

- ESIA including ESMP
- ESHS Manual (in line with NEPCO) that should include: (i) EHSS Policy; (ii) Human Resources Policy and Procedures; (iii) EHSS Organisational Structure and Responsibilities; (iv) EHSS Monitoring and Reporting Requirements; (v) EHSS Meeting Requirements; (Vi) EHSS Training Requirements.
- Water Management Plan
- Hazardous Material and Waste Management Plan
- Air Quality and Noise Management Plan
- Traffic and Transport Management Plan
- Occupational Health and Safety Plan

- Emergency Preparedness and Response Plan
- Security Management Plan
- Archaeology Management Plan and Chance Find Procedure
- Worker Influx Plan
- Subcontractor and Supplier Management Plan
- Labor and Working Conditions Management Plan

20.3 Compilation of Environmental and Social Management Plan (ESMP)

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20.3.1 ESMP for the Substation

Table 53 and Table 54 below present the ESMP for the planning and construction and operation phases, respectively, for the North Substation.

Table 53: ESMP for the Planning and Construction Phase for the Substation

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
LANDSCAPE AND VISUAL					
Temporary visual impacts from typical construction elements like excavators, trucks, loaders, and compactors.	▪ Construction site kept tidy and organised by the end of each working day. ▪ Relocate and store construction machinery, equipment, and vehicles not in use to minimise their visual impact on the surrounding area. ▪ Proper storage and management of waste streams.	Mitigation	Inspections of the works at all times	Continuous	EPC Contractor
LAND USE, LAND OWNERSHIP, AND RESETTLEMENT					
The acquisition of the substation land will cause permanent economic displacement, impacting those who rely on the land for their livelihoods, particularly affecting agricultural activities.	▪ Prepare and implement an EBRD PR5 compliant Resettlement Plan (RP) – Details in Section 10.2.1. ▪ Land audit for substation land to be carried out by the ESIA Team (to be prepared and issued following the ESIA) and corrective action plan (CAP) agreed with NEPCO before tendering for the Contractor and required measures implemented before contractor can mobilise to the site. ▪ NEPCO to work extensively with the E&S ESAP Implementation Consultant commissioned by EBRD to implement the E&S requirements of the EBRD and the ESAP measures including the CAP. ▪ Develop and implement RP, updated SEP and Grievance Redress Mechanism (GRM). NEPCO to bear any grievance redress and commit to follow due process in compliance with PR5 requirements.	Mitigation	▪ Detailed monitoring and evaluation as per RP ▪ Monitoring and audit. ▪ Monitoring and reporting on stakeholder engagement and GRM ▪ Documentation and reporting and documentation of stakeholder engagement. ▪ Audit the completed land acquisition and compensation programme.	Once before construction commences	NEPCO
GEOLOGY, HYDROLOGY AND HYDROGEOLOGY					
Potential for local flooding and soil erosion impacts, particularly during rainy seasons and flash floods.	▪ Undertake flood risk assessment and hydrodynamic analysis during the design phase. ▪ Conduct a detailed assessment employing high-resolution topographic data, Digital Elevation Models (DEMs), GIS for spatial analysis, and advanced hydrological modelling techniques such as the use of HEC-RAS or 2D hydrodynamic models to simulate flood	Avoidance	▪ NEPCO and EPC Contractor to review flood risk assessment and hydrodynamic analysis and detailed design.	During the detailed design	EPC Contractor and NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	behaviour and predict flood impact zones and flow velocities accurately.				
	▪ Implement slope stabilisation techniques at substation and other vulnerable areas to stabilise soil and reduce erosion. ▪ Substation design shall avoid the wadi and flood risk areas and shall apply required engineering measures to divert potential flood from the substation.				
	▪ Establish buffer zones around wadis and other high-risk flood areas to maintain natural hydrological processes and protect infrastructure				
	▪ Avoid executing excavation works under aggressive weather conditions	Mitigation	Inspection	Continuous	EPC Contractor and NEPCO
	▪ 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.				
Improper waste management and accidental leakage of oils or chemicals could contaminate soil and groundwater.	**Solid Waste**				
	▪ Develop and implement a Waste Management Plan (WMP).	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Once before construction commences	EPC Contractor
	▪ 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.				
	▪ Provide a dedicated storage areas for municipal solid waste and construction waste, clearly labelled and designed to prevent leaks and contamination.				
	▪ Implement waste separation and recycling measures to the extent possible and coordinate with recycling companies			Continuous	EPC Contractor
	▪ Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing				
	▪ Maintain records and manifests that indicate volume of waste generated onsite, collected by contractor, and disposed of at the landfill. The numbers within the				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	records are to be consistent to ensure no illegal dumping at the site or other areas.				
	Wastewater Generation				
	▪ Ensure that septic tanks used during construction are securely contained and impermeable to prevent any leakage of wastewater into the soil.	Avoidance	▪ Inspection	Once before construction commences	EPC Contractor
	▪ Coordinate with relevant water utility company to hire a private contractor for the collection of wastewater from the site to the nearest authorised WWTP.	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Continuous	EPC Contractor
	▪ Ensure that septic tanks are emptied and collected at appropriate intervals to avoid overflowing.				
	▪ Maintain records and manifests that indicate volume of wastewater generated onsite and disposed of at the designated WWTP.				
	Hazardous Waste				
	▪ 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.	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Continuous	EPC Contractor
	▪ Prohibit illegal disposal of hazardous waste to the land				
	▪ Follow the requirements for management and storage as per the 'Instructions for Hazardous Waste Management and Handling of the Year 2003' of the MoEnv				
	Hazardous Materials				
	▪ Utilise non-hazardous materials and substances wherever possible to eliminate the risk of hazardous waste generation and chemical spills.	Avoidance	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Once before construction commences	EPC Contractor
	▪ Any new transformers at the substation should use polychlorinated biphenyls (PCB) free oil				
	▪ 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.	Mitigation		Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS). Spilled material should be tracked and accounted for				
	▪ Store oils, chemicals, and other hazardous materials in secure areas to prevent land contamination from accidental spills. Storage areas shall be 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				
	Leaks and Spills				
	▪ Regular maintenance of machinery to prevent engine oil and fuel leaks	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Continuous	EPC Contractor
