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21-MSK-JOR-ENV - Preliminary Risks Assessment and ESIA for the Aqaba-Amman Water Desalination and Conveyance (AAWDC) Project (Jordan) – Renewable Energy Component

Comprehensive Environmental and Social Impact Assessment

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Glossary of Terms and Abbreviations

AAWDC	Aqaba-Amman Water Desalination and Conveyance
ADC	Aqaba Development Corporation
ANSI	American National Standards Institute
APE	Areas of Potential Effect
ASEZA	Aqaba Special Economic Zone Authority
BCRL	British Council for Research in Levant
BOT	Build-Operate-Transfer
BPS	Booster Pumping Station
CBD	Convention on Biological Diversity
CESMP	Construction Environmental and Social Management Plan
CFMP	Chance Finds Management Plan
CN	Curve Number
CSC	Construction Supervision Consultant
DoA	Department of Antiquities
DSTF	Dead Sea Transform fault
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPC	Engineering, Procurement and Construction
EPRP	Emergency Preparedness and Response Plan
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GHG	Greenhouse Gas
H&S	Health and Safety
HIV	Human Immunodeficiency Virus
HSMP	Health and Safety Management Plan
IBA	Important Bird Area
ICCROM	International Centre for the Study of Preservation and Restoration of Cultural Property
ICOMOS	International Council of Monuments and Sites
IFAPO	The French Institute for Archaeology in Amman
IFIs	International Financing Institutions

ILO	International Labour Organization
IUCN	International Union for Conservation of Nature
JHR	Jordan Hijaz Railway
JHRC	Jordan Hijaz Railway Corporation
JS	Jordanian Standards
KBA	Key Biodiversity Area
LAP	Land Acquisition Plan
MCM	Million Cubic Meters
MEGA	Middle Eastern Geodatabase for Antiquities
MEMR	Ministry of Energy and Mineral Resources
MoA	Ministry of Agriculture
MoEnv	Ministry of Environment
MoH	Ministry of Health
MoL	Ministry of Labor
MoLA	Ministry of Local Administration
MoPIC	Ministry of Planning and International Cooperation
MoTA	Ministry of Tourism and Antiquities
MPWH	Ministry of Public Works and Housing
MSDS	Material Safety Data Sheet
MWI	Ministry of Water and Irrigation
NEPCO	National Electric Power Company
NVMP	Noise and Vibration Management Plan
OESMP	Operation Environmental and Social Management Plan
OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
OUV	Outstanding Universal Value
PAI	Project Area of Influence
PAP	Project-affected people
PBF	Priority Biodiversity Feature
POP	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PV	Photovoltaic
RAs	Risk Assessments
RE	Renewable Energy

STD	Sexual Transmitted Disease
SWRO	Sea Water Reverse Osmosis
ToR	Terms of Reference
ToT	Training of Trainers
UNCCD	United Nations Convention to Combat Desertification
UNESCO	United Nations Educational, Scientific and Cultural Organization
WMP	Waste Management Plan
WPRA	Wadi Rum Protected Area

Executive Summary

Project Overview:

The Ministry of Water and Irrigation (MWI) of Jordan is developing the Aqaba-Amman Water Desalination and Conveyance (AAWDC) Project to address the country's severe water scarcity. The project aims to produce 300 million cubic meters (MCM) of drinking water annually through desalination of Gulf of Aqaba water, ensuring a reliable supply for Amman and other regions along the pipeline route. Implemented through a build-operate-transfer (BOT) scheme, the initiative responds to challenges like population growth, refugee influx, regional conflicts, and climate change.

Given the energy-intensive nature of desalination, a Renewable Energy (RE) component featuring a 300MW (240MW AC) solar photovoltaic (PV) plant in Quweira has been proposed. This facility will fully meet the power needs of the desalination plant and the pump stations within Aqaba Governorate during the daylight hours. Outside these hours, the plant and the pump stations will rely on electricity provided by NEPCO. This will reduce greenhouse gas emissions to below 3.2 kgCO_2eq per cubic meter of water produced. The RE component includes an overhead transmission line (OHTL) connecting the PV site to the Sea Water Reverse Osmosis (SWRO) plant.

In compliance with national and international standards, a comprehensive Environmental and Social Impact Assessment (ESIA) is underway for the RE component. The ESIA for the desalination and transmission line components was previously approved in 2022. The current ESIA, based on preliminary designs from the BOT Contractor and NEPCO, will be updated as needed during the detailed design phase.

Project Objectives:

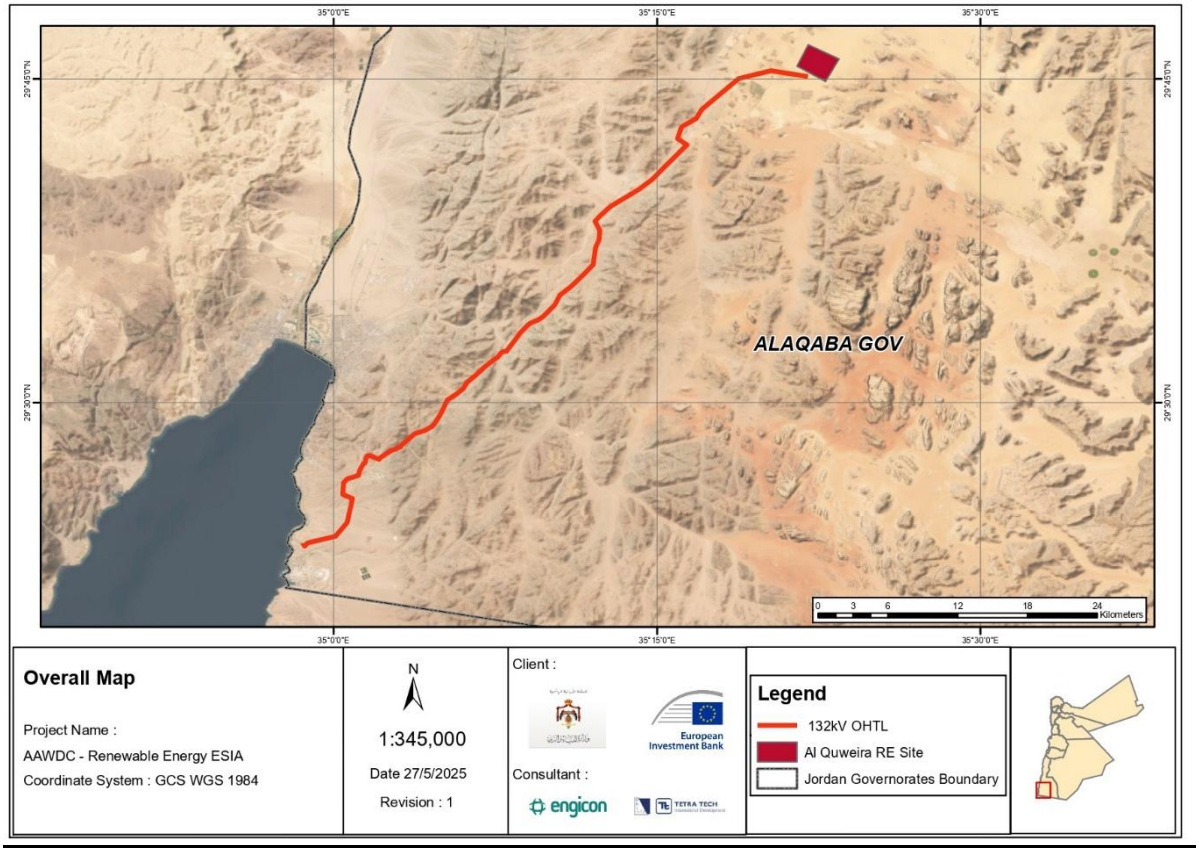
- Address Jordan’s growing water scarcity through sustainable water supply solutions.
- Reduce reliance on traditional energy sources by integrating renewable energy.
- Ensure compliance with environmental and social standards, safeguarding local ecosystems and communities.
- Promote local economic development through job creation and community engagement.

Project Proponents: Key entities involved include:

- **Ministry of Water and Irrigation:** Client and owner.
- **BOT Contractor (Meridiam and Suez JV):** Design, implement, and operate the project.
- **European Investment Bank (EIB) & USAID:** The funding agencies that financed the ESIA and the preliminary design, responsible to ensure the project is in line with their environmental and social standards
- **Aqaba Special Economic Zone Authority (ASEZA):** Environmental permit issuer.
- **National Electric Power Company (NEPCO):** Transmission line design and construction.

Project Components:

- **Renewable Energy Site:** A 500-hectare site in Al-Quweira with a PV capacity of 314.76 MWp (240 MWac).
- **Overhead Transmission Line (OHTL):** A 132 kV line connecting the RE site to the Sea Water Reverse Osmosis (SWRO) plant.
- **Support Infrastructure:** Includes water tanks, meteo stations, power transformers, and access roads.



Alternatives Considered

Two alternative sites were evaluated: the **Wadi Araba Site**, which was rejected due to security concerns, its proximity to the international border, and location within a nature reserve; and the **Al-Mudawara Site**, initially intended to power Booster Pump Station 5 but discarded after the station was cancelled.

NEPCO initially proposed an OHTL route that passed through the buffer zone of the Wadi Rum Protected Area, a designated UNESCO World Heritage Site. However, discussions with ASEZA and management of Wadi Rum Protected Area during and after the disclosure session lead to the conclusion that the most feasible option would be to reroute the OHTL to avoid passing through the buffer zone.

The **No Project Alternative**, involving reliance on conventional energy, was deemed unsustainable due to higher carbon emissions, increased costs, and missed opportunities for cleaner energy solutions.

National Legislation:

The project adheres to key national laws and policies, including:

- **National Water Strategy (2023-2040):** Ensures sustainable water management and efficient usage.
- **Climate Change Policy:** Focuses on reducing greenhouse gas emissions and adapting to climate change.
- **Water Authority Law:** Prohibits pollution of water sources and governs water resource management.
- **Agriculture and Antiquities Laws:** Protect forests, wildlife, and cultural heritage.
- **Public Health and Labor Laws:** Safeguard public health, ensure worker safety, and prevent child labor.
- **Solid and Hazardous Waste Regulations:** Govern proper waste disposal to prevent environmental harm.
- **Municipal and Traffic Laws:** Ensure public safety, infrastructure integrity, and pollution control.

International Standards and Commitments:

The project aligns with various international frameworks:

- **European Investment Bank (EIB) Standards:** Cover impact assessment, pollution prevention, biodiversity, cultural heritage, labor rights, and stakeholder engagement.
- **USAID Environmental Procedures:** Ensure environmental sustainability in funded projects.
- **ILO Core Labor Standards:** Protect workers' rights, prevent forced and child labor, and promote occupational safety.
- **EU Directives:** Address environmental assessments, labor conditions, public participation, and air quality standards.
- **International Conventions:** Jordan adheres to agreements like the **Kyoto Protocol**, **Ramsar Convention**, **Basel Convention**, and **Convention on Biological Diversity**, ensuring global environmental compliance.

Project Ownership and Implementation:

The AAWDC Project is owned by the Government of Jordan through the MWI and is being implemented under a Build-Operate-Transfer (BOT) scheme. The BOT contractor will operate the project for 26 years before transferring ownership back to the government.

Stakeholder Engagement:

A comprehensive stakeholder consultation process was conducted, including a public scoping session attended by 77 participants. Key concerns raised involved environmental impacts, job opportunities, and safety measures. The project has committed to ongoing community engagement and transparent communication.

Baseline Environmental Conditions:

- **Physical Environment**

  The physical environment of the AAWDC Project area in Al-Quweira District features rocky hills and sandy plains with gentle slopes averaging 0.85% and elevations ranging from 780.5 to 805.4 meters above sea level. The soil types include Torriorthent and Torripsamment (shallow, arid soils unsuitable for cultivation) and Xerochrept (moderately developed, clay-rich soils). The geology is dominated by the Ram Group (fluvial sandstones and siltstones) and the Basement Complex (Precambrian granitoids and volcanic rocks). The climate is arid, with a mean annual temperature of 22.42°C, extreme temperatures ranging from 2.3°C to 42.5°C, minimal rainfall peaking at 10 mm in January, and predominant north-northeasterly winds averaging 5-20 km/h.

  Regarding water resources, the Southern Wadi Araba and Wadi Yutum basins provide limited surface runoff, while the area relies on the Disi Groundwater Basin (non-renewable with an annual extraction of 144.95 MCM). Hydrological assessments revealed four contributing catchments (totaling 299.3 km²) with peak rainfall of 100.62 mm (100-year return period). Flood risk analysis showed significant flood depths and velocities along drainage paths, necessitating robust stormwater management and flood mitigation measures.

  The region is also seismically active, lying along the Dead Sea Transform Fault (DSTF) near the Gulf of Aqaba, with a medium earthquake hazard. Development near floodways should be minimized, with appropriate site grading and channelization to mitigate flood risks and ensure infrastructure stability.

- **Biological Environment**

  The biological environment of the Project Area of Influence (PAI), extending from Al-Quweira to Aqaba in southern Jordan, encompasses diverse landscapes including rocky hills, sandy plains, cultivated lands, and wadis. The area falls within the **Irano-Turanian** and **Sudanian** biogeographical zones, supporting vegetation types like sand dunes and Acacia-dominated shrublands. Flora includes drought-tolerant species such as *Vachellia tortilis* and *Ziziphus spina-christi*. The **ecological survey** identified four landscape units: (1) unsettled undulating hills, (2) rocky sandy wadis, (3) cultivated flat areas, and (4) uncultivated sandy clay flats. Fauna recorded included **six mammals** (e.g., *Gerbillus dasyurus*, Arabian Red Fox), **two reptiles** (notably the

Vulnerable *Uromastyx aegyptia*), and **28 bird species**, including the Endangered **Steppe Eagle**. However, no significant populations of migratory or endemic species were found.

The **Critical Habitat Assessment** concluded that the site does not qualify as Critical Habitat under the European Investment Bank (EIB) Standard 4 criteria, despite the presence of two globally Vulnerable species: the **Egyptian Spiny-tailed Lizard** and the **Sooty Falcon**. The lizard's burrows were found, though active sightings were limited due to survey timing; further surveys during spring/summer are recommended. Similarly, the Sooty Falcon, known to breed in nearby mountains, was not observed during fieldwork but may inhabit adjacent areas during breeding season (May–September).

The project site is located near but does not overlap with any Key Biodiversity Areas (KBAs) or protected zones, including the **Wadi Rum Protected Area** (approximately 5 km away). No priority natural habitats under the EU Habitats Directive were identified, and no net loss of biodiversity is required for natural habitats, although efforts should be made to minimize impacts. It is strongly recommended to conduct further ecological surveys to assess the populations of Vulnerable species and ensure appropriate biodiversity mitigation measures are implemented before the commencement of on-ground construction activities.

It is worth noting that the ecological surveys supporting this assessment were conducted within a limited timeframe during the month of November. Conducting the surveys outside optimal seasonal windows, particularly during colder months, may have limited the detection of certain species, including active populations of reptiles and migratory birds. This timing constraint could lead to an underestimation of biodiversity presence and activity.

- **Socio-Economic Environment:**

The **Project Area of Influence (PAI)** covers parts of the **Al-Quweira** and **Aqaba** districts, with **Al-Quweira village** (population: 14,286) being the closest to the Renewable Energy (RE) site. The Overhead Transmission Line (OHTL) corridor crosses several built-up areas, including Rashadeyeh, Um El-Basateen, and Re'a Sa'adeh. Average household sizes in Al-Quweira (5.5 persons) and Aqaba (4.9 persons) exceed the national average (4.8), while dependency ratios (73.2% and 75.2%, respectively) are higher than the national rate of 61.4%.

Economic activity is concentrated in public administration (24.6%), transportation (23.2%), and retail (10.6%), with an unemployment rate of **18.5%** in Aqaba, lower than the national average but higher in rural areas like Al-Quweira, where **poverty affects 31.1%** of residents. Household incomes in Al-Quweira (6,480.6 JD) are significantly below the national average, reflecting economic disparities.

Education infrastructure in Aqaba includes four universities, whereas Al-Quweira has only school-level education with 14 schools and 3,490 students. Health services in Al-Quweira comprise one comprehensive health center and several clinics, but specialized care is more accessible in Aqaba. **Water supply** relies heavily on the **Disi aquifer**, with all residents served by water networks. Wastewater management in Al-Quweira depends on septic tanks, and solid waste is disposed of at the Aqaba landfill, 50 km from the RE site.

Land use at the **RE site** is dominated by grazing and off-road vehicle tracks, while the **OHTL corridor** crosses mixed-use areas with infrastructure like roads, power lines, and agricultural lands. The area includes a nearby operational solar power plant (Al-Quweira 103 MWp PV Plant). Land acquisition for the OHTL will affect approximately **183 privately owned plots**, with final details pending. It is worth noting that the project area is in close proximity to the designated Wadi Rum Filming Area, which spans approximately 240.34 km2, overlapping with it by an area of 0.11 km2.

Gender aspects reveal persistent challenges: high female unemployment, wage disparities, and limited women's participation in entrepreneurship. Despite these challenges, initiatives like ASEZA's "Nashmiyah Project" aim to enhance women's economic involvement.

<u>Environmental and Social Impacts</u>

During Construction Phase

- **Soil and Land Degradation:** Land clearing and excavation activities may result in soil compaction, erosion, and loss of topsoil, increasing the potential for surface runoff.