	▪ Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.)				
	▪ Refuelling to take place at a suitable location (hard surface) with appropriate measures for trapping spilled material.				
	▪ If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.				
	▪ General purpose spill absorbent must be available at hazardous material storage areas.				
	▪ Maintain proper housekeeping practices onsite				
	▪ Minimise works near surface water bodies/wadis in wet weather				
ARCHAEOLOGY AND CULTURAL HERITAGE					
The land is located within an area surveyed by DoA in 2022, known as the "Bureiqa Survey" which might include several archaeological sites that might be affected by the construction activities.	▪ Coordinate with DoA to determine any additional requirements needed (such as an archaeology survey) and obtain the exact locations of archaeological sites that might be present within or in proximity to the land. Based on the response from the DoA, avoidance measures will be identified and incorporated in the detailed design.	Avoidance	▪ Submit proof for coordination with authorities ▪ Submit final design	During the detailed design	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
There is a chance that potential archaeological remains in the ground might be discovered during construction activities	▪ Implement chance find procedures for potential unearthing of any archaeological sites during construction.	Mitigation	▪ Submit chance find procedure ▪ Inspection ▪ Reporting of any archaeological find	Upon Occurrence	EPC Contractor
AIR QUALITY AND NOISE					
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.	▪ High noise level construction activities should not be carried out between 8pm - 6am.	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ If excessive noise levels are identified through inspections and visual monitoring, pinpoint the source and implement appropriate control measures.	Mitigation	▪ Inspection ▪ Reporting	Upon occurrence	EPC Contractor
	▪ Use noise suppressants and well-maintained mufflers for high-noise equipment, and maintain a regular maintenance schedule for all machinery	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ Implement basic dust control measures by watering active construction areas, scheduling dust-generating activities together, properly managing stockpiles, covering transport trucks, enforcing a 15 km/h speed limit for trucks, and regularly inspecting and maintaining vehicles and equipment.	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ Undertake consultation activities with surrounding land users to inform them of construction schedule	Mitigation	▪ Consultation records	Continuous	EPC Contractor
	▪ 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	Mitigation	▪ Consultation records ▪ GRM	Continuous	EPC Contractor
BIODIVERSITY					
Excavation, levelling, and land clearing during site preparation may disturb habitats. However, the substation site, mainly arid with low ecological value, lacks endangered species or sensitive habitats.	▪ Preserve existing vegetation as much as possible during site preparation.	Avoidance	▪ Submit final design	Continuous	EPC Contractor
	▪ Comply with the "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022 issued by the RSCN				
	▪ During detailed design stage, undertake field surveys at the Substation site and along the OHTL route, the surveys should include: - Nest search survey during the suitable period	Avoidance	▪ Review survey results/findings ▪ Documentation within the ESIA	During the detailed design	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	- Bird monitoring survey which includes vantage points during periods of intensive migration for at least 2 weeks, in areas that attract birds within the project area such as (water bodies, landfills, important nesting sites for hovering birds) - Special surveys for rare or threatened species and birds on nesting periods. - Survey of bird species that overwinter at the project site.				
	▪ Surveys should be undertaken according to the "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022 issued by the RSCN.				
Impacts from improper management of the site which could include improper practices by workers (i.e., hunting of animals, discharge of hazardous waste to land, etc.).	▪ Establish and train workers on an appropriate Code of Conduct including no hunting at any time and under any condition.	Mitigation	▪ Review of code of conduct (CoC) ▪ Training records ▪ Inspection	Continuous	EPC Contractor
	▪ No construction camps allowed onsite.				
	▪ 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				
Construction activities can cause soil compaction and erosion, adversely affecting plant growth and survival.	▪ Use low-impact construction techniques to reduce soil compaction, such as avoiding heavy machinery in sensitive areas.	Mitigation	▪ Inspection	Continuous	EPC Contractor
Construction disturbances can create opportunities for invasive species to establish and outcompete native flora, leading to ecological imbalances	▪ Use existing roads and tracks and do not establish new roads	Avoidance	▪ Inspection	Continuous	EPC Contractor
	▪ Any planning for new roads must avoid sensitive habitats (forested regions) and minimise ecological disruption.				
Construction and maintenance activities can disrupt terrestrial animal habitats, leading to displacement and fragmentation, which can adversely affect wildlife populations.	▪ Avoid scheduling constriction activities during critical breeding, nesting, and migration periods.	Avoidance	▪ Inspection	Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
Noise and human activity can disturb bird populations and other wildlife, potentially leading to behavioural changes and displacement	▪ Limit construction activities to daylight hours to minimise disturbance to nocturnal wildlife. ▪ Employ noise and dust suppression measures to minimise disturbance to wildlife and local communities.	Mitigation	▪ Inspection	Continuous	EPC Contractor
INFRASTRUCTURE AND UTILITIES					
The construction activities are anticipated to raise water demand and produce waste and wastewater, potentially straining existing facilities.	▪ Coordinate with relevant water utility company for securing additional water requirements of the Project.	Mitigation	▪ Submit proof for coordination with authorities	Once before construction commences	EPC Contractor
	▪ 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.				
	▪ Coordinate with certified recycling companies to manage and process recyclable materials.				
	▪ Avoid damage to existing infrastructure and utilities during the construction	Avoidance	▪ Inspection	Continuous	EPC Contractor
	▪ Develop and implement a water management plan to identify sources of water for the Project	Mitigation	▪ Submission of water management plan ▪ Inspection	Once before construction commences and continuous	EPC Contractor
	▪ Worker training	Mitigation	▪ Training records ▪ Inspection	Continuous	EPC Contractor
Transportation activities necessary for the construction phase might impact road networks, traffic, and users.	▪ Develop and implement a Traffic Management Plan (TMP).	Mitigation	▪ Submission of traffic and transport management plan ▪ Inspection	Once before construction commences and continuous	EPC Contractor
OCCUPATIONAL HEALTH AND SAFETY					