- **Air Quality:** Dust generation from excavation, material handling, and vehicle movement may temporarily impact air quality, while emissions from construction equipment and vehicles contribute to local pollution.
- **Noise:** Construction machinery and increased traffic will generate elevated noise and vibration levels, potentially affecting nearby communities and terrestrial fauna.
- **Water Resources:** Accidental spills, construction runoff, and improper waste disposal may pose contamination risks to water resources.
- **Biodiversity:**
    - Loss of habitats for local flora and fauna
    - Disturbance to migratory birds and local wildlife, especially near sensitive habitats.
- **Waste Generation:** Construction activities will produce solid and hazardous waste, requiring effective management to prevent environmental harm.
- **Employment Opportunities:** Temporary jobs during construction will benefit local communities, promoting economic opportunities.
- **Community Health and Safety:** Increased movement of construction vehicles may pose safety risks to local residents, with potential exposure to dust, noise, and hazardous materials
- **Land Acquisition and Resettlement:** Construction of the OHTL corridor may require acquisition of approximately 183 privately owned plots, potentially affecting livelihoods and land access.
- **Traffic:** Temporary disruption of local roads and pathways may inconvenience local communities and limit access to farmlands.
- **Gender Aspects:** Female participation in construction-related employment is expected to be limited due to cultural and societal norms.
- **Wastewater and Solid Waste Management:** Improper disposal could lead to public health risks and environmental pollutio

During Operation Phase

- **Air Quality and Noise:** Emissions and noise during the operational phase will be minimal, primarily associated with maintenance activities.
- **Biodiversity:**
    - *Bird Collisions:* The OHTL infrastructure may pose collision risks to avifauna, especially migratory birds.
    - *Ongoing Habitat Disturbance:* Maintenance activities may result in minor disturbances to local ecosystems.
- **Water Resources:** Accidental spills during maintenance activities may pose localized contamination risks**.**
- **Visual Intrusion:** The RE site and OHTL may affect the aesthetic landscape, particularly in areas near tourism sites and the filming area.
- **Employment Opportunities:** Limited, long-term job opportunities will be available for operations and maintenance.
- **Community Infrastructure Benefits:** Improved access roads and services will provide lasting benefits to local communities.
- **Access Limitations:** Occasional maintenance works may restrict community access to certain areas.
- **Occupational and Community Health and Safety:** Potential risks related to operational hazards, especially near high-voltage lines.

- **Gender Considerations:** Women's involvement in operational roles remains a challenge without targeted interventions

Institutional Arrangements

  - **Project Promoter (MWI):** Overall project governance and ESHS compliance oversight.
  - **BOT Contractor (for RE Site) and NEPCO (for OHTL):** Direct responsibility for ESMP implementation during construction and operation phases.
  - **International Financing Institutions (IFIs):** Monitor adherence to funding conditions, including E&S standards.

Environmental and Social Management Plan

The ESMP includes the **Construction Environmental and Social Management Plan** and **Operation Environmental and Social Management Plan** covering:

- Environmental mitigation measures
- Health and safety protocols
- Waste and hazardous materials management
- Biodiversity and habitat protection
- Emergency preparedness and response plans

1. Introduction

1.1. Project Background

The Ministry of Water and Irrigation (MWI) is planning to develop the Aqaba-Amman Water Desalination and Conveyance (AAWDC) Project, aiming to generate 300 million cubic meters (MCM) of drinking water annually through desalination of the Gulf of Aqaba water. This initiative seeks to alleviate the deficit in Jordan's critical water resources and ensure a safe and reliable freshwater supply for Amman, other governorates and areas along the project's pipeline route. The AAWDC Project will be implemented through a build-operate-transfer (BOT) scheme.

The AAWDC Project is a crucial response to Jordan's severe water scarcity, stemming from limited surface and groundwater resources. Economic, demographic, geopolitical, and environmental conditions compound the challenges, including the influx of refugees, high natural population growth, changing consumption patterns due to improved economic conditions, regional conflicts impacting resource supply, and discernible negative effects of climate change. As desalination is an energy-intensive activity, and in order to reduce the carbon footprint of the project, a renewable energy component has been introduced to provide electricity to the project using solar photovoltaic (PV) technology.

In line with national and international requirements, an Environmental and Social Impact Assessment (ESIA) is being prepared for this component, noting that the ESIA for desalination and transmission line components has already been prepared and approved in 2022.

1.2. Project Proponents

Several entities are involved in the planning and implementation of the Project. The responsibilities of each key entity that is of relevance to the ESIA are listed Table 1-1 below along with an overall description of their roles.

Table 1-1: Project Proponents

Entity	Role
Ministry of Water and Irrigation	Client and owner of the Project.
BOT Contractor	The contractor who is responsible for designing, implementing, and operating the project, as well as updating the ESIA as needed and developing the detailed management plans required during construction and operation.
European Investment Bank and USAID	The funding agencies that financed the ESIA and the preliminary design, , responsible to ensure the project is in line with their environmental and social standards
Aqaba Special Economic Zone Authority (ASEZA)	The governmental entity responsible for approving the Environmental Impact Assessment (EIA) and issuing the environmental permit for the RE component as it is located within its jurisdiction.
CDM Smith	The consultant responsible for the Project's preliminary design.

1.3. Purpose and Need for the Project

In order to reduce the AAWDC Project's energy consumption from the grid and its GHG emissions, the MWI is proposing a Renewable Energy (RE) component, hereinafter referred to as the **Project**, in **Quweira, south of Jordan and northeast of the SWRO facility**. The Project will include overhead transmission line (OHTL) connecting Al-Quweira RE Site to the Sea Water Reverse Osmosis (SWRO) plant. The RE facility, comprised of PV panels, aims to meet the total power production demand of the plant and the pump stations within Aqaba Governorate during daylight hours. Outside these hours, the plant and pump stations will rely on electricity provided by NEPCO. The plant will have a design capacity of approximately 300MW (240MW_{AC}), such that the emissions threshold does not exceed 3.2kgCO_2eq per cubic meter of delivered water.

As per ASEZA's letter No. 02/03/11602 dated August 22, 2022, the Project is classified as Category (1), which necessitates a comprehensive Environmental and Social Impact Assessment (ESIA) (see Annex 1). Furthermore, ASEZA's letter No. M.B./02/01/6205 dated April 29, 2024, confirms their approval of the Terms of Reference (ToR) for the ESIA (see Annex 2).

It is worth noting that this ESIA study is based on the preliminary design provided by the BOT Contractor and NEPCO. However, this ESIA will need to be updated**, if necessary**, by the BOT Contractor to reflect any changes in the project description or components made during the detailed design phase.

1.4. Purpose and Structure of the Report

This document constitutes the ESIA study which aims to:

1. Establish the national environmental, health and safety, legal and institutional framework, under which the Project should be implemented;
2. Describe the Project and its associated facilities and activities and present the alternative options that were assessed;
3. Describe baseline environmental and social conditions within the Project area of influence;
4. Identify and assess the significant environmental and social impacts associated with construction and operation of the project;
5. Develop an Environmental and Social Management Plan (ESMP) aimed at preventing, mitigating, reducing or offsetting the identified environmental and social impacts during the life of the Project, and that includes an environmental and social monitoring program for the Project; and
6. Conduct public consultation including disclosure of relevant information about the Project and the ESIA study in accordance with national and EIB requirements.

The structure is presented in Table 1-2.

Table 1-2: ESIA Report Structure

Section	Contents
1. Introduction	Presents background of the Project, the Project's proponents, the need for the Project and the ESIA objectives and structure
2. Project Description	Provides a detailed description of the Project and its components
3. Legal and Administrative Framework	Identifies the public entities that will be involved in the various aspects of Project construction and operation and the laws, regulations and standards governing the environmental and social performance of the Project and presents the alternatives considered for the Project
4. Methods	Defines the Project area of influence, presents the methods used to collect data on the physical, biological and socioeconomic conditions within this area and describes the methodology used for impact assessment
5. Stakeholder Engagement	Describes all stakeholder engagement activities conducted to date and the main findings
6. Environmental and Social Baseline	Presents all relevant information collected on environmental and social conditions within the Project area of influence setting the current baseline
7. Impact Assessment and Mitigation	Describes the anticipated positive and negative environmental and social impacts likely to result from the Project and proposed mitigation measures
8. Environmental and Social Management Plans for the AAWDCP – RE Component	Presents the ESMP developed to ensure that the project's environmental and social impacts are avoided, minimized or, if necessary, offset. It also presents the Monitoring Program in addition to a framework for all required Plans

Section	Contents
9. Annexes	All related annexes

2. Project Description

According to the BOT Contractor, the RE Site will be designed, constructed, and configured to exhibit high efficiency, availability, and reliability with minimum energy generation costs and be suitable for continuous operation at maximum output under climatic conditions particular to the RE Sites. In addition, all components of the RE facilities shall be designed to ensure that the failure of any component shall not compromise the ability of the Project to meet the Contract Capacity Requirements. Facilities shall comply with all relevant local and international laws, regulations, and permitting requirements.

These facilities shall adopt a “zero feed-in” scheme and shall be connected directly to each project Site at the main point of common coupling to the grid through feeders/transmission lines (e.g., 400kV/132kV/33kV). The maximum power production from these RE Facilities shall not exceed at any moment the loads consumed by the Project. In other words, there will be no feed-in to the national grid.

2.1. Project Components and Locations

The RE Site at Al-Quweira is located within the ASEZ, approximately 60 km northeast of the SWRO facility in the Aqaba Governorate. The site spans an area of approximately 500 hectares and is owned by the Government of Jordan and has been allocated to the Project. Al-Quweira site which is designated to supply electricity to the SWRO Plant and the pump stations within Aqaba Governorate during daylight hours (Figure 2-1).

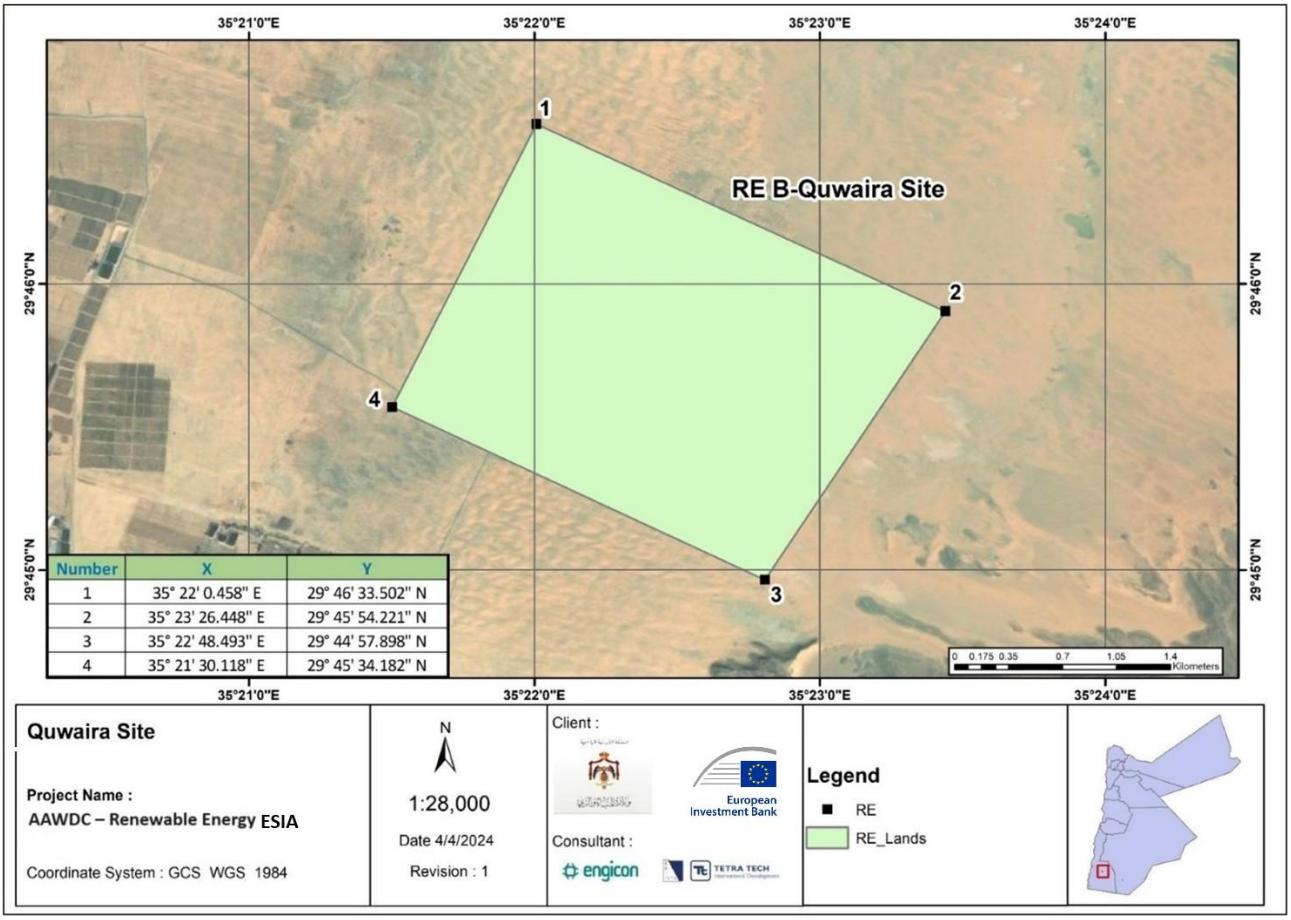


Figure 2-1: Al-Quweira Location

It is important to consider the following points to conform to Cabinet Resolution No. 8333 dated 25/8/2022 (currently under discussion to amend):

- The amount of self-generated RE shall not exceed at any time the total project consumption, i.e. no feed-in to the grid.
- Exporting self-generated energy to the national grid is not allowed (Zero Feed In).

- The BOT Contractor must bear the electrical losses resulting from the transfer of energy from the renewable energy generation plant to the consumption centres, in compliance with the request of the Ministry of Energy and Mineral Resources (MEMR), to place the meter next to the load.

Once the RE Facilities solution is defined by the Project Company and the connection points are approved by the National Electric Power Company (NEPCO), the ultimate design responsibility will rest entirely with the BOT Contractor. However, the ESIA team has received a general layout from the BOT Contractor, as shown in Figure 2-2. It should be noted that the current design remains preliminary and may be subject to further changes to reflect updated assumptions.

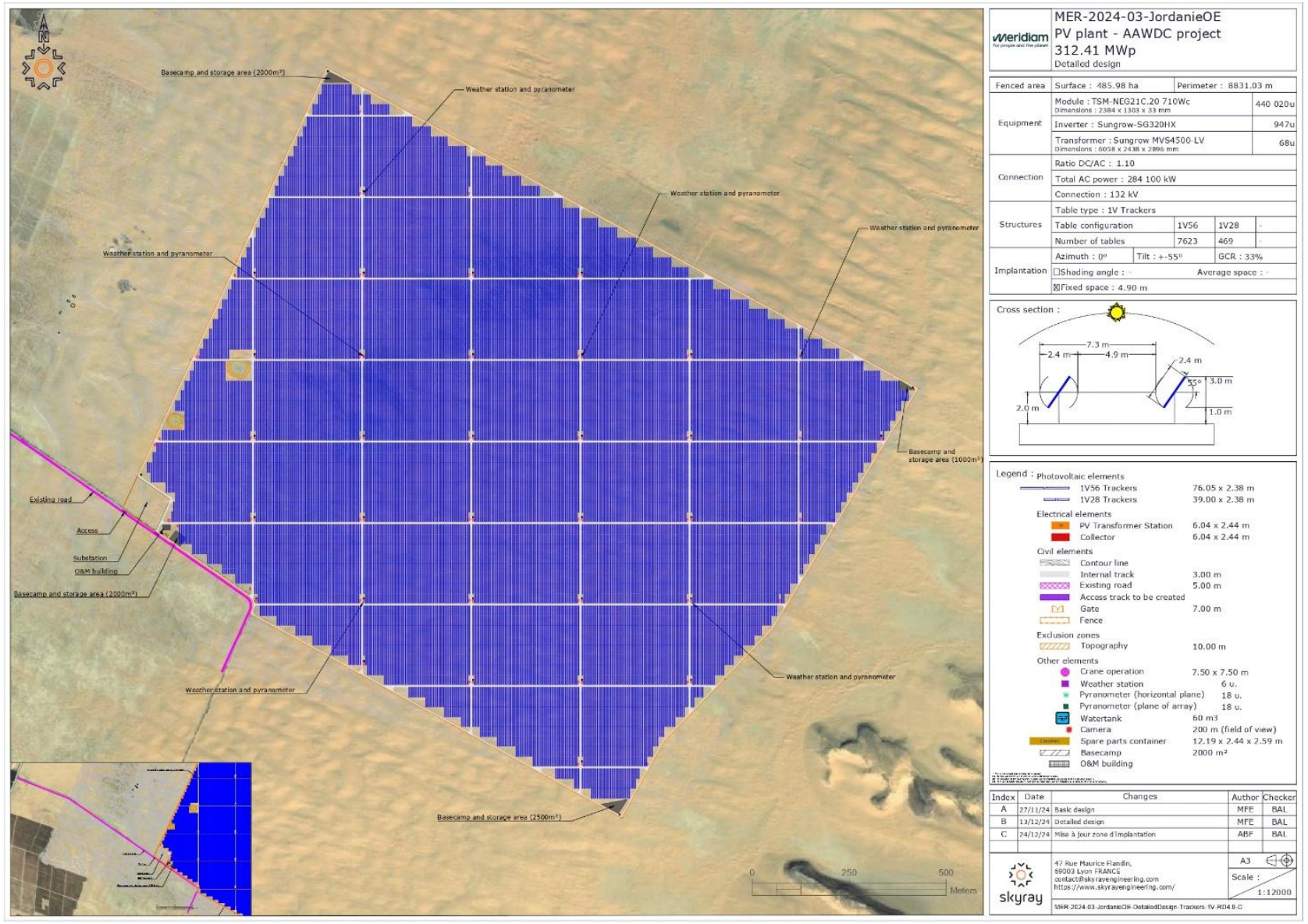


Figure 2-2: Al-Quweira RE Site- General Layout

The RE Site consists of the components described below such that Table 2-1 provides details of the PV capacity, inverter capacity, and connection value for the site:

1. **Modules:** The module proposed for the construction of the photovoltaic plant is the Trina Vertex NEG21C, with a power of 710Wp
2. **Mounting Structure:** The modules will be installed on tracker structures
3. I**nverters:** The electrical concept of the solar plant will utilize string inverters. The inverters will be mounted on special rails, they will be distributed throughout the site, close to the central road, allowing easy access for any maintenance work.
4. **Power Transformers Station**
5. **Meteo Station:** The design includes 6 weather stations, 18 pyranometers in an array of planes and 18 pyranometers in the horizontal plane. The weather station and the pyranometers in the horizontal plane will be installed near a transformer station, and the pyranometers in the plane of array will be installed in the plane of the modules on a structure near a transformer station.
6. **Client Substation:** The Client Substation will be located at the entrance of the site and will be accessible from an existing pathway. It will cover 2.4 hectares.
7. **Access Roads:** The project will be equipped with roads to facilitate the maintenance of the plant's equipment
8. **Water Tanks:** Water tanks have been planned for the project, with a ratio of approximately 60m³ of water per 40 hectares of land, which corresponds approximately to 12 tanks of 60m³ for the 500-hectare site.
9. **Drainage System:** A drainage system will need to be considered for the entire project.