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
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.	▪ Develop and implement an Occupational Health and Safety (OHS) Plan that ensures compliance with national legal labour requirements. ▪	Mitigation	▪ Review of the OHS Plan ▪ Inspection ▪ Documentation	Once before construction commences and continuous	EPC Contractor
	▪ Allocate specific personnel responsible for health & Safety management on site.	Mitigation	▪ Inspection ▪ Documentation	Continuous	EPC Contractor
	▪ Provide adequate and appropriate training of all workers on the contractor's OHS policies and procedures.	Mitigation	▪ Training records ▪ Inspection	Continuous	EPC Contractor
	▪ Ensure fire extinguishers are provided and regularly maintained.	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ Ensure all workers are equipped with proper Personal Protective Equipment	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ Carry out daily site inspections to verify the proper implementation of safety measures.	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ Prepare and implement an Emergency Preparedness and Response Plan (EPRP)	Mitigation	▪ Review of EPRP ▪ Inspection ▪ Documentation	Once before construction commences and continuous	EPC Contractor
	▪ Establish and implement a Grievance Redress Mechanism (GRM) for workers to receive and facilitate resolution of workers grievances.	Mitigation	▪ Review of GRM ▪ Review of GRM records and actions taken	Once before construction commences and continuous	EPC Contractor
SOCIOECONOMICS					
The Project is anticipated to create temporary employment opportunities for local communities as well as other indirect benefits.	▪ 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 to include Project Updates Procedure, Local Recruitment Procedure, Local Procurement Procedure				
PUBLIC HEALTH AND SAFETY					
Risk of exposure of community members to construction-related health risks	▪ Develop security measures to prevent unauthorised access to the construction site. Such measures could include installing a fence around the construction site.	Avoidance	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ Develop and implement a TMP.	Mitigation	▪ Inspection	Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
Movement of heavy machinery and vehicles to and from the site and the risk of traffic accidents that may affect passing public.	▪ Ensure that all trucks and vehicles accessing the facility are operated by licensed operators.		▪ Reporting		
	▪ Presence of flagman at the entrance and exit of the project site to control vehicles and truck movement.				
	▪ Ensure that the number of traffic signs, their characteristics and distance among them is placed according to local legal requirements.				
	▪ Ensure that vehicles adhere to a speed limit of 15km/h within the construction site.				
Construction activities can cause elevated dust and noise emissions, potentially affecting air quality in the surrounding area.	▪ Implement basic dust control and suppression measures: - Regularly watering active construction areas to suppress dust. - Planning dust-generating activities to occur simultaneously to reduce dust incidents. - Managing stockpiles by watering, containing, covering, or bundling them. - Covering trucks transporting aggregates and fine materials with tarpaulins.	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
Construction activities, including heavy machinery and equipment operation, can create excessive noise levels.	▪ High noise level construction activities should not be carried out between 8 pm – 6 am.	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ Employ noise suppression measures, including using well-maintained mufflers and noise suppressants for high-noise equipment, and maintaining regular equipment maintenance schedules.		▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ If excessive noise levels are identified through inspections and visual monitoring, pinpoint the source and implement appropriate control measures.		▪ Inspection ▪ Reporting	Upon Occurrence	EPC Contractor
	▪ EPC Contractor to implement and update the SEP and GRM as required during construction		▪ Review of GRM ▪ Reporting	Once before construction commences and continuous	EPC Contractor
LABOUR AND WORKING CONDITIONS					
Inappropriate management of the workforce during both the construction and operation phase	▪ Provide an overview of the labour use on the project throughout the construction phase.	Mitigation	▪ Submission of signed GBVH Code of Conduct for all workers.	Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
could entail several human right risks and violations	▪ Prepare a Human Resources policies and procedures, inclusive of equal opportunities and non-discrimination policies. This is to be done in accordance with Jordanian Labour Laws, EBRD PR 2 and International Labour Organisation (ILO) standards. ▪ Ensure contractors and all subcontractors implement the EBRD/IFC Worker accommodation Guidelines and undertake monthly audits to ensure compliance with these on NEPCO team and on contractor working for the Company. Accommodation on the construction site shall not be allowed. ▪ Setup and implement the practices that allow NEPCO employees and Contractor workers to have grievances addressed and monitor contractor grievance mechanism. ▪ Submit employment terms form to include a summary of employment terms for workers including employment duration, benefits, allowances, etc. Such forms should be explained to workers through appropriate means (e.g. as part of induction training) and should be signed by all employees retained. ▪ Prepare a supply chain declaration form to be signed by all major equipment suppliers to the Project. The form must state that the supplier complies with EBRD PR for supply chain and EHSS Policy prepared as part of the EHSS-MS. ▪ Submit and implement labour employment plan. The plan should provide details on number of workers required for the project with breakdown (skilled and unskilled), labour histogram, contract services required for the Project, and a local community labour /contractor recruitment strategy. Plan should be according to local employment requirements for local communities and should be implemented through appropriate local platforms (e.g. local District office / local Municipality).		▪ Documentation of submitted grievances related to GBVH and SEAH as part of the SEP and worker grievance mechanism and measures undertaken to resolve such grievances.		