Table 2-1: RE Site Details

Key Data	
Installed PV Capacity (kWp)	314.76
Installed PV Inverter Capacity (MVA)	287.1
Connection Voltage (KV)	132

2.1.1. Over Head Transmission Lines

In addition to the proposed RE Site, a preliminary suggestion has been made for the OHTLs with a power of 132 kilovolts from Al-Quweira Site to the SWRO. The OHTL will be designed and built by NEPCO and financed

by MWI. It is worth noting that the ESIA team has received from NEPCO the OHTL corridor (

Figure 2-3), with no data regarding the exact locations of the towers as those will be developed at a later stage.

Figure 2-3: OHTL Corridor Route

Figure 2-4 shows that the RE facility will supply power to Pump Stations No. 1 and 2, both located within Aqaba Governorate, as well as the SWRO Plant. It is worth noting that the ESIA assumes that all transmission lines

are OHTLs, with no underground sections. Additionally, a single OHTL is expected to supply both the pump stations and the SWRO Plant.

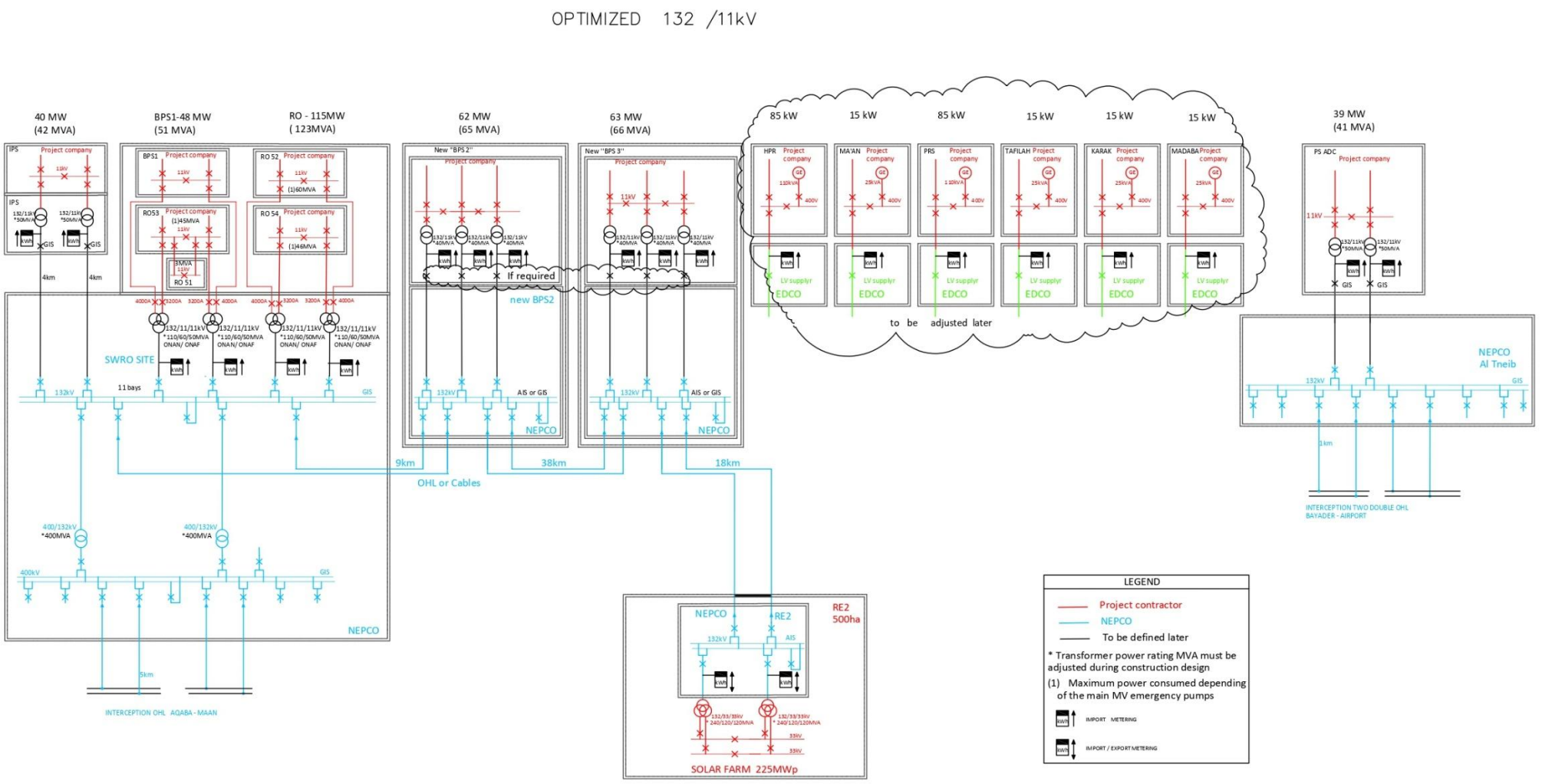


Figure 2-4: Single Line Diagram of Power Supply for the Project

2.2. Alternatives Considered

2.2.1. Alternative Locations

In addition the Quweira Site, the project identified **Wadi Araba RE Site** (Figure 2-5) for the project. The site is located 60km to the northwest of the SWRO Plant in the Aqaba Governorate, north of King Hussein International Airport, with an area of approximately 500 ha. The Site is owned by MWI/Jordan Valley Authority and had been allocated to the Project. However, the site was associated with various challenges included security concerns due to its proximity to the international border and its location within a nature reserve. As a result, MWI decided to abandon this site after careful consideration.

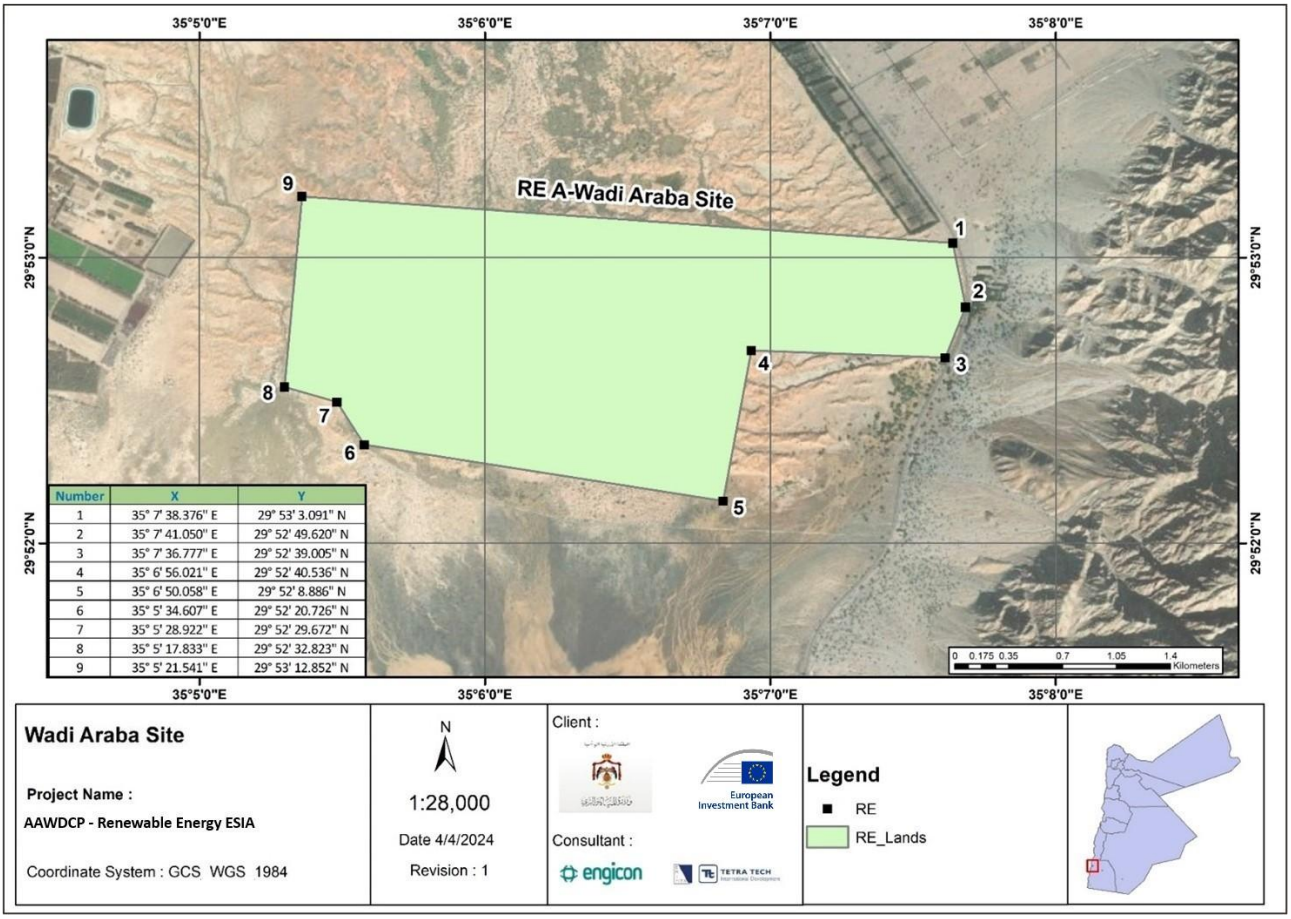


Figure 2-5: Wadi Araba RE Site Location

However another RE location was studied to provide renewable energy to Booster Pump Station 5 which is located at **Al-Mudawara** (Figure 2-6), 90km to the northeast of the RO and immediately adjacent to Booster Pumping Station 5 (BPS5) in the Maan Governorate with an area of approximately 70 ha. The site is owned by the Government of Jordan– Treasury and has been allocated to the Project. However, the BOT Contractor has cancelled Booster Pump Station 5, eliminating the need for this RE site. .

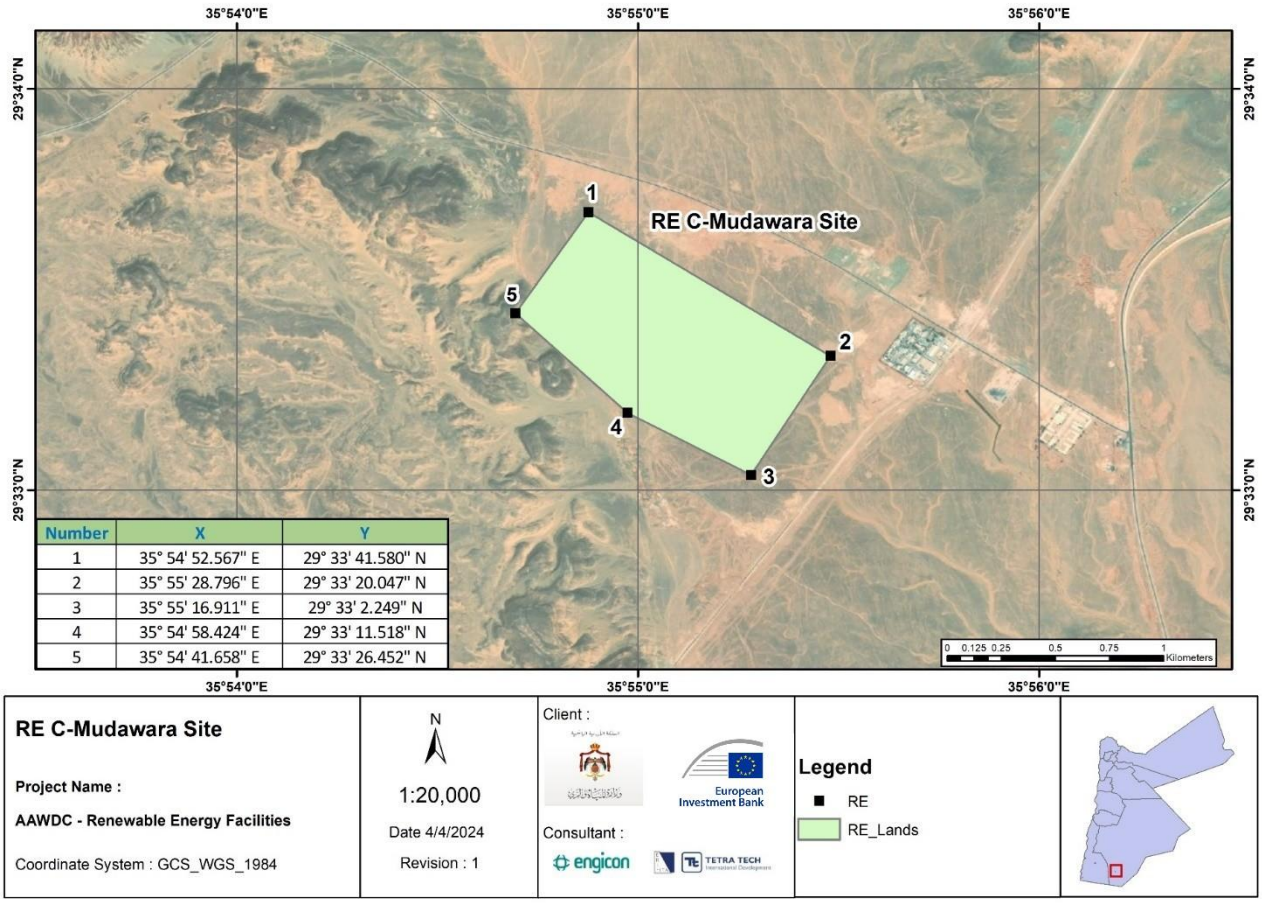


Figure 2-6: RE C- Al-Mudawara Location

2.2.2. Original OHTL Route

NEPCO initially proposed an OHTL route that passed through the buffer zone of the Wadi Rum Protected Area, a designated UNESCO World Heritage Site, requiring additional assessments and a no objection from UNESCO. However, during and after the disclosure session, discussions with ASEZA and the Wadi Rum Protected Area management concluded that the most feasible option would be to reroute the OHTL to remain outside this buffer zone.