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ Prepare Security staff employment plan to be guided by international best practice requirements (such as the Voluntary Principles on Security and Human Rights). ▪ All workers should be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct should prohibit be subject to disciplinary action and should prohibit harassment, gender-based violence and abuse of any kind. ▪ All workers should be provided with a copy of the Gender Based Violence and Harassment (GBVH) Code of Conduct and will be required to sign it.				

Table 54: ESMP for the Operation Phase for the Substation

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
LANDSCAPE AND VISUAL					
The substation is expected to be visible in the nearby area of the Project site, which may result in visual impacts.	▪ Construct a high concrete perimeter wall around the Substation. ▪ Plant native trees and shrubs around the substation to efficiently shield it from nearby receptors. ▪ A SEP along with a grievance mechanism will be implemented by NEPCO. Please refer to the standalone SEP for additional details.	Mitigation	▪ Inspection	Once before operation commences	NEPCO
GEOLOGY, HYDROLOGY, AND HYDROGEOLOGY					
▪ 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	▪ 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	Avoidance	▪ Inspection	Continuous	NEPCO
	▪ Develop and implement a Waste Management Plan (WMP).	Mitigation	▪ Review of WMP	Once before operation commences	NEPCO
	▪ 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	Mitigation	▪ Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Prohibit fly-dumping of any solid waste to the land	Mitigation	▪ Inspection	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
flora/fauna and the general health and safety of workers (from being exposed to such waste streams). Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures which are expected to be implemented by the Project Operator. ▪ Solid Waste: - Solid waste generated will likely include municipal solid waste such as cardboard, plastic, food waste, etc. - Municipal solid waste generated will likely be collected and stored onsite and then disposed to the closest municipal approved dumpsite. ▪ Wastewater Generation	▪ Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste"	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ Coordinate with certified recycling companies to manage and process recyclable materials	Mitigation	▪ Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Implement proper housekeeping practices on the construction site at all times.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ 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.	Mitigation	▪ Review manifests to ensure consistency	Continuous	NEPCO
	▪ Coordinate with relevant water utility company to hire a private contractor for the collection of wastewater from the site to the closest WWTP.	Mitigation	▪ Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Prohibit illegal disposal of wastewater to the land.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ 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.	Mitigation	▪ Review manifests to ensure consistency	Continuous	NEPCO
	▪ Ensure that septic tanks are emptied and collected by wastewater contractor at	Mitigation	▪ Inspection	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
- Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, showers, etc.) generated from workers. Wastewater quantities are expected to be minimal. It is expected that wastewater will be collected and stored in fully contained septic tanks and then collected and transported by transportation tankers to be disposed at the closest Wastewater Treatment Plant (WWTP). ▪ Hazardous Waste Generation - Hazardous waste generated throughout the operation phase	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.	Mitigation	▪ Review of training records	Continuous	NEPCO
	▪ 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	Mitigation	▪ Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Follow the requirements for management and storage as per the 'Instructions for Hazardous Waste Management and Handling of the Year 2003' of the MoEnv	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ Prohibit illegal disposal of hazardous waste to the land	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ 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	Mitigation	▪ Inspection	Upon Occurrence	NEPCO
	▪ Ensure that hazardous waste containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing	Mitigation	▪ Inspection	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
could include consumed oil, chemicals, paint cans, etc. Hazardous waste generated will likely be collected and stored onsite and then disposed at the 'Swaqa Hazardous Waste Treatment Facility' which is managed by the MoEnv. - 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.	▪ 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.	Mitigation	▪ Review manifests to ensure consistency	Continuous	NEPCO
	▪ 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.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ 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	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of	Mitigation	▪ Inspection	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
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 - 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. ▪ Substations often utilise oil-filled transformers and	hazardous materials (such as oil, fuel, etc.)				
	▪ Any new transformers at the substation should use polychlorinated biphenyls (PCB) free oil.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ Ensure that a minimum of 1,000 litters 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	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.	Mitigation	▪ Inspection	Continuous	NEPCO
			▪ Reporting of incident and measures taken to minimize impact	Upon occurrence	NEPCO
	▪ 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.	Mitigation	▪ Review of training records	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
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 not properly managed. Effective spill response plans and regular maintenance checks are essential to mitigate these risks.					
AIR QUALITY AND NOISE					
▪ Air quality impacts from substations are very minimal, primarily stemming	▪ Install sound barriers or enclosures around transformers and other noisy equipment to reduce noise propagation.	Mitigation	▪ Inspection	Once before operation commences	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
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	▪ Use vibration isolation mounts and pads under equipment to minimise transmission of noise through the ground and structures.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ Ensure regular maintenance of equipment to reduce emissions and ensure efficient operation.	Mitigation	▪ Review of maintenance records	Continuous	NEPCO
	▪ Implement emission control technologies, such as particulate filters, to minimise emissions from diesel-powered equipment.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ For SF6 in substation: - 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 continuously monitor and detect any leaks in SF6 equipment - Handling of hazardous material to be performed as mentioned	Mitigation	▪ Inspection	Continuous	NEPCO
		Mitigation	▪ Review of maintenance records	Continuous	NEPCO
		Mitigation	▪ Review of training records	Continuous	NEPCO
		Mitigation	▪ Reporting of any leakage and measures taken to minimize impact	Upon occurrence	NEPCO
		Mitigation	▪ Maintain records of periodic third-party audits	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
potent greenhouse gases, with a global warming potential thousands of times higher than carbon dioxide (CO_2) 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.	within the accompanying l 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. This documentation serves to track the history of SF6 equipment and past leak incidents. - 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 - Arrange for periodic third-party audits or inspections to ensure compliance with international				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	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.				
BIODIVERSITY					
Potential avi-fauna fatalities due to electrocution	▪ 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	Avoidance	▪ Inspection	Continuous	NEPCO
OCCUPATIONAL HEALTH AND SAFETY					
▪ Operation and maintenance of a substation involves various OHS considerations due to the nature of the activities and the equipment involved. These impacts include:	▪ Replace hazardous substances (e.g., toxic oils or gases) with safer alternatives where feasible to eliminate potential exposure risks.	Avoidance	▪ Inspection	Continuous	NEPCO
	▪ The design of the substation shall include high safety measures, minimising hazards through equipment selection, layout, and insulation to reduce exposure to	Avoidance	▪ Review of final detailed design	Once before construction commences	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
- 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	electrical, mechanical, and other risks.				
	▪ Develop an Occupational Health and Safety (OHS) Plan tailored to the nature of the operation and maintenance activities.	Mitigation	▪ Review of Plan	Once before operation commences	NEPCO
	▪ Ensure that all workers engaged in maintenance activities have received adequate training.	Mitigation	▪ Review of training records	Continuous	NEPCO
	▪ Have fire extinguishers.	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ 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.).	Mitigation	▪ Inspection	Continuous	NEPCO
	▪ Prepare an Emergency Preparedness and Response Plan that takes into account a series of organisational, operational and preventive measures in case of an emergency.	Mitigation	▪ Review of Plan	Once before operation commences	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
failure, or external factors. - Exposure to Electric and Magnetic Fields (EMF).					
SOCIO-ECONOMIC					
The project 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	Positive Impact				
PUBLIC HEALTH AND SAFETY					
▪ Trespassing of unauthorised personnel into the substation may result in exposure to electric shocks. ▪ Other issue of concern includes the exposure of nearby residents to EMF. It is important to note that the intensity of a magnetic field diminishes significantly as the distance from its source increases. This implies that the strength of the field	▪ 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 levels that does not cause public health impacts based on International Standards. This shall be reflected in the tender for the EPC contractor.	Avoidance	▪ Review of final detailed design	Once before construction commences	NEPCO
			▪ Inspection	Once before operation commences	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
reaching a residence or building will be considerably lower compared to its original point of origin. In general, the strongest EMF around the outside of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substation fence or wall, the EMF produced by the substation equipment is typically indistinguishable from background levels (Electric and Magnetic Fields Associated with the Use of Electric Power NIEHS). Considering that the nearest receptor is a	▪ Limit public exposure to electric and magnetic fields (EMF), including: - 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.	Mitigation	▪ Review of final detailed design	Once before construction commences	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
farmhouse approximately 80 meters from the nearest boundary of the land, there will be no impacts in this regard.					
LABOUR AND WORKING CONDITIONS					
Inappropriate management of the workforce during both the construction and operation phase could entail several human right risks and violations	▪ Provide an overview of the labour use on the project throughout the construction phase. ▪ Prepare a Human Resources policies and procedures, inclusive of equal opportunities and non-discrimination policies. This is to be done in accordance with Jordanian Labour Laws, EBRD PR 2 and International Labour Organisation (ILO) standards. ▪ Ensure contractors and all subcontractors implement the EBRD/IFC Worker accommodation Guidelines and undertake monthly audits to ensure compliance with these on NEPCO team and on contractor working for the Company. Accommodation on the construction site shall not be allowed. ▪ Setup and implement the practices that allow NEPCO employees and Contractor workers to have grievances addressed and monitor contractor grievance mechanism. ▪ Submit employment terms form to include a summary of	Mitigation	▪ Submission of signed GBVH Code of Conduct for all workers. ▪ Documentation of submitted grievances related to GBVH and SEAH as part of the SEP and worker grievance mechanism and measures undertaken to resolve such grievances.	Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	employment terms for workers including employment duration, benefits, allowances, etc. Such forms should be explained to workers through appropriate means (e.g. as part of induction training) and should be signed by all employees retained. ▪ Prepare a supply chain declaration form to be signed by all major equipment suppliers to the Project. The form must state that the supplier complies with EBRD PR for supply chain and EHSS Policy prepared as part of the EHSS-MS. ▪ Submit and implement labour employment plan. The plan should provide details on number of workers required for the project with breakdown (skilled and unskilled), labour histogram, contract services required for the Project, and a local community labour /contractor recruitment strategy. Plan should be according to local employment requirements for local communities and should be implemented through appropriate local platforms (e.g. local District office / local Municipality). ▪ Prepare Security staff employment plan to be guided by international best practice requirements (such as the				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	Voluntary Principles on Security and Human Rights). ▪ All workers should be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct should prohibit be subject to disciplinary action and should prohibit harassment, gender-based violence and abuse of any kind. ▪ All workers should be provided with a copy of the Gender Based Violence and Harassment (GBVH) Code of Conduct and will be required to sign it.				

20.3.2 ESMP for the OHTL

Table 55 and Table 56 below present the ESMP for the planning and construction and operation phases, respectively, for the OHTL.