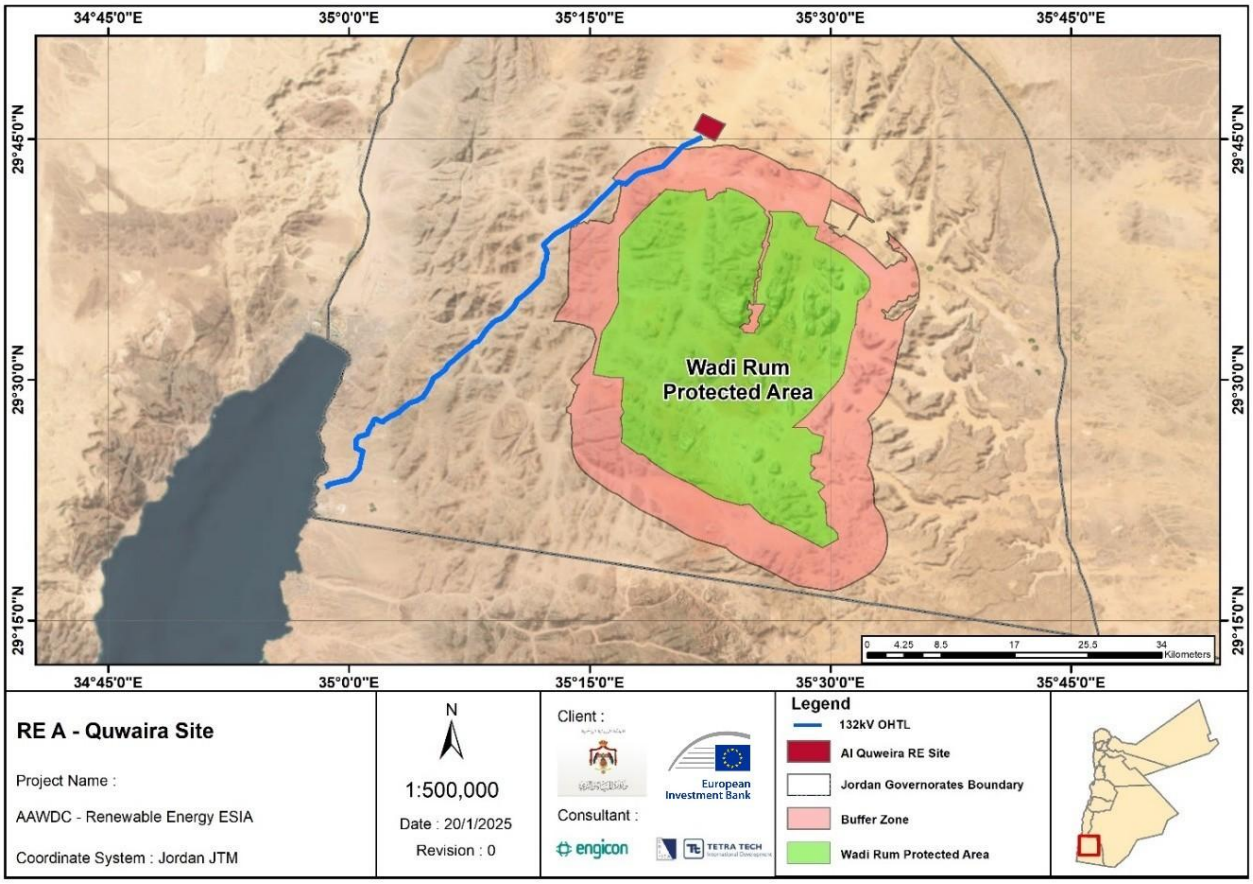


Figure 2-7: Original OHTL Alternative

2.2.3. No Project Alternative

The No Project alternative entails the absence of RE Facilities such that the AAWDC project would rely solely on conventional energy sources to meet its power requirements for the desalination process and associated facilities. This option would likely result in a higher environmental impact and dependency on non-renewable energy, contributing to increased carbon emissions and lead to additional long-term costs and price instability due to fluctuating fuel prices. The absence of RE Sites could also impact the overall sustainability and resilience of the AAWDC project, as it would miss the opportunity to harness cleaner and more sustainable energy solutions.

2.3. Raw Materials and Infrastructure

The final design of the project will determine quantities of raw material and type of infrastructure required, which will be done by the BOT contractor. These will be based on the design and the technology used. Below is a list of the main raw materials that are expected to be used during construction of the project:

- Silicon
- Aluminium
- Glass
- Plastic (PVC + XLPE)
- Concrete
- Gravel
- Semi-Conductor
- Anodized Aluminium

2.4. Water and Energy Use during construction

Water tanks will be used in the project for construction purposes, and the machinery will be connected to the national electricity grid. Construction vehicles will be powered mainly by heavy fuel. This will be confirmed during the detailed design phase, as will the amount of water and energy required for various uses.

2.5. Project Schedule

MWI has signed a preliminary agreement with the BOT Contractor, a joint venture between Meridiam and Suez in January 2025. While a preliminary design of the project components is ready, the final financiers have not yet been determined; and as a result, a project schedule has not been prepared.

3. Legal and Administrative Framework

The Environmental and Social Impact Assessment (ESIA) include the legal and institutional frameworks related to the Project's environmental and social considerations. This includes relevant national institutions, legislation and international agreements, as well as EIB environmental and social standards.

3.1. Relevant Institutions

Table 3-1 lists the relevant institutions involved in the project, highlighting their overall mandates and the specific roles they play concerning the project.

Table 3-1: Relevant Institutions and Their Mandates for the Project

Entity	Overall Mandate	Relevant Mandate
MWI	Manage and regulate water resources, formulate national water policies, and ensure the development and sustainability of water infrastructure.	Oversee water-related projects, allocate water resources, and ensure policy compliance during project implementation.
Aqaba Special Economic Zone Authority (ASEZA)	Manage the Aqaba region's economic development and facilitate investment.	Grant environmental approval for the project, monitor compliance with environmental legislation.
Ministry of Environment (MoEnv)	Maintain and improve environmental quality, develop policies and strategies, enforce environmental legislation, and promote public awareness and cooperation.	Issues policies and standards that the project would need to abide by.
Ministry of Energy and Mineral Resources	Ensure sustainable development of energy and mineral resources through policies, strategies, and oversight.	Facilitate energy supply for project operations and approve RE components.
Ministry of Tourism and Antiquities / Department of Antiquities (DoA)	Protect and document antiquities and manage heritage sites in Jordan.	Ensure compliance with regulations concerning cultural and archaeological heritage in case of any within the Study Area and intervene in case of a chance find.
Ministry of Health (MoH)	Safeguard public health through health policies, strategies, and regulation of healthcare services.	Monitor public health concerns, including the impact of any project-related public health risk.
Ministry of Public Works and Housing (MPWH)	Develop and maintain public infrastructure, focusing on road networks and public buildings.	Provide oversight and ensure infrastructure development meets technical and safety standards, including mitigation of environmental impacts such as air pollution and noise.
Ministry of Planning and International Cooperation	Coordinate and implement social and economic development plans in collaboration with international partners.	Maximize benefits from foreign assistance and ensure alignment with development plans, such as the rehabilitation of irrigation networks.
Ministry of Local Administration / Relevant Municipalities	Oversee local governance and municipal affairs, ensuring sustainable development and effective oversight.	Coordinate with municipalities to address public concerns and provide access to essential services during project implementation.
Ministry of Labor	Ensure the health and safety of workers and regulate employment standards in Jordan.	Monitor occupational health and safety standards during the construction phase of the project.
Ministry of Agriculture	Manage rangelands, forests, soil resources, and wildlife; oversee agricultural research and consultation.	Issue approvals for dealing with flora and fauna and manage impacts on agricultural areas during project implementation.

Entity	Overall Mandate	Relevant Mandate
Public Security Directorate / Traffic Department	Ensure public safety, prevent crimes, manage prisons, and regulate traffic.	Oversee traffic management and enforce safety measures on roads used during project implementation.
Ministry of Social Development	Promote social welfare, support vulnerable groups, and provide social services.	Address social issues arising from project activities, ensuring community welfare and support.
Aqaba Development Corporation (ADC)	Develop and manage infrastructure and assets in the Aqaba Special Economic Zone.	Support infrastructure development relevant to the project and ensure compliance with investment and development agreements.
Municipalities of Al-Jafer, Qatar Wa Rahmeh, and Al-Quwaira	Provide municipal services, including water distribution, sanitation, and public health management.	Facilitate local coordination for project activities, including solid waste management and minimizing disruptions to municipal services.
International Financing Institutions (IFIs) including EIB and USAID	Provide financial and technical support for development projects.	Provide project financing and oversee fund utilization and promote project sustainability through compliance with funding conditions including environmental and social standards.

3.2. National Legislation

Table 3-2 summarizes the key national policies and legislation relevant to the project, including specific provisions applicable to its implementation.

Table 3-2: Relevant National Policies and Legislation

Legislations	Relevant Provisions
Strategies and Policies	
National Water Strategy (2023-2040)	Sets long-term water management goals, including sustainability, resource protection, and efficient water use.
Jordan's Climate Change Policy	Outlines measures for climate adaptation, mitigation, and reducing greenhouse gas emissions.
Jordan Renewable Energy Strategy 2020-2030	Continue to generate electric power in the Kingdom, depending on natural gas, renewable energy, and committed projects. Continue to work on increasing the participation of renewable energy projects in covering the Kingdom's needs of electric power, to increase from (2.400) MW in 2020 to (3.200) MW in 2030.
Laws	
Aqaba Special Economic Zone Law No. 32 of 2000	**Article 10-b:** assigns the responsibility of protecting the environment, water resources, natural resources, and biological diversity. **Article 11-c:** The Authority shall also assume the protection of the environment in the Region according to the provisions of this Law, the Regulations issued pursuant thereto and any pertinent legislation in force
Agriculture Law No. 13 of 2015 and its amendment	**Article 33-a:** It is prohibited to cut down or burn forest trees and shrubs, strip them of their bark or leaves, or remove them in any form without obtaining a license from the minister, except in cases and circumstances specified by the minister. **Article 33 and 34**, certain types of trees cannot be cut except with the approval of the Ministry of Agriculture. **Article 56:** forbids the hunting and trading of wild animals and birds except in accordance with instructions issued by the Ministry of Agriculture.
Water Authority Law No. 18 of 1988 and its amendment No. 22 of 2014	**Article 12** Prohibits the discharge of pollutants into water sources, including rivers, reservoirs, and groundwater, to protect water quality

Legislations	Relevant Provisions
	Article 26: If WAJ and the Landowner do not agree on the amount of compensation to be paid in exchange for the expropriation of real estate, land, and related rights, or for water or sewage projects, either party may submit a request to the competent court to determine this amount according to the provisions of the applicable Expropriation Law. They may also agree to refer the dispute to arbitration according to the provisions of the applicable Arbitration Law.
General Antiquities Law No. 21 of 1988 and its Amendments	**Article 9** prohibits the destruction or damaging of antiquities. **Article 13** prohibits licensing of any structure including buildings or walls unless it is at least 5 to 25 m away from any antiquities.
Public Health Law No. 47 of 2008	**Article 4** states that the Ministry of Health is responsible for protection of public health and for monitoring water quality to ensure its safety and adequacy for human consumption.
Labor Law No. 8 of 1996 and its Amendments	**Article 73** prohibits employment of juveniles under 16 years under any circumstance **Article 74** prohibits juveniles under 18 to be employed in hazardous or exhausting occupations or those harmful to health. **Article 82** states that the employees working in any establishment shall abide by the provisions, instructions and decisions related to health and safety precautions.
Social Security Law No. 1 of 2014	**Article 6** requires the provision of social security and worker insurance for all workers with certain exceptions (seafarers, domestic workers, and agricultural workers). It covers occupational injuries and diseases, retirement and disability and death benefits.
Prevention of Human Trafficking Law No.9 of 2009	Prohibits trafficking in persons, creation of offences, prosecution and punishment of offenders, protection of victims of trafficking in persons, and other related matters.
Traffic Law No. 49 of 2008	**Article 24** states that driving vehicles that are spilling or leaking oils or oil derivatives or any dangerous materials on the road or that are emitting smoke or any other polluting materials while in motion, at non permissible rates, shall be impounded. **Article 31** imposes imprisonment or a fine for throwing or pouring vehicle loads such as stones, solid waste, liquid materials, on the road, and the responsible entity shall bear the cost of removing these materials. **Article 35** imposes a fine for driving a vehicle that emits smoke or any other polluting materials.
Protection of Architectural and Urban Heritage Law No. 5 of 2005	The Law aims to conserve, protect, and maintain Jordanian heritage sites. **Article 11** of the law, destruction or damage of any heritage site is strictly forbidden.
Municipalities Law No. 41 of 2015	**Article 5** authorizes the municipalities to prepare and implement sustainable development programs with the participation of local communities and the private sector. Furthermore, it authorizes the municipalities to coordinate with the concerned authorities in order to manage and organize water distribution among the population and prevent the pollution of springs, canals, basins and wells.
Law on Securing the Right to Information Access No. 47 of 2007	**Article 8** requires public access to information and ensures the prompt disclosure thereof in the manner set forth in this Law.
Civil Defence Law No. 18 of 1999	**Article 8** states that in case of emergency and disaster cases, and after an authorization from the Prime Minister, the Minister of Interior may regulate and limit the use of water and electricity resources, their tools and all their supplies in coordination and cooperation with the authorities responsible for managing and running them.
Solid Waste Management Framework Law No. 16 of 2020	**Article 11-B** states that waste must be sorted and collected within sites in a manner that reduces environmental risks and for a specific period of time in accordance with applicable legislation.

Legislations	Relevant Provisions
	Article 28-b states that any entity that disposes of construction waste on roads, pavements or any location that causes damage to public health will be fined.
General Electricity Law No. (64) of 2002	**Article 43** establishes the conditions under which licensed entities may undertake electricity-related activities, including the extension, installation, or placement of power lines and electrical equipment across, under, or above streets, roads, pathways, open spaces, or properties, excluding heritage sites. The article also requires a notice to be published in two local newspapers at least five days prior to commencing these activities to ensure transparency and compliance with proper procedures. **Article 44-45** outlines the general framework for land acquisition in relation to electricity projects. It emphasizes the need for fair compensation to affected parties for any damages or land use, and provides mechanisms for resolving disputes, including referral to courts if agreements cannot be reached.
Law No. 12 of 2024 – Amending Law for the Renewable Energy and Energy Efficiency Law for the Year 2024	Provides legal and regulatory framework for renewable energy in Jordan. It aims to facilitate the development, implementation, and management of renewable energy projects in the country
Regulations	
Regulation No. 21 for 2001 for the Protection of the Environment in the Aqaba Special Economic Zone	**Article 4 A** requires a permit to engage in an economic activity related to the disposal of solid waste, waste dumps, sewage stations, and oil reception facilities. **Article (6) A** states that any activity may be suspended if it causes or threatens to cause environmental pollution in the Zone, or results in deterioration of the quality of water resources. **Articles 8 – 24** describes ASEZA's Process of conducting an ESIA Study within the zone.
Hazardous Waste and Materials Management Regulation No. 68 of 2020	**Article 8** lists the prohibited actions related to hazardous substances and waste, such as import, circulation, throwing on the ground, in water, or in the air.
Non-Hazardous Solid Waste Management Regulation No. 44 of 2022	Establish a solid waste management system that would protect the environment and public health. It also strives to benefit from material found in or resulting from this waste in an environmentally safe manner.
Regulation for the Prevention of Health Nuisances within Municipal Areas No. 8 of 2014	Prohibits any party from causing any nuisance to anybody or from damaging public health. These nuisances include bad odours, noise, solid and liquid waste or any other practice deemed harmful to public health or sanity. In addition, it states penalty of violators and waste collection fees.
Regulation for the Classification of Birds and Wild Animals Species Forbidden from Hunting No. 43 of 2008	This regulation classifies all bird species that are not allowed to be hunted in Jordan into three appendices based on their conservation status and their number in the country.
Regulation for Obligatory Employment of Jordanian Workforce from Surrounding Communities in Development Projects No. 131 of 2016	Requires the obligatory employment of local communities within development projects to include fresh graduate engineers, technicians, labourers, etc. and specifies requirements for training as well as giving priority to local contractors. The number of job opportunities is specified based on the investment amount of the development project.
Regulation No. 29 of 2005 on Natural Protected Areas and National Parks	**Article 9:** it is prohibited for any individual to undertake any activities within the boundaries of a nature reserve or national park, including the exploitation of natural resources in any form, without obtaining prior approval from the competent authority responsible for managing the nature reserve or national park. Such approval must be granted according to the principles and conditions specified in regulations issued by the minister for this purpose.
Air Protection Regulation No. 28 of 2005	Framework legislation to protect public health and the environment from pollution resulting from human activities by controlling air pollutants emitted from stationary and mobile sources.

Legislations	Relevant Provisions
Soil Protection Regulation No. 25 of 2005	**Article 3e** states that: "the MoEnv, in coordination with the Ministry of Agriculture, is responsible for studying the sites of development projects and their impact on land and natural resources."
Wadi Rum Development Regulation No. 21 of 2001	**Article 9-a:** It is prohibited, under legal liability, to undertake any activities, actions, or behaviours that could lead to the destruction or harm of the natural environment, its components, or its aesthetic value within the designated area of Wadi Rum, which include: These include constructing buildings outside designated zones, unauthorized entry or exit, hunting or harming wildlife, damaging geological formations essential for habitats, defacing natural features, removing or damaging structures, polluting soil, water, or air, and engaging in actions that harm the area's environment, such as lighting fires or improper waste disposal. Additionally, driving vehicles off designated roads is strictly prohibited to preserve the natural landscape and ecosystem
Groundwater Monitoring Regulation No. 85 of 2002 and its Amendments of 2022	**Article. 10** obligates anyone who is granted a license to extract underground water to refrain from causing any water pollution or depletion. **Article 16** states that of any areas were found to be polluted or depleted, WAJ's Board of Directors shall take a decision to set the appropriate measures that will put an end to such pollution or depletion including the rationalization or reduction of the extraction rate, to an extent that would allow the halt of pollution or depletion, and the restoration of the natural balance to the aquifer or to the underground water basin
Instructions	
Instructions for the Protection of Workers and Institutions from Occupational Hazards issued by Article (79) of Labour Law No.8 of 1996	Provide a framework for identifying and managing occupational hazards to ensure worker safety and compliance with national and international standards. It categorizes hazards into physical, chemical, biological, ergonomic, and psychosocial risks, outlining preventative measures such as risk assessments, safety protocols, proper training, and the provision of personal protective equipment (PPE). The instructions also emphasize the importance of maintaining safe workplace facilities, monitoring health risks, and implementing measures to prevent accidents and occupational illnesses.
Instructions for the Protection of Workers against the Risks of the Work Environment No. 8 of 1996	Instructions concerning the protection of employees and establishments from dangers in the work environment.
Instructions for Reduction and Prevention of Noise for 2003	Specify the maximum allowable level of noise for the different types of areas, both during the daytime and at night
Initial Medical Examination of Workers in Institutions of 1999	Outlines the instructions for preliminary medical examinations in workplaces, established to ensure the health and safety of workers in various sectors. It mandates conducting medical evaluations before hiring employees, especially in industries or roles where health risks are significant, such as construction, manufacturing, agriculture, and chemical industries.
Instructions for Protecting Wild Birds and Wild Animals and Regulating Their Hunting and Trade No. 2 of 2021	**Article 5** states that wild animals and wild birds are hunted in the areas and seasons specified by the Minister in the schedule based on a recommendation from the competent committee.
Instructions for the Management of Electrical and Electronic Waste for the Year 2021	These instructions aim to ensure the safe and environmentally responsible handling, collection, storage, transportation, and disposal of such waste.
Standards	
Ambient Air Quality Standards (JS 1140/2006)	Provides definitions of ambient air pollutants and the maximum allowable concentration for each of those pollutants. The standards specify the maximum allowable limits of concentration of ambient air pollutants, beyond which, responsible parties should take action.
Maximum Allowable Limits of Air Pollutants Emitted from	Specifies the maximum allowable limits of air pollutants emitted from the stationary sources.

Legislations	Relevant Provisions
Stationary Sources (JS 1189/2006)	

3.3. International Standards and Commitments

Table 3-3 lists the international Standards relevant to this project, including the international commitments under which Jordan is a signatory.

Table 3-3: Project relevant International Standards and Commitments

Category	Relevant Institutions, Laws or Standards
International Standards and Commitments	
EIB Environmental and Social Standards	• Standard No. (1): Assessment and management of environmental and social impacts and risks • Standard No. (2): Pollution prevention and abatement • Standard No. (3): Biodiversity and ecosystems • Standard No. (4): Climate-related standards • Standard No. (5): Cultural heritage • Standard No. (6): Involuntary Resettlement • Standard No. (7): Rights and Interests of Vulnerable Groups • Standard No. (8): Labour Standards • Standard No. (9): Occupational and Public Health, Safety and Security • Standard No. (10): Stakeholder Engagement
USAID Environmental Procedures	• 22 CFR 216 Agency Environmental Procedures
ILO Core Labour standards	• C87 – Freedom of Association and Protection of the Right to Organise Convention, 1948 • C138 – Minimum Age Convention (Minimum age specified: 16 years), 1998 • C182 – Worst Forms of Child Labour Convention, 2000 • C029 – Forced Labour Convention, 1966 • C098 – Right to Organise and Collective Bargaining Convention, 1968 • C100 – Equal Remuneration Convention, 1966 • C111 – Discrimination (Employment and Occupation) Convention, 1963 • C105 – Abolition of Forced Labour Convention, 1958 • C155 – Occupational Safety and Health Convention, 1981 • C187 – Promotional Framework for Occupational Safety and Health Convention, 2006
EU Directives	• Directive 85/337/EEC - Directive on EIA • Directive 2006/54/EC – Equal opportunities • Directive 2002/14/EC – Informing and consulting employees • Directive 2000/78/EC – Equal treatment • Directive 89/391/EEC – OHS- Framework & Directive • Directive 2009/104/EC – Use of work equipment • Directive 92/58/EEC – Safety and/or health signs • Directive 89/656/EEC – Use of personal protective equipment • Directive 89/654/EEC – Workplace requirements • Directive 2009/161/EU – Occupational exposure limit values • Directive2012/18/EU – Major-accident hazards • Directive 90/269/EC – Manual handling of loads • Directive 96/62/EC - Air quality framework directive • Directive 2002/49/EC - Assessment and Management of Environmental Noise • Directive 2008/98/EC - Waste Framework • Directives relating to Public Participation • Directive 2003/04/EC – Access to Environmental Information • Directive 2003/35/EC – Providing for Public Participation • Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the Conservation of Wild Birds

Category	Relevant Institutions, Laws or Standards
	• Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora • EU Noise Directive (2002/49/EC).
International Conventions and Agreements	• Kyoto Protocol on Climate Change, 2003 • Ramsar Convention of Wetlands of International Importance, 1971 • Vienna Convention and the Montreal Protocol for the Protection of the Ozone Layer, 1988 • Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1992 • UN Convention to Combat Desertification (UNCCD), 1996 • Cartagena Protocol on Bio-safety, 2003 • Convention on the Protection of African-Eurasian Migratory Waterfowls, 1996 • Convention on the Conservation of Migratory Species of Wild Animals, 1979 • Stockholm Protocol on Persistent Organic Pollutants (POPs), 2004 • Convention on Biological Diversity (CBD) – 1994 • Jordan is a member of the International Labour Organization (ILO) and has ratified seven of the core conventions in addition to 13 other conventions.

3.4. Project Ownership

The AAWDC Project will be owned by the Government of Jordan through MWI, the Project Promoter. Since the AAWDC Project is planned to be implemented through a BOT scheme, the BOT contractor will operate the project for an agreed duration, approximately 26 years, after which it will be transferred to the Jordanian Government.

4. Methods

4.1. Defining the Project Area of Influence

The Project Area of Influence (PAI) has been defined in line with EIB Environmental and Social Standards of 2022, which states that the ESIA shall include "a description of the location of the project, with particular regard to the environmental sensitivity and any relevant social aspects of the **geographical area likely to be affected**."

Reference is also made to the definition of the 'Study Areas' as provided in the Guidance for Preparing Environmental Impact Assessments issued by the Jordanian Ministry of Environment in October 2014:

'Study areas should encompass the area in which impacts may occur [areas of potential effect (APE)] for each technical parameter (described in Section 3.7, Existing Environment). The size of the study area may vary depending on the resource area and type of impact (direct, indirect, induced or cumulative), and should include both primary (direct impacts) and secondary (indirect or secondary impacts) study areas when appropriate.'

Physical Environment

The project will influence the physical environment including air, water and soil quality, such that the PAI during construction is considered as the footprint of the RE facility, OHTL and adjacent areas that may be directly affected by construction activities. During operation, the PAI encompasses the facility's footprint and the areas where the OHTL is located.

Biological Environment

The PAI for terrestrial ecology encompasses the designated land plot for the RE site, along with all biogeographic regions, vegetation types, and habitats surrounding the project. It extends 2 km from each side of the OHTL corridor/alignment for literature review purposes and 100 m for field activities within the project-specific PAI.This study assumes the construction corridor to be 50m in total width to accommodate heavy machinery movement/operation. Accordingly, the PAI for the assessment of project impacts, which shall be subject to additional field surveys is identified as a corridor of 100m for the OHTL (i.e., 50m from each side of the centreline of the route). This 100m corridor PAI will also cover the campsites, storage sites and machinery parking areas.

Socioeconomic Environment

The PAI for the socioeconomic environment includes residential areas and communities, businesses and farms near the RE Site and along the OHTL corridor. It also includes all roads connecting residential, commercial and production areas that may be affected by the movement of construction machinery or temporary closures for project activities.

Cultural Heritage

The construction works including excavation and movement of machinery might influence cultural heritage and archaeological sites along the OHTL. As such, the PAI is defined as areas where excavation works will take place.

4.2. Establishing Baseline Conditions

This section describes the literature review undertaken to date, information gaps identified, and site visits and surveys that have been undertaken for establishing the environmental and social baseline conditions in the ESIA study.

4.2.1. Physical Environment

Establishing the physical environmental baseline for the project's study area has been conducted through a combination of literature review, field investigations and site visits. The desktop research was done during the Constraints Mapping Phase covering the following topics:

- Topography

- Climate conditions
- Geology and soils
- Water resources (groundwater and surface water)
- Air quality
- Earthquake

4.2.1.1. Review of Literature and Desktop Research

The ESIA team established baseline data utilizing available secondary sources, including the AAWDC Project ESIA. The ESIA Team conducted hydrological and hydraulic modelling (2D modelling) to establish flood risk assessment. The areas of the project prone to flooding were identified through the mapping of flood zones and by defining risk categories. Flood risk maps showing the different risk categories (Low, Moderate, High) were established based on flooding depths and flow velocities. The findings from this hydrological assessment contributed essential information to the team understanding of the baseline conditions and were integrated into the ESIA.

Approach

- Identify and gather literature relevant to the project area.
- Synthesize key findings related to topography, geology, hydrology, and climate.
- Conduct flood risk mapping through hydrologic and hydraulic modeling.
- Evaluate the reliability and accuracy of the information obtained from literature sources.

Integration into Baseline Conditions:

- Summarize critical insights derived from the literature review, emphasizing physical environment parameters.
- Utilize relevant data and observations to enhance the current understanding of the baseline physical conditions.

4.2.1.2. Site Visits

The ESIA team has conducted several visits to the sites to observe the surrounding environment and identify any additional nearby environmentally sensitive receptors or significant environmental issues.

Approach

- Schedule and execute on-site visits specifically focused on assessing physical characteristics of the surrounding areas.
- Conduct interviews with local experts to gather data on topography, geology, hydrology, and climate.
- Document notable physical features and variations within the project area

Integration into Baseline Conditions:

- Incorporate qualitative and quantitative insights gained from site visits into the baseline assessment.
- Validate and supplement information obtained from the literature review with on-the-ground observations.
- Highlight any unique physical features or challenges observed during site visits.

4.2.2. Biological Environment

4.2.2.1. Review of Literature

Information on the natural environment in the target areas was obtained through a comprehensive review of available literature of the ecology and biodiversity across the different project components. In addition to the identification of the location of the project components in relation to biogeographical regions and vegetation types, the desktop literature review identified the location of the different project components in relation to areas and species of conservation importance, including protected areas, Key Biodiversity Areas (KBAs) and Important Bird Areas (IBAs).

Approach

- Systematically identify and gather literature specific to the biological environment within the project area.
- Extract and synthesize relevant data, including information on biogeographical regions, vegetation types, and conservation areas.
- Evaluate the reliability and credibility of information obtained from literature sources.
- Integrate findings into the baseline conditions assessment, emphasizing their role in shaping the understanding of the biological environment.

Integration into Baseline Conditions:

- Summarize key findings from the literature review related to the biological environment.
- Emphasize the identification of biogeographical regions, vegetation types, and conservation areas within the PAI.

4.2.2.2. Site Visits

Approach

The rapid diagnoses ecological survey was carried out by a qualified team of researchers comprising lead ecologist/avifauna specialist, two zoologists and GIS specialist for the Sooty Falcon (*Falco concolor*) and Egyptian spiny-tailed lizard (*Uromastyx aegyptia*).

The field survey was conducted on November 22-26, 2024. The survey included a walk-over and drive-over survey with regular stops to record ecological features along the PAI, and all the data was recorded visually in the field. These included the following:

- Key landscape features: ponds, caves, wells, etc.
- Sooty Falcon (*Falco concolor*)
- Egyptian spiny-tailed lizard (*Uromastyx aegyptia*).
- Small mammals

The survey team had a comprehensive view of most of the PAI. However, some areas were inaccessible due to certain barriers, including restricted zones that were closed off and mountainous terrains that were difficult to reach. Despite these challenges, the survey covers the majority of the PAI and the route of inspection covered is shown in Figure 4-1.

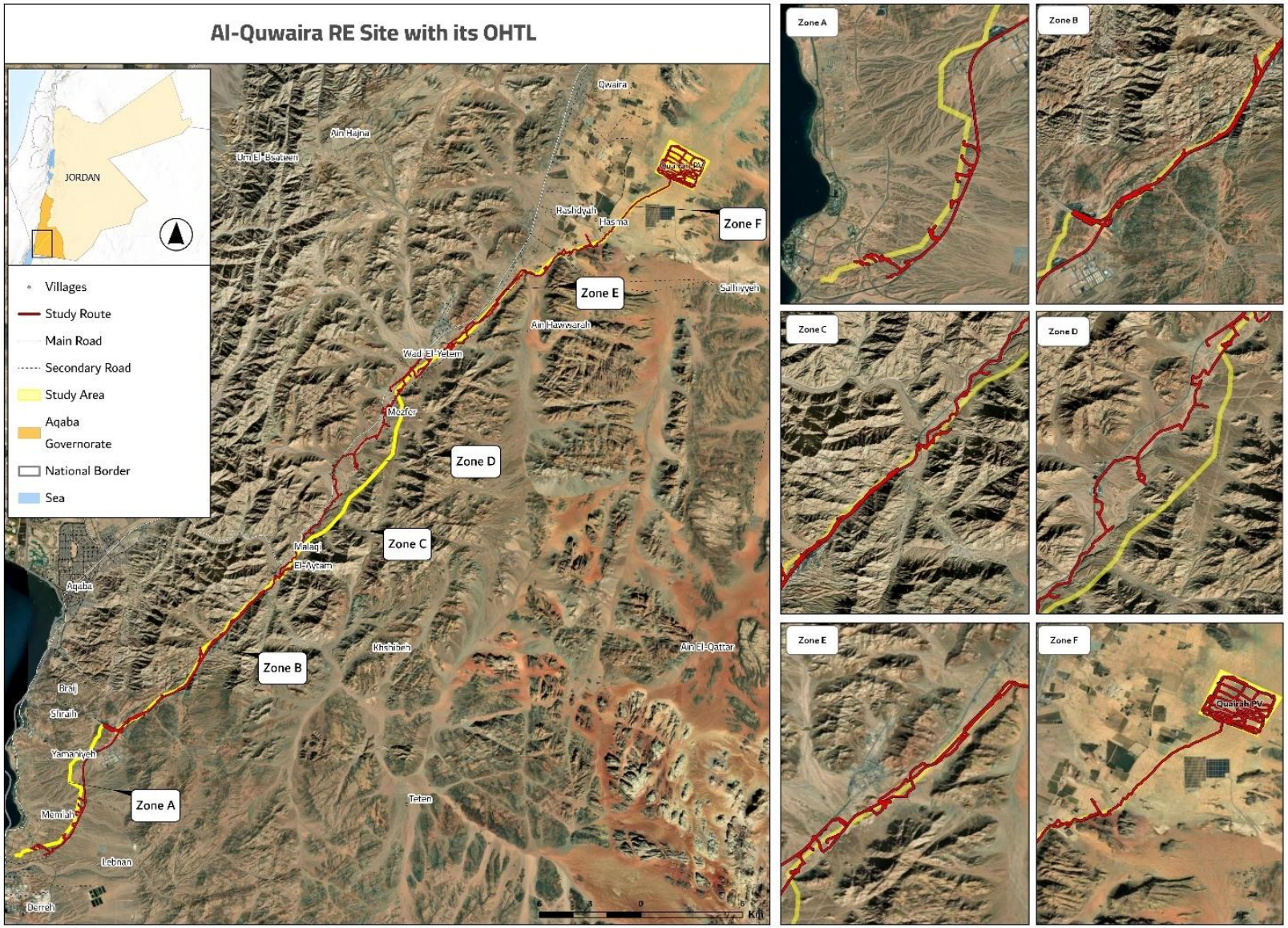


Figure 4-1: Routes of Inspection in the PAI

For capturing small mammals, the team used Sherman traps, specifically the XLK Extra Large Folding Kangaroo Rat model (Figure 4-2). Traps were placed in areas where rodents were likely to be present, such as near vegetation, rocks, and burrowing sites. They were set up before sunset, with their locations recorded using a GPS device. To ensure animal welfare and prevent overheating, the traps were checked early in the morning. Each trap was documented as positive (captured an animal), negative (no capture), or missing. Captured animals were identified and then released back into the Study Area. They set these traps for a total of 29 nights by deploying 29 traps in the Study Area (Figure 4-3).