Table 55: ESMP for the Planning and Construction Phase for the OHTL

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
LANDSCAPE AND VISUAL					
Temporary visual impacts from typical construction elements like excavators, trucks, loaders, and compactors.	▪ Construction site kept tidy and organised by the end of each working day. ▪ Relocate and store construction machinery, equipment, and vehicles not in use to minimise their visual impact on the surrounding area. ▪ Proper storage and management of waste streams. ▪ Implement restoration and rehabilitation measures to restore the site's visual quality through for example reinstatement and removing temporary structures.	Mitigation	▪ Inspections of the works at all times	Continuous	EPC Contractor
LAND USE, LAND OWNERSHIP, AND RESETTLEMENT					
The construction of the OHTL may lead to physical displacement of residential structures and economic displacement of agricultural activities, impacting registered landowners, informal land users, and tenants. It may also disrupt roads, utilities, forested areas, and other communal lands, affecting property values and potentially interfering with beekeeping due to EMF.	▪ Avoid placing OHTL towers on privately owned lands as much as feasibly possible. ▪ Prioritise the route with the least overall resettlement impacts. ▪ Conduct proper alternatives assessment for the OHTL route and location of towers to ensure resettlement/ livelihood impacts are avoided. ▪ Assess OHTL alternative routes and location of towers and non-used lands will be preferred for the sitting of the towers and for lay-down areas or temporary land needs. Scheduling of the construction activities will also be required to ensure no disruption of seasonal agricultural and economic activities. ▪ Whenever possible, use areas with seasonal uses to minimise disruption to year-round activities.	Avoidance	▪ Review of Final Detailed Design ▪ Records of consultation ▪ Comparison of route alternatives and factors for final selection	Once before construction commences	NEPCO and EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ If the OHTL passes through lands utilised by farmers for seasonal cultivation or crop planting, avoid constructing during the growing season. Postpone construction activities until after harvesting. ▪ Choose a route that avoids high-value agricultural land to protect valuable farming areas. ▪ 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. ▪ 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 point of view – as practically as possible. ▪ Avoid the need to build new access roads whenever possible and use existing roads and access roads whenever possible. ▪ Select OHTL route that avoids densely utilised areas to minimise loss impacts. ▪ Worker accommodation will not be allowed onsite. ▪ To reduce economic displacement, avoid routing through prime agricultural land and areas with high-value crops. ▪ To further avoid losses and impacts, the clearance of the ROW and construction				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	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.				
	▪ Prepare and implement an EBRD PR5 compliant Resettlement Plan (RP) – Details in Section 10.2.1. ▪ NEPCO to work extensively with the E&S ESAP Implementation Consultant commissioned by EBRD to implement the E&S requirements of the EBRD and the ESAP measures including the RP. ▪ Develop and implement RP, updated SEP and Grievance Redress Mechanism (GRM). NEPCO to bear any grievance redress and commit to follow due process in compliance with PR5 requirements. ▪ Prior notice to the landowner/ user/occupier should be given. They are entitled to be informed about what activities are proposed on their land – as practically as possible. ▪ Restore any temporary access routes and construction areas to their original condition after the work is completed. ▪ 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	Mitigation	▪ Submission and disclosure of RP ▪ Land entry protocol ▪ Signed agreement with landowners and PAPs ▪ Inspection and reporting ▪ Records of valuation through private land valuers ▪ GRM records ▪ Records of consultation ▪ Completion audit ▪	Before and during impact (construction)	
	▪ NEPCO shall pay compensation	Mitigation	▪ Signed Compensation settlement and agreement	Once installation and energisation	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
				of OHTL are complete	
	▪ If a landowner chooses to contest the proposed compensation through legal means, NEPCO would be required to pay the compensation	Mitigation	▪ Court decisions and settled compensation records	Immediately after court ruling is issued	NEPCO
GEOLOGY, HYDROLOGY AND HYDROGEOLOGY					
Potential for local flooding and soil erosion impacts, particularly during rainy seasons and flash floods.	▪ Undertake flood risk assessment and hydrodynamic analysis during the design phase.	Avoidance	▪ NEPCO and EPC Contractor to review flood risk assessment and hydrodynamic analysis and detailed design. ▪ OHTL route alternatives and route and tower selection criteria	During the detailed design	EPC Contractor and NEPCO
	▪ Conduct a detailed assessment employing high-resolution topographic data, Digital Elevation Models (DEMs), GIS for spatial analysis, and advanced hydrological modelling techniques such as the use of HEC-RAS or 2D hydrodynamic models to simulate flood behaviour and predict flood impact zones and flow velocities accurately.				
	▪ Implement slope stabilisation techniques at substation and other vulnerable areas to stabilise soil and reduce erosion. ▪ Tower siting shall avoid the wadi and flood risk areas and shall apply required engineering measures to divert potential flood from the substation.				
	▪ No towers within 10 meters of water bodies.				
	▪ Undertake a rigorous scrutiny and assessment of the infrastructure within this catchment area				
	▪ Where construction near wadis is unavoidable, ensure structures are built on elevated foundations to minimise flood impact.				
	▪ Establish buffer zones around wadis and other high-risk flood areas to maintain natural hydrological processes and protect infrastructure				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ Avoid executing excavation works under aggressive weather conditions	Mitigation	Inspection	Continuous	EPC Contractor and NEPCO
	▪ 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.				
Improper waste management and accidental leakage of oils or chemicals could contaminate soil and groundwater.	**Solid Waste**				
	▪ Develop and implement a Waste Management Plan (WMP).	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Once before construction commences	EPC Contractor
	▪ 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.				
	▪ Provide a dedicated storage areas for municipal solid waste and construction waste, closed/sealed as appropriate, clearly labelled and designed to prevent leaks and contamination.				
	▪ Implement waste separation and recycling measures to the extent possible and coordinate with recycling companies			Continuous	EPC Contractor
	▪ Ensure that containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing				
	▪ 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.				
	Wastewater Generation				
	▪ Ensure that septic tanks used during construction are securely contained and impermeable to prevent any leakage of wastewater into the soil.	Avoidance	▪ Inspection	Once before construction commences	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ Coordinate with relevant water utility company to hire a private contractor for the collection of wastewater from the site to the nearest authorised WWTP.	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Continuous	EPC Contractor
	▪ Ensure that septic tanks are emptied and collected at appropriate intervals to avoid overflowing.				
	▪ Maintain records and manifests that indicate volume of wastewater generated onsite and disposed of at the designated WWTP.				
	Hazardous Waste				
	▪ 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.	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Continuous	EPC Contractor
	▪ Prohibit illegal disposal of hazardous waste to the land				
	▪ Follow the requirements for management and storage as per the 'Instructions for Hazardous Waste Management and Handling of the Year 2003' of the MoEnv				
	Hazardous Materials				
	▪ Utilise non-hazardous materials and substances wherever possible to eliminate the risk of hazardous waste generation and chemical spills.	Avoidance	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Once before construction commences	EPC Contractor
	▪ Any new transformers at the substation should use polychlorinated biphenyls (PCB) free oil				
	▪ 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.	Mitigation		Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS). Spilled material should be tracked and accounted for				
	▪ Store oils, chemicals, and other hazardous materials in secure areas to prevent land contamination from accidental spills. Storage areas shall be 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				
	Leaks and Spills				
	▪ Regular maintenance of machinery to prevent engine oil and fuel leaks	Mitigation	▪ Inspection ▪ Review of records and manifests to ensure consistency ▪ Regular environmental reporting	Continuous	EPC Contractor
	▪ Incorporate dripping pans at machinery, equipment, and areas that are prone to contamination by leakage of hazardous materials (such as oil, fuel, etc.)				
	▪ Refuelling to take place at a suitable location (hard surface) with appropriate measures for trapping spilled material.				
	▪ If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.				
	▪ General purpose spill absorbent must be available at hazardous material storage areas.				
	▪ Maintain proper housekeeping practices onsite				
	▪ Minimise works near surface water bodies/wadis in wet weather				
ARCHAEOLOGY AND CULTURAL HERITAGE					
Several archaeological sites were identified along the OHTL route which might be	▪ Coordinate with DoA to provide the exact locations of the proposed OHTL tower, and determine any additional requirements	Avoidance/Mitigation	▪ Submit proof for coordination with authorities	During the detailed design	NEPCO and EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
impacted by the construction of the OHTL towers.	needed (such as an archaeology survey). Based on the response from the DoA, avoidance measures will be identified and incorporated in the detailed design.		▪ Submit final design		
Construction activities for the OHTL towers could damage potential archaeological remains which could be buried in the ground (if any).	▪ Implement chance find procedures for potential unearthing of any archaeological sites during construction.	Mitigation	▪ Submit chance find procedure ▪ Inspection ▪ Reporting of any archaeological find	Upon Occurrence	EPC Contractor
AIR QUALITY AND NOISE					
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.	▪ High noise level construction activities should not be carried out between 8pm - 6am.	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ If excessive noise levels are identified through inspections and visual monitoring, pinpoint the source and implement appropriate control measures.	Mitigation	▪ Inspection ▪ Reporting	Upon occurrence	EPC Contractor
	▪ Use noise suppressants and well-maintained mufflers for high-noise equipment, and maintain a regular maintenance schedule for all machinery	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ Implement basic dust control measures by watering active construction areas, scheduling dust-generating activities together, properly managing stockpiles, covering transport trucks, enforcing a 15 km/h speed limit for trucks, and regularly inspecting and maintaining vehicles and equipment.	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ Undertake consultation activities with surrounding land users to inform them of construction schedule	Mitigation	▪ Consultation records	Continuous	EPC Contractor
	▪ 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	Mitigation	▪ Consultation records ▪ GRM	Continuous	EPC Contractor
BIODIVERSITY					