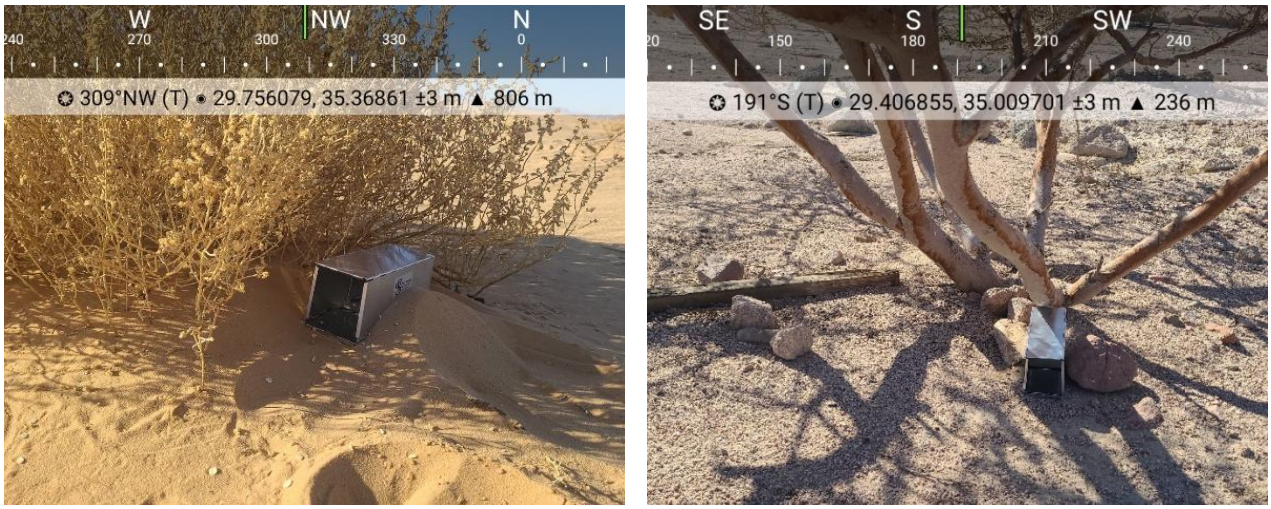


Figure 4-2: Sherman Traps Positioned within the PAI

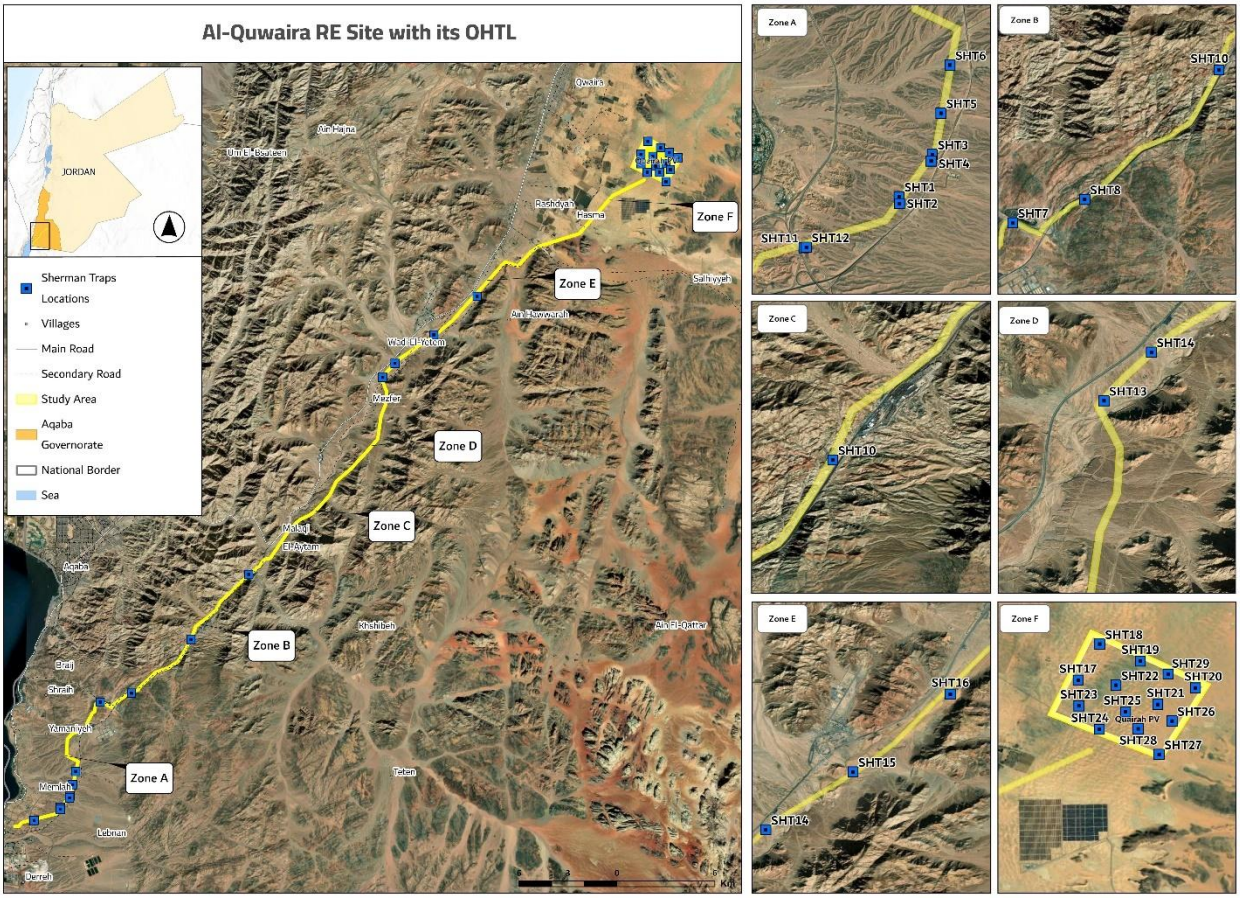


Figure 4-3: Sherman trap locations

4.2.2.3. Critical Habitat Assessment

The Critical Habitat Assessment (CHA) aims to identify features that trigger the critical habitat status and priority biodiversity features. This will be applied through the following:

- Identification of Critical Habitat and Priority Biodiversity Features present in the area based on a comprehensive literature review, including the Integrated Biodiversity Assessment Tool (IBAT, 2025).
- Analysis of already available information collected as part of the desktop reviews and the biodiversity assessments and that were undertaken at the project site.

A Critical Habitat Assessment is usually carried out at a landscape scale, using ecologically and/or administratively coherent units for determining the presence or absence of Critical Habitat-qualifying features under EIB Standard 4, PS6 criteria 1 – 3 and PR6 Criteria ii – iv. Based on this, the study area level is based on the whole area of the Project Site; the RE Site and the OHTL route, along with its surrounding vicinity. However, since the components of the Project Site are a RE Site that is confined to an area of around 5km^2 and an OHTL that extends for a distance of around 60.7km, the criteria of the CHA are applied separately on both parts of the Project Site.

This assessment is based on existing literature in addition to global and regional datasets, including Integrated Biodiversity Assessment Tool (International Biodiversity Assessment Tool, 2025). All species classified as Critically Endangered, Endangered, Vulnerable or Data Deficient in the IUCN Red List were screened, as well as all species mapped by IUCN, which could be considered a restricted range. Additionally, up-to-date ecological assessments were used in the analysis. Desktop reviews were undertaken for the different taxa including plants, mammals (including bats), herpetofauna and birds.

This assessment was conducted using the best recent and available information at the time of its production. It is believed that as further research could be undertaken in the future, at the Project Site and/or its vicinity, a better understanding of the area as a whole will be obtained. These results could affect the results of this assessment; however the location of the Project Site is located at least 0.5km away from an IBA/KBA and 3.4 km from an established Protected Area and 7.0km from a proposed one, will not change the level of importance of the area as a whole and specifically the Project Site .

4.2.3. Socioeconomic Conditions

Establishing the socioeconomic conditions for the PAI will be conducted through a combination of literature review, field investigations and site visits. The baseline conditions will cover the following topics:

- Population and demographics
- Economic activities including employment and poverty
- Education, and health
- Land use and ownership
- Infrastructure (roads, telecommunication, electricity, and water)

4.2.3.1. Review of the Literature

The ESIA Consultant will utilize data from the Department of Statistics and other available literature.

Approach

- Identify and compile literature specific to the socioeconomic aspects within the PAI.
- Extract and synthesize relevant data on demographics, economic activities and infrastructure within the area
- Assess the reliability and credibility of information obtained from literature sources.

Integration into Baseline Conditions:

- Summarize key socioeconomic findings from the literature review.
- Emphasize the identification of demographic trends, economic activities, land use and social structures within the project area.

4.2.3.2. Site Visits

The ESIA team has conducted several visits to the sites to observe the land use of the proposed RE sites and along the OHTL corridor.

Approach

- Incorporate socioeconomic considerations into on-site assessments alongside physical and biological aspects.
- Engage directly with local communities, businesses, and stakeholders to understand socioeconomic dynamics in the area.
- Document qualitative data related to livelihoods, economic activities, and community structures.

Integration into Baseline Conditions:

- Integrate qualitative socioeconomic data obtained during site visits into the baseline assessment.
- Validate and complement information from the literature review with on-the-ground observations.

4.2.4. Cultural Heritage

The methodology for establishment of baseline conditions related to cultural heritage complies with internationally accepted charters and guidelines such as those adopted by ICCROM (International Centre for the Study of Preservation and Restoration of Cultural Property) and ICOMOS (International Council of Monuments and Sites) and is based mainly on the following activities:

- Library research
- Review of existing ESIA reports for previous projects
- Determine actual and potential locations of relevant cultural heritage sites and determine those that require field verification;
- Conduct field investigations to all relevant sites along the OHTLs and the three proposed RE Sites;
- Documentation and report writing.

4.2.4.1. Literature Review

The available data was researched from Jordanian and international sources. This includes:

- Previously conducted surveys, excavation, limited studies, preliminary reports,
- Old maps or any written document about the PAI subjected to intensive assessment and evaluation.
- A preliminary desk-based assessment which has revealed the following readily available information:
  - The archaeological and cultural heritage sites identified close to the OHTLs
  - The current condition/state of these sites.

The Archaeology and Cultural Heritage expert continued the research in national and international libraries such as **(1)** Jordan antiquities database and information system (MEGA Program search).Site Visits and **(2)** Library search/ Department of Antiquities of Jordan / British Council for Research in Levant (BCRL), IFAPO / The French Institute for Archaeology in Amman, German Institute of the Holy Land, and Jordan Universities such as Jordan University, Yarmouk University, etc

Approach:

- Identify and compile literature research specific to the cultural heritage aspects within the project area.
- Extract and synthesize relevant data on historical sites, archaeological findings, traditional practices, and cultural significance.
- Assess the reliability and credibility of information obtained from literature sources.

Integration into Baseline Conditions:

- Summarize key cultural heritage findings from the literature review.
- Emphasize the identification of historical sites, archaeological features, traditional practices, and cultural significance within the PAI.

4.2.4.2. Site Visits

Approach

The Archaeology and Cultural Heritage expert initiated the site visit process through a preliminary screening visit to the proposed project sites and Overhead Transmission Lines (OHTLs). This rapid screening aimed to identify and inventory record both existing and potential archaeological and cultural heritage sites.

Integration into Baseline Conditions

The findings of the site visits contributed to a broader understanding of the cultural heritage environment within the PAI. Specifically, the data collected from the site visits was synthesized with insights obtained from literature reviews and constraints mapping. This integration ensures a holistic understanding of the cultural heritage environment, allowing for a more robust foundation for subsequent impact assessments and project planning.

4.3. Method for Evaluation of Impacts and Significance Criteria

This section describes the methodology that was uniformly applied in the final ESIA study for the AADWC Project for the identification and assessment of impacts resulting from the implementation of the Project throughout its life cycle. It is noted that some of these impacts can be avoided during the early stages of the Project through appropriate design and construction management procedures guided through the precautionary principle.

The key stages of the applied approach involve:

1. Identification of Project related activities (during both construction/commissioning and operation phases) that are likely to result in environmental and social impacts (environmental stressors);
2. Identification of the environmental and social features at the PAI that could be affected by Project activities (environmental receptors);
3. Identification of potential impacts on the physical, biological, and socioeconomic environment (environmental receptors) that may arise from the Project activities during its life cycle; and
4. Assessment and evaluation of potential impacts to determine their significance and subsequently their priority ranking in terms of mitigation based on pre-set criteria.

Stages 1 to 3 above relate to the process of identifying potential environmental and social impacts of the AADWC Project implementation during its life cycle. The following documentation served as basis to this effect:

- Concept design data related to Project components (desalination; water conveyance) as being available at the stage of the assessment;
- Collected baseline information relative to environmental and social settings in target areas where the Project unfolds (secondary sources data complemented with field surveys as applicable); and
- Literature review of projects similar in nature and size.

The following tables present the criteria used for the assessment and evaluation of impacts in Stage 4 as listed above.

First, the potential impacts resulting from the Project activities to the physical, biological, and socioeconomic environment are assessed and characterised as per (a) their nature, i.e., beneficial or adverse, and (b) type of induced interaction between the stressors and the receptors (***Table 4-1***).

Table 4-1: Characterisation of Nature and Type of Impacts

Term	Descriptor	Impact Evaluation Definition
Nature	Beneficial	Impacts are considered to improve the baseline condition or introduces a new desirable factor.
	Adverse	Impacts result in an adverse change of the baseline condition or lead to a new undesirable factor.
Type	Direct	Impacts resulting from a direct interaction between a project activity and the surrounding environment.
	Indirect	Impacts generated from subsequent interactions within the environment.

Term	Descriptor	Impact Evaluation Definition
	Cumulative	Combined impacts that act together with other impacts arising from other projects including future developments, to disturb the same environmental receptor or resource.

Once the nature of the impact has been defined, the adverse impacts, irrespective of their type, are further **evaluated per their significance** based on the criteria provided below. More specifically, for each predicted adverse impact, the magnitude (at the indicated spatial scale), the probability of occurrence, the duration (time scale) and the extent (spatial scale) are assessed based on the respective rating definition per criterion. These criteria are used to determine the significance of each identified impact through following **Steps 1 to 5** below. As for Beneficial impacts, no further analysis is undertaken, and they are described qualitatively and with measures proposed to enhance them.

Step 1

Step 1 assesses the **magnitude** and **probability** of each impact in line with the rating definitions in ***Table 4-2***.

Table 4-2: Step 1 - Assessing Magnitude and Likelihood

Term	Descriptor	Rating Definition
Magnitude	High	Major alteration of natural properties, functions, processes.
	Medium	Notable alteration of natural properties, functions, processes.
	Low	Negligible alteration of natural properties, functions, processes.
Likelihood	High	Definite or highly probable (estimated greater than 90% chance of the impact occurring).
	Medium	Fair chance of occurring (estimated 10% to 90% chance of the impact occurring).
	Low	No chance or unlikely to occur (estimated less than 10% chance of the impact occurring.)

Step 2

Once the impact is rated for **magnitude** and **probability**, Step 2 uses the matrix in ***Table 4-3*** to determine the impact **intensity**.

Table 4-3: Step 2 – Assessing Intensity

Intensity Rating				
Magnitude		High	Medium	Low
Likelihood	High	High	High	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Low

Step 3

Step 3 assesses the **duration (temporal scale)** and **extent (geographic scale)** of each impact in line with the rating definitions in ***Table 4-4***.

Table 4-4: Step 3 - Assessing Duration and Extent

Criterion	Descriptor	Rating Definition
Duration	Long-term	Continuous or regular (once per day) over Project life, with effects of long duration (> 10 years after construction).
	Medium-term	Effect of medium duration (2 to 10 years after construction).

Criterion	Descriptor	Rating Definition
	Short-term	Effect restricted to construction and/or up to 2 years after construction.
Extent	Regional	Far-range impact; beyond a 5 km radius of Project site(s)
	Local	Medium-range impact within a 5 km radius of Project site(s)
	Site	Onsite specific impact within 100m radius from Project site(s)

Step 4

Once the impact has been rated for **duration** and **extent**, Step 4 uses of the matrix in ***Table 4-5*** to determine the impact **scale** (temporal and geographic).

Table 4-5: Step 4 – Assessing Scale

Scale Level				
Duration		**Long-term**	**Medium-term**	**Short-term**
Extent	**Regional**	High	High	Medium
	Local	High	Medium	Low
	Site	Medium	Low	Low

Step 5

After determining the impact's intensity, duration and extent, the fifth and final step is to determine its **significance** based on the matrix in ***Table 4-6***.

Table 4-6: Step 5 – Impact Significance Assessment

Scale Level				
Intensity		**High**	**Moderate**	**Low**
Scale	**High**	Critical	High	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Negligible

Impact Significance

Impacts are rated as either Critical, High, Moderate, Low or Negligible. ***Table 4-7*** describes the implications of each significance rating as adopted for this Project.

Table 4-7: Description of Impact Significance Results

Significance	N	**Negligible:** • No measurable impact. Issues identified as negligible can be scoped out.
	L	**Low:** • No considerable adverse alteration of the existing environment • Low priority mitigation or mitigated through best practices
	M	**Moderate:** • Results in considerable adverse alteration of the existing environment • Impact is a priority for mitigation to minimize or prevent the significance of the impact
	H	**High:** • Results in considerable adverse alteration of the existing environment • Project cannot be safely implemented without mitigation measures; compensation or

		offsetting may be necessary
	C	**Critical:** • Results in critically adverse alteration of the existing environment • Project cannot be safely implemented. Alternatives including the "no project" alternative need to be investigated in depth for reducing the level of impact significance

It should be noted that there is no universally applied definition of significance whereas whether an impact is assessed to be significant or not depends also on factors such as the project size and design, and the sensitivity of the environment (receptors) at the selected project site(s).

As a result, a narrative description of each assessed impact is followed by the table below summarizing the impacts and evaluating their significance in line with the methodology described above.

Summary of Impact Assessment

Parameter	Assessed Impact	Residual Impact
Nature		
Type		
Magnitude		
Likelihood		
Intensity		
Duration		
Extent		
Scale		
Significance		

4.4. Preparation of the Environmental and Social Management Plan

Based on the findings of the environmental and social impact assessment, the Environmental and Social Management Plan (ESMP) was developed to address impacts that were assessed as having Medium or High Significance. The ESMP was structured to provide the following information:

- Identification of environmental and social issues;
- Identification of impacts;
- Suggested mitigation / management measures;
- Allocation of responsibility; and

The ESMP included an Environmental and Social Monitoring Program that will help in signalling potential problems that might result from the project and allow for prompt implementation of effective corrective measures, ensuring that environmental protection is achieved through early detection of negative environmental impacts. Environmental and social monitoring is required for both the construction and operation phases of the project.

The main objectives of monitoring are:

- To assess the changes in environmental and social conditions;
- To monitor the effective implementation of mitigation measures; and
- To warn significant deteriorations in environmental quality and social conditions for further prevention action.

The Monitoring Program comprised a number of parameters. The monitoring results will feed into the decision-making process as a trigger for the implementation of corrective actions, in order to maintain compliance with environmental laws and regulations, ensure environmental protection and workplace safety, as well as ensure appropriate application of the mitigation measures and the management plans. It is important to note that

environmental monitoring is a dynamic process. The proposed locations, parameters and frequencies will be subject to continuous changes, based on the results of the first monitoring round(s).

An ESMP has already been developed for the AAWDC Project and includes a framework of the plans that will need to be further developed by the developer. The ESMP for this Project will be based on that ESMP and include, as a minimum, frameworks for the following:

- During Construction:
  - Spill Prevention and Management Plan
  - Waste Management Plan
  - Health and Safety Plan
  - Traffic and Transport Management Plan
  - Labour Employment Plan
  - Cultural Heritage Management Plan
  - Chemical Substances Management Plan
  - Code of Conduct
  - Emergency Preparedness and Response Plan
  - Chance Finds Procedure
- During Operation:
  - Spill Prevention and Management Plan
  - Waste Management Plan
  - Health and Safety Plan
  - Chemical Substances Management Plan
  - Emergency Preparedness and Response Plan
  - Decommissioning Plan

The ESMP included requirements for documentation and reporting on environmental and social issues throughout the life of the project. These include:

- Regular Reporting
- Incident Reporting
- Training and Awareness

.

5. Stakeholder Engagement

5.1. Scoping Session

As part of the stakeholder engagement process for the project, a public consultation session was held on 20/12/2023, as mandated by the national environmental approval process and in alignment with the EIB Standard 10 on Stakeholder Engagement. The participants in the session included representatives from ministries, NGOs, and the local community within the project area. The meeting took place at the Movenpick Hotel in Aqaba and was also accessible online via MS Teams. The session lasted three hours, from 10:30 am to 01:30 pm. Invitations were extended to approximately 78 agencies and institutions, resulting in the participation of 77 individuals who attended the session in person and 58 participants online. The session allowed for questions and discussions about the Project and ensured that feedback was obtained from participants.

It is worth mentioning that during the initial preparation phase of the scoping session, three renewable energy sites were under consideration. At a later stage, an agreement was reached between the MWI and the EIB to undertake the ESIA on Al-Quweira RE Site as the preferred location.

The session commenced with welcoming words from the Chief Commissioner of Aqaba Special Economic Zone Authority, Minister Nayef Al Fayez, followed by a welcome address from Engineer Fawaz Al-Karasneh (Director of the Licensing Department) from the Ministry of Environment. Engineer Issa Al-Wer, the Project Manager from MWI, provided a concise overview of the AAWDC Project and its RE component. Subsequently, the Technical Team from CDM Smith delivered a technical presentation on Project components. The ESIA Team then presented information on the three proposed sites, the legal and institutional framework governing the project, ESIA objectives and processes, high-level baseline data, and the methodology for establishing baseline conditions and impact assessment and management. The presentation also covered the main anticipated environmental and social risks associated with the construction and operation of the project. The summary below provides an overview of the session's proceedings, while Annex 3 contains detailed information on the session, including the presentation, letters of invitations, list of participants, agenda, questionnaire, and photographic documentation.

5.1.1. Discussions during Scoping Session

Table 5-1 presents all the questions and comments that were raised during the session and the responses made.

Table 5-1: Main Concerns Raised during the Session and Responses

Name	Agency	Question / Comment	Response
Ali Abu Khalil	Aqaba-Governorate-Wadi Araba	Is this project an alternative to the Red-Dead Project, is it an independent project, or do they have any connection?	The project is a national Jordanian initiative and has no connection to the Red-Dead Project.
Khalid Khasawneh	Jordan Atomic Energy Commission	Taking into consideration the integration of renewable energy projects, what is the potential cost of the water reaching Amman?	As the price of water will be determined by the developer, this is currently not known because we have not yet reached the Financial Proposal evaluation stage and are still in the Technical Proposal evaluation stage.
Mohammad Al-Qatati	GEOTECK	Where will the intake and the SWRO Plant be located? As mentioned, it will be in the industrial shore, and this area is small, fully utilized, and crowded with facilities. There is no space in the proposed area to create a new intake, and constructing a station close to the shores is challenging.	The location has been determined by the ADC and ASEZA. It has been thoroughly studied from all technical and environmental aspects. Environmental approval for the site has been granted.

Name	Agency	Question / Comment	Response
Ameen Othman	National Electricity Company	Renewable energy is intermittent throughout the day and across seasons. Will there be battery banks or storage?	- The project does not include provisions for power storage and there will be no feed-in to the grid, noting that detailed design will be developed by the winning BOT Contractor in collaboration with NEPCO - 20-30% of the project's electricity will rely on renewable energy.
Mohammad Aytani	National Electricity Company	- In response to Engineer Amin Othman's question: Since there is no battery storage, 20% of the renewable energy will be available during the daytime, and during the night, the entire supply will come from the national grid. - The site selection is based on discussions with NEPCO, which has a technical role. There have been discussions on this matter with NEPCO, but Wadi Araba has not been proposed as one of the options, and this should be taken into consideration ultimately.	- Communication has been established with NEPCO, and they are aware of the proposed sites. - The MWI, the Ministry of Energy, and NEPCO have agreed on all requirements. - The transmission line between the RE sites is separate from the national grid under NEPCO. Areas that do not rely on the RE sites will be connected to the national grid within Aqaba Governorate.
Maryam Khlouf	ASEZA	What is the difference between the desalination, AAWDCP, and solar energy projects?	All of them are part of the same project. The AAWDCP includes a desalination plant, conveyor, intake, and RE sites. However, the RE sites have a separate ESIA because their locations were not determined during the study period of AAWDCP (SWRO and the conveyor).
Amro Halalat	The Jordan Maritime Authority	The environmental approval was granted for the preliminary design of the project. Will there be any further development by the BOT Contractor on the SWRO Plant and the project? It is possible that this could have environmental impacts or affect maritime navigation, considering site is crowded.	The BOT Contractor has the right to make improvements to the project, but any changes made by the developer require approvals from the relevant authorities.
Sultan Hassan	Development Affairs	What activities have been accomplished during the approximately five-month period between the ESIA disclosure session for AAWDCP and the scoping session for RE Sites?	- The ESIA has been approved, - The technical proposals have been evaluated. - The sites for the renewable energy project were identified and studied.
Amjad Obeidat	Aqaba Regional Affairs Manager	There is a film shooting area that overlaps with 16 dunums of the proposed site in Al-Quwaira. Please take this overlap into consideration.	- This will be taken into consideration during the site selection phase.
Nour Khreis	The Royal Society for The Conservation of Nature	- The location of Wadi Araba is within the sanctuary of Qatar PA and not inside it. - Al-Quewira RE Site is located within the buffer zone of Wadi Rum PA	- Wadi Araba RE Site is located within Wadi Araba KBA - According to Mr. Amjad Obeidat, only the OHTL is within the Buffer zone. However, the Consultant will investigate this further (refer to Section 4.2.2) for preliminary results of the investigations).).
Ya'qoub Bani taha	Jordanian Engineers Association	Which of the three proposed energy sites is the most environmentally and technically suitable?	- Al-Quwaira site is the best from a technical perspective. - By the end of the ESIA, it will be determined which site is

Name	Agency	Question / Comment	Response
			environmentally better based on the approval of the MoEnv and ASEZA. - From a biological perspective, Mudawara site is the best.
Ja'far Al-Omary	ASEZA	The solar panels have negative impacts on birds, as they attract them, assuming the surface is water.	This depends on the design. Modern solar panels are designed to minimize reflections. The panels can affect small migratory birds, causing them to burn if they get too close to the panels. Bird collisions with OHTL are a danger to bird life. However, the proposed OHTL is close to an existing OHTL and no cases of collisions with existing OHTL have been recorded
Tasneem Ramadan	ASEZA	- Wadi Araba site is within a bird migration area (Europe – Africa) and vice versa. What are the precautionary measures to avoid harming them and changing the direction of migration? - Are there precautionary measures to protect energy sites from sudden floods, as a flash flood occurred in Shamiyya Area and reached the airport, where Wadi Araba RE Site is near the airport? - Will aircraft take-offs and landings affect the OHTLs?	- There is a distance between the OHTLs site and the airport. - There is no permanent bird migration route in that area. - The Consultant has conducted a preliminary hydrological assessment of the site during the constraints mapping and no major concerns were identified.
Ali Abu- Elbeh	National Electricity Company	- Regarding the questions about the impact of OHTL on birds: High-voltage towers do not affect birds unless the size of these birds is large, such as the American eagle. Small birds are not affected by them. - The phenomenon of corona is not permanent; it exists only during high humidity.	Noted
Mohanad Na'imat	the National Security and Crisis Management Center	Is it feasible to construct a new RE Site that would only contribute 20-30% of the total project's energy output using clean energy?	At the beginning of the project, there was no component for RE. However, the Prime Minister's Office committed to 3.2 kg of CO_2eq emissions per cubic meter, a condition by funders and donors.
Ra'ed Al-Khalafat	ASEZA	What is the number of job opportunities that the project will provide?	This will be determined by the BOT Contractor, but it will be significant during both construction and operation.

Figure 5-1 below presents photographic documentation from the session.

Figure 5-1: Photos from the Scoping Session

5.1.2. Results of the Questionnaire during Scoping Session

Following conclusion of the session, a questionnaire in Arabic and English was distributed both in person and online to the participants. The initial nineteen questions in the questionnaire aimed at gathering feedback regarding the perceived significance of environmental and social impacts during both the construction and operation phases. Additionally, two questions were included to allow participants to express any additional concerns or suggestions they may have. Respondents were also encouraged to share their feedback on the scoping session itself. In total, 37 individuals responded to the questionnaire.

Potential Environmental and Social Impacts and Issues

Table 5-2 presents the results of the questionnaire in terms of perceived significance of environmental and social impacts. Over 60% of the respondents believed that the following issues were of Moderate to High significance for the project during construction:

- Flora and Fauna loss or alteration (62%)
- Job opportunities (56% rated this as High significance)
- Change of land use/land cover (Over 50%)
- Unknown artifacts may be uncovered during excavation (56%)

During the operation phase, the impact on birds and mammals from solar panels and transmission lines was rated as having moderate significance by over 55% of the respondents. However, the only impacts rated as positive during the operation phase were:

- Job opportunities (40.5%)
- Improve air quality (11%)
- Disposal and recycling of end-of-life components (11%)
- Impact of overhead transmission lines on neighbouring communities (11%)
- Impacts on visual landscape of solar panels and transmission Lines (5.5%)

Table 5-2: Questionnaire Results for Both Construction and Operation phase

Impact	Significance (%)			
	Low	Moderate	High	Positive
During Construction				
1 Contamination of surface and groundwater	37.84	45.94	16.21	0
2. Exhaust from machinery and excavation affect local air quality	21.62	51.35	27.03	0
3. Energy consumption for generating electricity in the Site	18.92	43.24	37.84	0
4. Flora and Fauna loss or alteration	29.73	62.16	8.12	0
5.Job opportunities	2.70	40.54	56.76	0
6.Change the land use / land cover	13.51	51.35	35.13	0
7.Affect cultural heritage	62.16	21.62	16.22	0
8.Workers and local community health and safety	35.13	48.65	16.22	0
9.Unknown artifacts may be uncovered during excavation	24.33	56.76	18.92	0
During Operation				
10. Improve air quality	54.05	21.62	13.51	10.81
11. Impact on birds especially from solar panels	40.54	40.54	18.92	0
12. Job opportunities	5.41	24.32	29.73	40.54
13. Disposal and recycling of end-of-life components	18.92	37.84	32.43	10.81
14. Impact of overhead transmission lines on neighbouring communities	29.73	40.54	18.92	10.81
15. Worker health and safety during maintenance of solar panels and transmission lines	48.65	45.94	5.40	0
16. Reduced importance pf archaeological Sites located along the transmission lines	44.44	41.67	13.89	0
17.Impacts on visual landscape of solar panels and transmission Lines	27.78	38.89	27.78	5.56
18. Impact on birds and mammals from solar panel and transmission line operation	30.56	55.56	13.89	0
19. Reduced importance of archaeological and cultural heritage sites	62.16	29.73	8.11	0

Other Concerns and Suggestions

As mentioned earlier, the questionnaire consisted of two open questions to allow the participants to make suggestions and raise additional concerns. Table 5-3 presents the respondents' concerns and suggestions, respectively. The table also indicates how these concerns have been/will be taken into consideration during the various Project phases.

Table 5-3: Stakeholder Concerns and Suggestions in the Questionnaire

No.	Concerns	Response
1.	Limited employment opportunities for the local community	The ESMP will highly encourage the BOT contractor to engage local communities in project activities to mitigate social tensions.
2.	Deviation from the specified project implementation timeline due to various obstacles.	The project is considered a national priority due to Jordan's need for potable water, particularly with the depletion of the Disi Basin. At this stage, the BOT proposals are being evaluated and any deviation from the Project will require approval from the relevant authorities.

No.	Concerns	Response
3.	Restriction of renewable energy lands from being utilized for alternative purposes.	The proposed sites will be owned by the MWI and will exclusively serve the purpose of this project.
4.	The proposed sites are in close proximity to residential areas, particularly in Quweira.	Al-Quweira site is approximately 5.5 km away from Al-Quweira village.
5.	Al- Quweira site is situated within the buffer zone, posing potential impacts on site selection due to land use considerations	This issue has been addressed and will be investigated further in the ESIA.
6.	Susceptibility of the transmission line and its facilities to potential attacks.	The RE Sites will be enclosed with fencing, and only individuals with authorized permission will be allowed to enter the premises. Security concern noted.
7.	Concerns regarding the consequences of a significant malfunction on the transmission line (line break), potentially affecting human elements and the surrounding environment.	Noted.
8.	Environmental impact from the sea intake and discharge station on the marine ecosystem.	These concerns were thoroughly examined in detail in the AAWDCP ESIA.
9.	The impact on maritime navigation traffic due to the proximity of the station and its lines to the marine piers	These concerns were thoroughly examined in detail in the AAWDCP ESIA.
10.	Increased salinity levels in the Gulf of Aqaba/Jordanian side due to prolonged exposure to brine, impacting the marine environment.	These concerns were thoroughly examined in detail in the AAWDCP ESIA.
12.	Possibility of concentrating salts in specific areas	These concerns were thoroughly examined in detail in the AAWDCP ESIA.
Suggestions		
1	Utilizing renewable energy lands for alternative purposes, such as agriculture.	Whenever possible, this will be recommended in the ESIA. However, the RE facilities (not OHTL) will be fenced for security purposes and no access into them will be allowed.
2	Selecting lands situated away from populated areas.	The three proposed sites are situated at a considerable distance from populated areas.
3	Ensuring general safety conditions during both the construction and operation phases.	The ESIA Study will include a framework for an ESMP during construction and operation to ensure development and implementation of an Occupational Health and Safety (OHS) Plan, emphasizing the use of Personal Protective Equipment (PPE) by workers. The ESMP will also include a monitoring program that will include an OHS component.
4	Recommending the study of hydrogen energy generation (air condensation), involving only two containers and a few solar cells to produce significant energy. This method is considered the energy of the future and does not pose disposal challenges associated with solar cell waste.	Selection of the technology to be used for renewable energy generation will be made by the BOT Contractor.
5	Possibility of providing emergency water pipes with a diameter to be determined later for emergency uses (scenario for multiple areas in the south of Aqaba).	These concerns were thoroughly examined in detail in the AAWDCP ESIA.

5.2. Disclosure Session

In accordance with ASEZA requirements, a stakeholder disclosure session was held on 12 May 2025 at the Hyatt Regency in Aqaba. The session was attended by over 42 participants, including representatives from EIB, MWI, ASEZA, RSCN, MPWH and the local community. Full details of the session are provided in Annex 4.

Figure 5-2: Images from the Disclosure Session

Eng. Taghreed Al-Maaytah, Director of Environment Protection and Sustainability at ASEZA, opened the session with a welcoming statement, highlighting ASEZA's role in the project and noting its classification as high-risk. H.E. Dr. Jihad Al-Mahamid, Secretary General of the Ministry of Water and Irrigation, followed with remarks on behalf of the Ministry. H.E. Dr. Ayman Suleiman, Commissioner for Environment at ASEZA, expressed his strong support for the project, describing it as a nationally significant initiative. He stressed the importance of collaboration among all stakeholders to ensure successful implementation and affirmed the full cooperation of relevant entities. Dr. Suleiman also emphasized the project's environmental, social, and economic value, noting that, despite its wide geographic scope, it remains a solar energy initiative aligned with Jordan's international climate commitments, particularly its Nationally Determined Contributions

The agenda included presentations on the technical aspects of the renewable energy project by Engineer Issa Al-Wer, the Project Manager at MWI and baseline conditions for the physical, biological, and socio-economic environments; identified environmental and social impacts; and proposed mitigation measures by the ESIA Team. Participants were invited to provide feedback and raise concerns during an open discussion session.

Key issues raised during the session included:

- **Request for a UNESCO Impact Assessment**: ASEZA requested that the Consultant and MWI prepare an impact assessment aligned with the *Guidance and Toolkit for Impact Assessments in a World Heritage Context*, as the OHTL passes through the buffer zone of the Wadi Rum Protected Area. Conditional approval may be granted upon submission of this assessment.
- **Status of UNESCO Screening**: ASEZA confirmed that no prior screening with UNESCO had been conducted. A coordination meeting between MWI, ASEZA, and the Wadi Rum Project Area was proposed. A focal point for UNESCO coordination was identified.

- **OHTL Route Considerations**: Discussions were made regarding the possibility of shifting the OHTL route to avoid the buffer zone entirely.
- **Community Health and Safety**: ASEZA raised concerns regarding the proximity of the OHTL alignment to a school. The Consultant confirmed that community and occupational health and safety measures were addressed in the ESMP and that the detailed design of the OHTL and towers will take these issues into consideration.
- **Land Acquisition and Assets**: ASEZA inquired about the status of land acquisition and existing assets along the route. The Consultant and MWI clarified that tower locations are not yet finalized and that NEPCO holds responsibility for land acquisition and compensation.
- **Impacts on Avifauna**: RSCN asked about potential impacts of the OHTL on bird species and whether underground cabling was considered. The Consultant clarified that an overhead line will be used and that a dedicated survey was conducted for the sooty falcon. Based on field data and literature, the area is not a significant migratory bird corridor.