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
Construction activities for the OHTL towers will be confined to small footprints, causing minimal disturbance. However, activities may affect habitats, especially impacting habitats which has been noted along the route.	▪ During detailed design stage, undertake field surveys at the Substation site and along the OHTL route, the surveys should include: - Nest search survey during the suitable period - Bird monitoring survey which includes vantage points during periods of intensive migration for at least 2 weeks, in areas that attract birds within the project area such as (water bodies, landfills, important nesting sites for hovering birds) - Special surveys for rare or threatened species and birds on nesting periods. - Survey of bird species that overwinter at the project site.	Avoidance	▪ Review survey results/findings ▪ Documentation within the ESIA	During the Detailed Design	EPC Contractor
	▪ Surveys should be undertaken according to the "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022 issued by the RSCN.				
	▪ The final OHTL alignment shall take into consideration the following design factors to avoid impacts on biodiversity: - 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. If needed, request prior authorisation from MoA and implement corresponding requirements.	Avoidance	▪ Final design ▪ Inspection	During design and during construction	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	- Plan the route to avoid significant forest areas and restrict clearings to the minimum required width for safety and maintenance.				
Excavation, levelling, and land clearing during site preparation may disturb habitats.	▪ Preserve existing vegetation as much as possible during site preparation. ▪ Comply with the "General Guidelines for Bird Surveys and Assessment for Utilities and Infrastructure" dated October 2022 issued by the RSCN	Avoidance	▪ Submit final design	Continuous	EPC Contractor
Construction activities can cause soil compaction and erosion, adversely affecting plant growth and survival.	▪ Use low-impact construction techniques to reduce soil compaction, such as avoiding heavy machinery in sensitive areas.	Mitigation	▪ Inspection	Continuous	EPC Contractor
Impacts from improper management of the site which could include improper practices by workers (i.e., hunting of animals, discharge of hazardous waste to land, etc.).	▪ Establish and train workers on an appropriate Code of Conduct including no hunting at any time and under any condition. ▪ No construction camps allowed onsite. ▪ 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	Mitigation	▪ Review of code of conduct (CoC) ▪ Training records ▪ Inspection	Continuous	EPC Contractor
Construction disturbances can create opportunities for invasive species to establish and outcompete native flora, leading to long-term ecological imbalances	▪ Use existing roads and tracks and do not establish new roads ▪ Any planning for new roads must avoid sensitive habitats (forested regions) and minimise ecological disruption.	Avoidance	▪ Inspection	Continuous	EPC Contractor
Construction and maintenance activities can disrupt terrestrial animal habitats, leading to displacement and fragmentation, which can adversely affect wildlife populations.	▪ Avoid scheduling constriction activities during critical breeding, nesting, and migration periods.	Avoidance	▪ Inspection	Continuous	EPC Contractor
Construction poses a risk of direct mortality to less mobile species unable to escape the area during active construction phases.	▪ No construction camps allowed onsite.	Avoidance	▪ Inspection	Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
Noise and human activity during construction and maintenance can disturb bird populations and other wildlife, potentially leading to behavioural changes and displacement	▪ Limit construction activities to daylight hours to minimise disturbance to nocturnal wildlife.	Mitigation	▪ Inspection	Continuous	EPC Contractor
INFRASTRUCTURE AND UTILITIES					
Conflict with disturbance to existing infrastructure and utilities within the OHTL route and where the towers will be constructed	▪ 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 consultations will include formal communications.	Avoidance	▪ Submit proof for coordination with authorities	Once before construction commences	EPC Contractor
	▪ EPC Contractor to coordinate with MPWH to identify road crossing and ROW alignment requirements and conditions.				
The construction activities are anticipated to raise water demand and produce waste and wastewater, potentially straining existing facilities.	▪ Coordinate with relevant water utility company for securing additional water requirements of the Project. In addition, implement water-saving measures on-site during construction. These measures should include efficient dust control methods, water-saving practices for washing and regular monitoring of water usage.	Mitigation	▪ Submit proof for coordination with authorities	Once before construction commences	EPC Contractor
	▪ 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				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	hazardous waste from the site to the Swaqa Hazardous Waste Treatment Facility.				
	▪ Coordinate with certified recycling companies to manage and process recyclable materials.				
	▪ Avoid damage to existing infrastructure and utilities during the construction	Avoidance	▪ Inspection	Continuous	EPC Contractor
	▪ Develop and implement a water management plan to identify sources of water for the Project	Mitigation	▪ Submission of water management plan ▪ Inspection	Once before construction commences and continuous	EPC Contractor
	▪ Worker training	Mitigation	▪ Training records ▪ Inspection	Continuous	EPC Contractor
Transportation activities necessary for the construction phase might impact road networks, traffic, and users.	▪ Develop and implement a Traffic Management Plan (TMP).	Mitigation	▪ Submission of traffic and transport management plan ▪ Inspection	Once before construction commences and continuous	EPC Contractor
OCCUPATIONAL HEALTH AND SAFETY					
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.	▪ Develop and implement an Occupational Health and Safety (OHS) Plan that ensures compliance with national legal labour requirements.	Mitigation	▪ Review of the OHS Plan ▪ Inspection ▪ Documentation	Once before construction commences and continuous	EPC Contractor
	▪ Allocate specific personnel responsible for health & Safety management on site.	Mitigation	▪ Inspection ▪ Documentation	Continuous	EPC Contractor
	▪ Provide adequate and appropriate training of all workers on the contractor's OHS policies and procedures.	Mitigation	▪ Training records ▪ Inspection	Continuous	EPC Contractor
	▪ Ensure fire extinguishers are provided and regularly maintained.	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ Ensure all workers are equipped with proper Personal Protective Equipment	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ Carry out daily site inspections to verify the proper implementation of safety measures.	Mitigation	▪ Inspection	Continuous	EPC Contractor
	▪ Prepare and implement an Emergency Preparedness and Response Plan (EPRP)	Mitigation	▪ Review of EPRP ▪ Inspection	Once before construction	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
			▪ Documentation	commences and continuous	
	▪ Establish and implement a Grievance Redress Mechanism (GRM) for workers to receive and facilitate resolution of workers grievances.	Mitigation	▪ Review of GRM ▪ Review of GRM records and actions taken	Once before construction commences and continuous	EPC Contractor
		Mitigation	▪ Review of the OHS Plan ▪ Inspection ▪ Documentation	Once before construction commences and continuous	EPC Contractor
SOCIOECONOMICS					
The Project is anticipated to create temporary employment opportunities for local communities as well as other indirect benefits.	▪ 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 to include Project Updates Procedure, Local Recruitment Procedure, Local Procurement Procedure				
PUBLIC HEALTH AND SAFETY					
Risk of exposure of community members to construction-related health risks	▪ Develop security measures to prevent unauthorised access to the construction site. Such measures could include installing a fence around the construction site.	Avoidance	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
Movement of heavy machinery and vehicles to and from the site and the risk of traffic accidents that may affect passing public.	▪ Develop and implement a TMP.	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ 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 to control vehicles and truck movement.				
	▪ Ensure that the number of traffic signs, their characteristics and distance among them is placed according to local legal requirements.				
	▪ Ensure that vehicles adhere to a speed limit of 15km/h within the construction site.				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
Construction activities can cause elevated dust and noise emissions, potentially affecting air quality in the surrounding area.	▪ Implement basic dust control and suppression measures: - Regularly watering active construction areas to suppress dust. - Planning dust-generating activities to occur simultaneously to reduce dust incidents. - Managing stockpiles by watering, containing, covering, or bundling them. - Covering trucks transporting aggregates and fine materials with tarpaulins.	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
Construction activities, including heavy machinery and equipment operation, can create excessive noise levels.	▪ High noise level construction activities should not be carried out between 8 pm – 6 am.	Mitigation	▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ Employ noise suppression measures, including using well-maintained mufflers and noise suppressants for high-noise equipment, and maintaining regular equipment maintenance schedules.		▪ Inspection ▪ Reporting	Continuous	EPC Contractor
	▪ If excessive noise levels are identified through inspections and visual monitoring, pinpoint the source and implement appropriate control measures.		▪ Inspection ▪ Reporting	Upon Occurrence	EPC Contractor
	▪ EPC Contractor to implement and update the SEP and GRM as required during construction		▪ Review of GRM ▪ Reporting	Once before construction commences and continuous	EPC Contractor
LABOUR AND WORKING CONDITIONS					
Inappropriate management of the workforce during both the construction and operation phase could entail several human right risks and violations	▪ Provide an overview of the labour use on the project throughout the construction phase. ▪ Prepare a Human Resources policies and procedures, inclusive of equal opportunities and non-discrimination policies. This is to be done in accordance with Jordanian Labour Laws, EBRD PR 2 and International Labour Organisation (ILO) standards.	Mitigation	▪ Submission of signed GBVH Code of Conduct for all workers. ▪ Documentation of submitted grievances related to GBVH and SEAH as part of the SEP and worker	Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ Ensure contractors and all subcontractors implement the EBRD/IFC Worker accommodation Guidelines and undertake monthly audits to ensure compliance with these on NEPCO team and on contractor working for the Company. Accommodation on the construction site shall not be allowed. ▪ Setup and implement the practices that allow NEPCO employees and Contractor workers to have grievances addressed and monitor contractor grievance mechanism. ▪ Submit employment terms form to include a summary of employment terms for workers including employment duration, benefits, allowances, etc. Such forms should be explained to workers through appropriate means (e.g. as part of induction training) and should be signed by all employees retained. ▪ Prepare a supply chain declaration form to be signed by all major equipment suppliers to the Project. The form must state that the supplier complies with EBRD PR for supply chain and EHSS Policy prepared as part of the EHSS-MS. ▪ Submit and implement labour employment plan. The plan should provide details on number of workers required for the project with breakdown (skilled and unskilled), labour histogram, contract services required for the Project, and a local community labour /contractor recruitment strategy. Plan should be according to local employment requirements for local communities and should be implemented through appropriate local platforms (e.g. local District office / local Municipality).		grievance mechanism and measures undertaken to resolve such grievances.		

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsibility
	▪ Prepare Security staff employment plan to be guided by international best practice requirements (such as the Voluntary Principles on Security and Human Rights). ▪ All workers should be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct should prohibit be subject to disciplinary action and should prohibit harassment, gender-based violence and abuse of any kind. ▪ All workers should be provided with a copy of the Gender Based Violence and Harassment (GBVH) Code of Conduct and will be required to sign it.				

Table 56: ESMP for the Operation Phase for the OHTL

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
LANDSCAPE AND VISUAL					
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.	▪ 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.	Mitigation	Review of SEP	Once before operation commences	NEPCO
			Review of grievance records and actions taken	Continuous	NEPCO
GEOLOGY, HYDROLOGY, AND HYDROGEOLOGY					
▪ 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	▪ 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	Avoidance	Inspection	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
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). Generally, such impacts can be adequately controlled through the implementation of general best practice housekeeping measures which are expected to be implemented by the Project Operator. ▪ Solid Waste: - Solid waste generated will likely include municipal solid waste such as cardboard, plastic, food waste, etc. - Municipal solid waste generated will likely be collected and stored onsite and then disposed to the closest municipal approved dumpsite. ▪ Wastewater Generation - Wastewater is mainly expected to include black water (sewage water from toilets and sanitation facilities), as well as grey water (from sinks, showers, etc.) generated from workers. Wastewater quantities are expected to be minimal. It is expected that wastewater will be collected and stored in fully contained septic tanks and then collected and transported by	▪ Develop and implement a Waste Management Plan (WMP).	Mitigation	Review of WMP	Once before operation commences	NEPCO
	▪ 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	Mitigation	Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Prohibit fly-dumping of any solid waste to the land	Mitigation	Inspection	Continuous	NEPCO
	▪ Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste" ▪	Mitigation	Inspection	Continuous	NEPCO
	▪ Coordinate with certified recycling companies to manage and process recyclable materials ▪	Mitigation	Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Implement proper housekeeping practices on the construction site at all times.	Mitigation	Inspection	Continuous	NEPCO
	▪ 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.	Mitigation	Review manifests to ensure consistency	Continuous	NEPCO
	▪ Coordinate with relevant water utility company to hire a private contractor for the collection of wastewater from the site to the closest WWTP.	Mitigation	Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Prohibit illegal disposal of wastewater to the land.	Mitigation	Inspection	Continuous	NEPCO
	▪ 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.	Mitigation	Review manifests to ensure consistency	Continuous	NEPCO
	▪ Ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing.	Mitigation	Inspection	Continuous	NEPCO
	▪ Continuous training for personnel on best practices and emergency response procedures further enhances the effectiveness of these mitigation	Mitigation	Review of training records	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
transportation tankers to be disposed at the closest Wastewater Treatment Plant (WWTP). ▪ Hazardous Waste Generation - Hazardous waste generated throughout the operation phase could include consumed oil, chemicals, paint cans, etc. Hazardous waste generated will likely be collected and stored onsite and then disposed at the 'Swaqa Hazardous Waste Treatment Facility' which is managed by the MoEnv. - 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	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	Mitigation	Submit proof of coordination with authorities	Once before operation commences	NEPCO
	▪ Follow the requirements for management and storage as per the 'Instructions for Hazardous Waste Management and Handling of the Year 2003' of the MoEnv	Mitigation	Inspection	Continuous	NEPCO
	▪ Prohibit illegal disposal of hazardous waste to the land	Mitigation	Inspection	Continuous	NEPCO
	▪ 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	Mitigation	Inspection	Upon Occurrence	NEPCO
	▪ Ensure that hazardous waste containers are emptied and collected by the contractor at appropriate intervals to prevent overflowing	Mitigation	Inspection	Continuous	NEPCO
	▪ 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.	Mitigation	Review manifests to ensure consistency	Continuous	NEPCO
	▪ 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.	Mitigation	Inspection	Continuous	NEPCO
	▪ Maintain a register of all hazardous materials used and accompanying Material Safety Data Sheet (MSDS)	Mitigation	Inspection	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
- The nature of the operational activities entail 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. ▪ 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 not properly managed. Effective spill response plans and regular maintenance checks are essential to mitigate these risks.	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 (such as oil, fuel, etc.)	Mitigation	Inspection	Continuous	NEPCO
	▪ Any new transformers at the substation should use polychlorinated biphenyls (PCB) free oil.	Mitigation	Inspection	Continuous	NEPCO
	▪ Regular maintenance of all equipment and machinery used onsite. Maintenance activities and other activities that pose a risk for hazardous material spillage (such as refuelling) must take place at a suitable location (hard surface) with appropriate measures for trapping spilled material.	Mitigation	Inspection	Continuous	NEPCO
	▪ Ensure that a minimum of 1,000 litters 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 ▪	Mitigation	Inspection	Continuous	NEPCO
	▪ If spillage on soil occurs, spill must be immediately contained, cleaned-up, and contaminated soil disposed as hazardous waste.	Mitigation	Inspection	Continuous	NEPCO
			Reporting of incident and measures taken to minimize impact	Upon occurrence	NEPCO
	▪ 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.	Mitigation	Review of training records	Continuous	NEPCO
AIR QUALITY AND NOISE					
▪ High-voltage transmission lines can generate small amounts of ozone due to corona discharge, which occurs when the electrical field around the conductors ionises the surrounding air. However, the amount of ozone produced is	▪ 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	Avoidance	Inspection	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
typically very low and does not significantly impact air quality. ▪ With regards to noise, OHTLs can produce a low-level hissing or crackling noise due to corona discharge, especially during wet weather conditions. This noise is generally not loud and tends to be more noticeable in very quiet environments.	based on International Standards. This shall be reflected in the tender for the EPC contractor. ▪ NEPCO to implement measures to control operation noise: - Engineering measures (e.g., rubber footings) to suppress operational noise at substations				
	▪ NEPCO to implement measures to control operation noise, this could include monitoring in case of complaint or request by resident or other affected persons.	Mitigation	Review of monitoring results	Upon occurrence	NEPCO
	▪ Implementation of mitigation if noise exceeds standards	Mitigation	Inspection	Upon occurrence	NEPCO
BIODIVERSITY					
▪ 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 electromagnetic radiation (EMF) from high voltage power lines on wildlife is varied and an area of ongoing research. EMFs may interfere with birds' navigation abilities, particularly those relying on the Earth's magnetic field for migration. Evidence of long-term effects from EMFs alone is limited. Studies on mammals show mixed results, with some research suggesting potential behavioural changes and stress responses, while others find minimal or no significant effects. Insects, especially those relying on magnetoreception, may	▪ 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: - 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. A proper design may reduce 100% electrocution and minimise collision risk.	Avoidance	Review of final detailed design	Once before construction commences	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
experience disrupted navigation and communication due to EMFs. The impact on plant growth and development is inconclusive, with some studies indicating potential effects. Overall, the impact of EMFs on ecosystems and biodiversity remains uncertain, requiring further research to draw definitive conclusions.	▪ According to findings of the preconstruction surveys and the avi-fauna surveys and after consultation with the RSCN/BirdLife, install bird diverters at suitable spacing where collision is a risk, and mainly on approximately 60% of the line between two pylons (from the centre out, as the pylons are fairly obvious and most collisions occur in the centre of the span between the pylons) to reduce risk of collision as per expert advice. Other measures may also be required for the substation and the OHTL based on request from MoEnv and RSCN and based on expert advice and RSCN requirements. These will also be included in the project details. The BFDs installed will be ones that glow or light up at night and are dynamic (e.g. move with the wind) to increase visibility for diurnal and nocturnal migrants. BFDs shall meet the required long-term guarantee (e.g. of ten years or more). Installation of earthing wire and attached BFDs will be completed at the same time (within 1 week). BFDs will be installed to the manufacturer's guidance and assessment of the OHTL, taking into consideration number and spacing.	Mitigation	Inspection	Once before operation commences	NEPCO
	▪ Use isolated poles to prevent electrical shocks to birds through contact.	Mitigation	Inspection	Once before construction commences	NEPCO
	▪ 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.	To be determined	----	----	----
OCCUPATIONAL HEALTH AND SAFETY					
▪ Operation and maintenance of OHTLs involves various OHS considerations due to the nature of the activities and the equipment involved. These impacts include: - Potential injuries from handling heavy equipment, tools, and materials.	▪ Replace hazardous substances (e.g., toxic oils or gases) with safer alternatives where feasible to eliminate potential exposure risks.	Avoidance	Inspection	Continuous	NEPCO
	▪ Develop an Occupational Health and Safety (OHS) Plan tailored to the nature of the operation and maintenance activities.	Review of Plan	Once before operation commences	NEPCO	
	▪ Ensure that all workers engaged in maintenance activities have received adequate training.	Mitigation	Review of training records	Continuous	NEPCO

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
- 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).	▪ Have fire extinguishers.	Mitigation	Inspection	Continuous	NEPCO
	▪ Ensure all workers are equipped with proper Personal Protective Equipment (e.g., masks, eye goggles, breathing equipment, gloves, EMF shielding clothing, etc.). ▪ Workers engaged in tasks at elevated heights must wear full-body harnesses and be equipped with lanyards or lifelines.	Mitigation	Inspection	Continuous	NEPCO
	▪ Prepare an Emergency Preparedness and Response Plan that considers a series of organisational, operational and preventive measures in case of an emergency.	Mitigation	Review of plan	Once before operation commences	NEPCO
SOCIO-ECONOMIC					
The project 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	Positive Impact				
PUBLIC HEALTH AND SAFETY					
▪ 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.	▪ 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.	Avoidance	Review of final detailed design	Once before construction commences	NEPCO
			Inspection	Once before operation commences	NEPCO
▪ 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	▪ Limit public exposure to electric and magnetic fields (EMF), including: - 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				

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
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).	- 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.				
LABOUR AND WORKING CONDITIONS					
Inappropriate management of the workforce during both the construction and operation phase could entail several human right risks and violations	▪ Provide an overview of the labour use on the project throughout the construction phase. ▪ Prepare a Human Resources policies and procedures, inclusive of equal opportunities and non-discrimination policies. This is to be done in accordance with Jordanian Labour Laws, EBRD PR 2 and International Labour Organisation (ILO) standards. ▪ Ensure contractors and all subcontractors implement the EBRD/IFC Worker accommodation Guidelines and undertake monthly audits to ensure compliance with these on NEPCO team and on contractor working for the Company. Accommodation on the construction site shall not be allowed. ▪ Setup and implement the practices that allow NEPCO employees and Contractor workers to have grievances addressed and monitor contractor grievance mechanism. ▪ Submit employment terms form to include a summary of employment terms for workers including employment duration, benefits, allowances, etc. Such forms should be explained to	Mitigation	▪ Submission of signed GBVH Code of Conduct for all workers. ▪ Documentation of submitted grievances related to GBVH and SEAH as part of the SEP and worker grievance mechanism and measures undertaken to resolve such grievances.	Continuous	EPC Contractor

Potential Impact	Management Action	Type of Management	Monitoring Action	Frequency	Responsible Entity
	workers through appropriate means (e.g. as part of induction training) and should be signed by all employees retained. ▪ Prepare a supply chain declaration form to be signed by all major equipment suppliers to the Project. The form must state that the supplier complies with EBRD PR for supply chain and EHSS Policy prepared as part of the EHSS-MS. ▪ Submit and implement labour employment plan. The plan should provide details on number of workers required for the project with breakdown (skilled and unskilled), labour histogram, contract services required for the Project, and a local community labour /contractor recruitment strategy. Plan should be according to local employment requirements for local communities and should be implemented through appropriate local platforms (e.g. local District office / local Municipality). ▪ Prepare Security staff employment plan to be guided by international best practice requirements (such as the Voluntary Principles on Security and Human Rights). ▪ All workers should be required to read and sign a Worker Code of Conduct which will be explained verbally. The code of conduct should prohibit be subject to disciplinary action and should prohibit harassment, gender-based violence and abuse of any kind. ▪ All workers should be provided with a copy of the Gender Based Violence and Harassment (GBVH) Code of Conduct and will be required to sign it.				