6. Environmental Baseline Conditions

6.1. Physical Environment

6.1.1. Topography

In Al-Quweira District, the terrain features a combination of rocky hills and sandy plains, with an average elevation of approximately 819 meters above sea level. The region's topography is shaped by tectonic activities such as faulting and uplifting, resulting in steep, eroded slopes and sharp escarpments (Bazazo, Al-Orainat, & Al-shamaileh, 2020; Farhan, Anaba, & Salim, 2016). Figure 6-1 show the Topography of the Renewable location and its OHTL. Survey results provided by MWI indicate that the site features predominantly flat topography, with elevation levels ranging from 780.5 to 805.4 meters above sea level. This slight elevation variation reflects a gentle slope from north to south across the survey area, with an average gradient of approximately 0.85%.

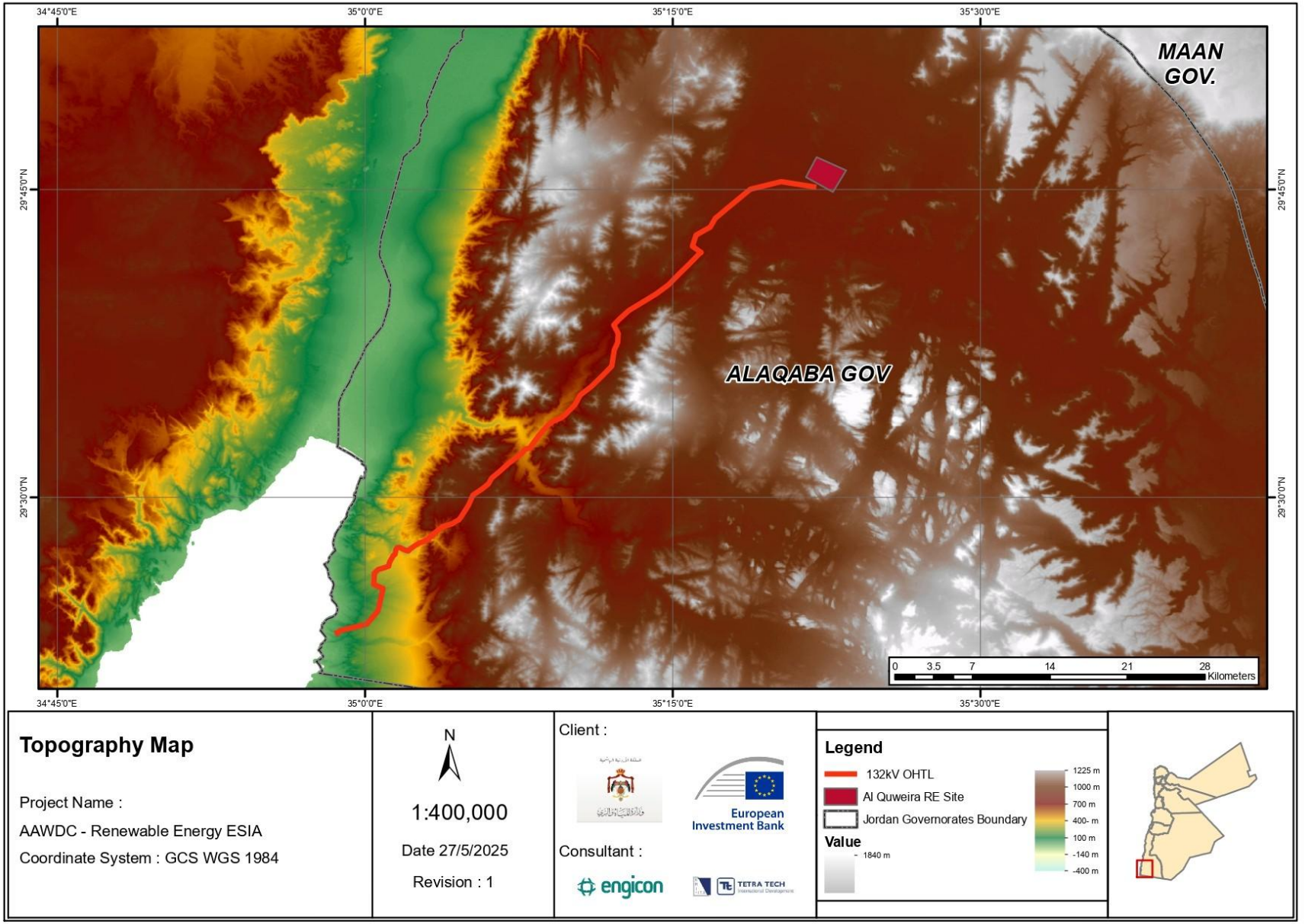


Figure 6-1: Elevation profile of the OHTL route and RE Site

6.1.2. Soil

As illustrated in Figure 6-2, the following dominant soil orders are present within the study area:

- Torriorthent and Torripsamment, characterized by shallow soils which occupy slopes steeper than 10% where the soil is very weakly developed and exists mainly in the arid regions. In addition, it's considered as primary soil also its very hard to cultivate due to the domination of sandy, gravelly, stony or shallow substrate (AL-Taani, Al-husban, & Farhan, 2021).
- Xerochrept: Moderately developed soils, in Jordan mostly red, with clay-rich B-horizon, often rich in primary or secondary calcium carbonate fertile soil, high clay content and moderately developed (Ababsa, 2013).

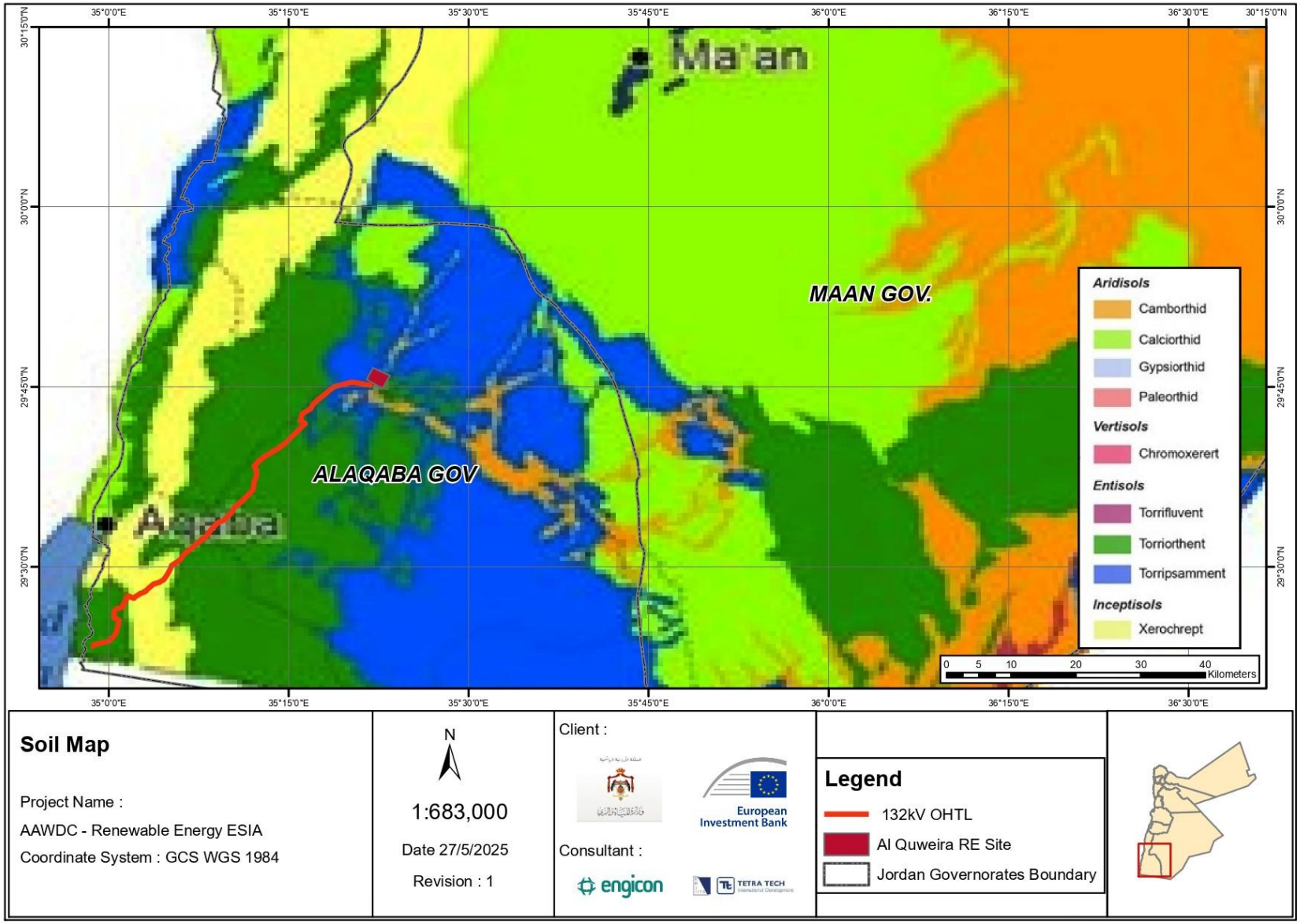


Figure 6-2: Soil Types

6.1.3. Geology

The geology of the Study Area is defined by the Ram Group and the Basement Complex defined as follows:

Ram Group, which consists mainly of siliciclastic formations and a marine carbonate/siliciclastic wedge, which unconformably overlie the Neoproterozoic basement terrain (Aqaba Complex and Araba Complex). This sequence forms a cohesive unit of fluvial medium - to coarse-grained sandstones that vary in colour, mineralogy, sedimentary structures, and hardness, along with associated siltstones. These sandstones, collectively referred to as the Ram Group, form the backbone of the Ram area, reaching a thickness of up to 1,000 meters and comprising four formations, listed from oldest to youngest: Saleb, Umm Ishrin, Disi, and Umm Sahm Formations. The Ram Group shapes a rugged topography of steep-faced cliffs and mesas, interspersed with sand-filled wadis in the Southern Desert region (Powell, Abed, & Le Nindre, 2014; Jordan Journal of Natural History , 2018).

Basement Complex: The Precambrian basement is categorized into two primary complexes: the older Aqaba Complex (800–600 Ma), consisting predominantly of granitoids, exposed near Aqaba and extending eastward and northward, and the younger Araba Complex (600–540 Ma), characterized by abundant volcanic rocks, metasedimentary rocks (mainly conglomerates), and minor granitoids. Extensive erosion of the Precambrian rocks occurred during the Ram unconformity, preceding the deposition of the overlying Paleozoic sandstones (Jordan Journal of Natural History , 2018).

6.1.4. Climate

According to the BOT Contractor's design report, the mean temperature in the Project area is approximately 22.42°C, with a maximum temperature of 42.5°C and a minimum of 2.3°C. Figure 6-3 illustrates the average temperatures and precipitation within the Project area, showing that monthly precipitation is minimal throughout the year, with a slight peak in January at approximately 10 mm (Meteoblue, 2024).

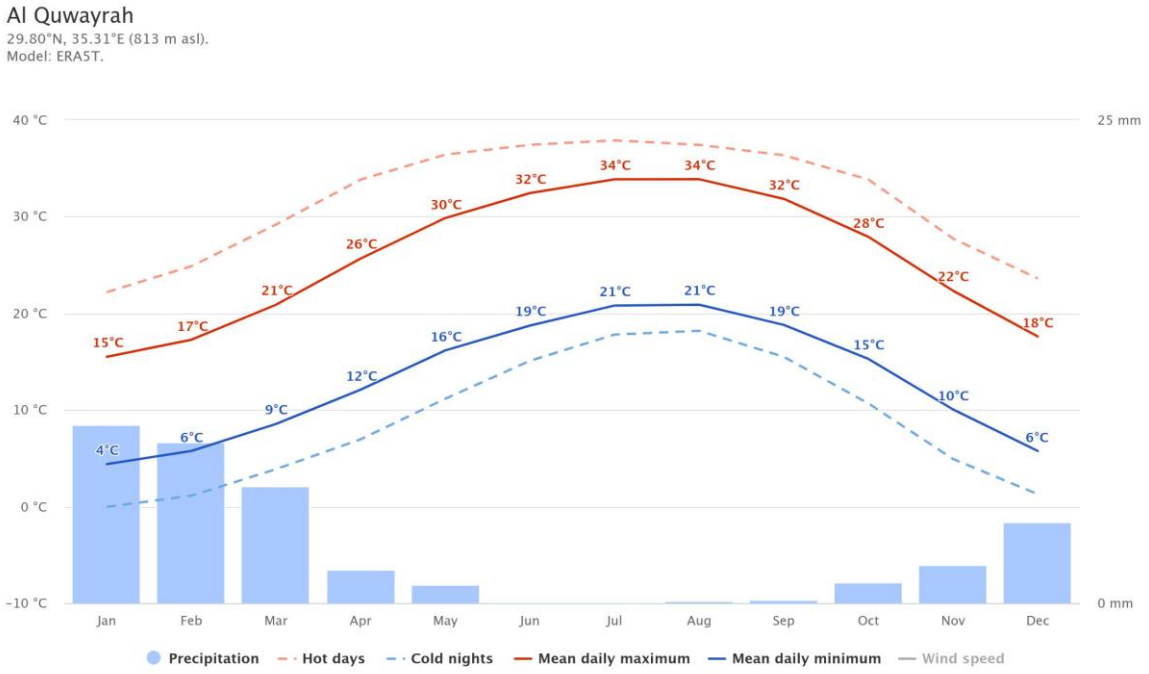


Figure 6-3: Average Temperatures and Precipitation (Meteoblue, 2024)

Figure 6-4 shows the wind rose within the Project Area. Most winds are predominantly north to north-northeasterly, with speeds of 5-20 km per hour (Meteoblue, 2024).

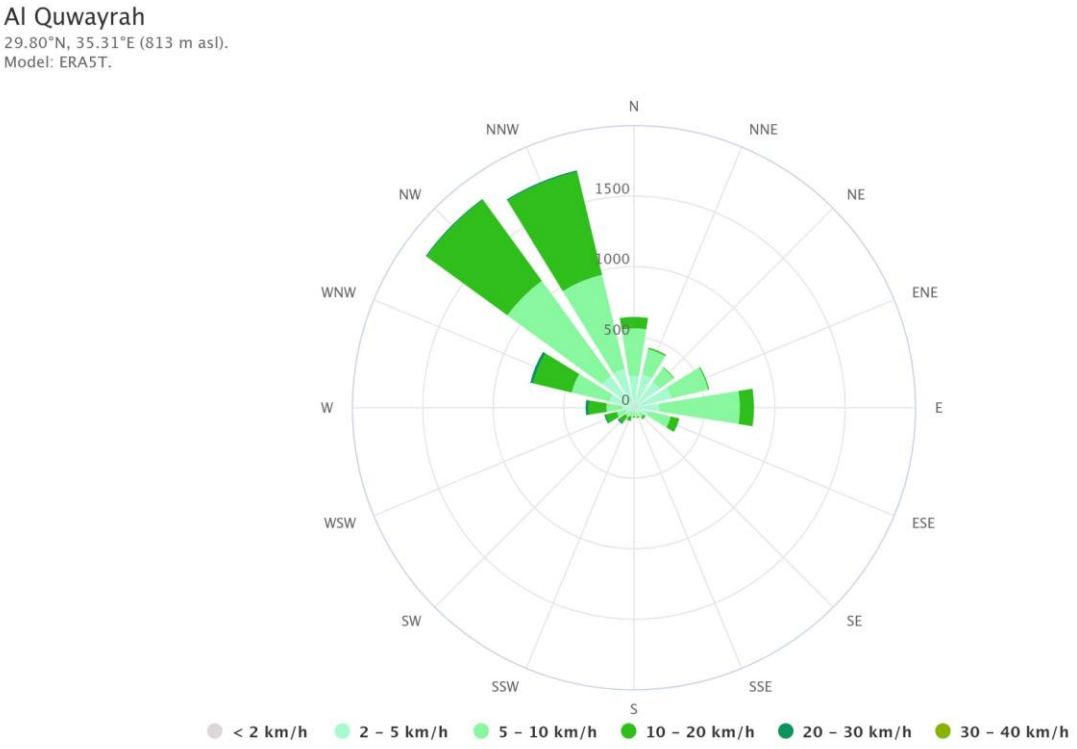


Figure 6-4: Wind Rose of Al-Quweira (Meteoblue, 2024)

6.1.5. Water Resources

6.1.5.1. Surface Water

The surface water basins identified within the PAI are as follows (Figure 6-5):

- **Southern Wadi Araba Basin**: Spanning from the southern end of the Dead Sea to the Gulf of Aqaba, it covers an area of 5,670 km². The basin receives limited rainfall, with an annual average of 32.7 mm, resulting in an annual surface runoff volume of approximately 1.7 MCM. Rainfall is used for agricultural purposes, supplementing crop irrigation and supporting the maintenance of natural vegetation (Al-Addous, Bdour, Alnaief, Rabaiah, & Schweimanns, 2023).
- **Wadi Yutum Basin** is situated in the southern desert of Jordan, covering a catchment area of 2,323 km². It receives an average annual rainfall of 73 mm and has a flood flow rate of 0.53 MCM/year (Al-Addous, Bdour, Alnaief, Rabaiah, & Schweimanns, 2023; Shatanawi, et al., 2024).

Figure 6-5: Surface Water Basins

6.1.5.2. Groundwater Basins

The project area is located within the Disi Groundwater Basin (Figure 6-6), which spans approximately 4,234 km² in southern Jordan. It is a non-renewable aquifer with an annual extraction estimated at 144.95 MCM. The groundwater is primarily used for domestic and agricultural purposes, making it a vital resource for the region. The Jordanian portion of the aquifer is estimated to hold approximately 100,000 MCM of water in storage (Al-Addous, Bdour, Alnaief, Rabaiah, & Schweimanns, 2023; Ministry of Water and Irrigation, 2014).

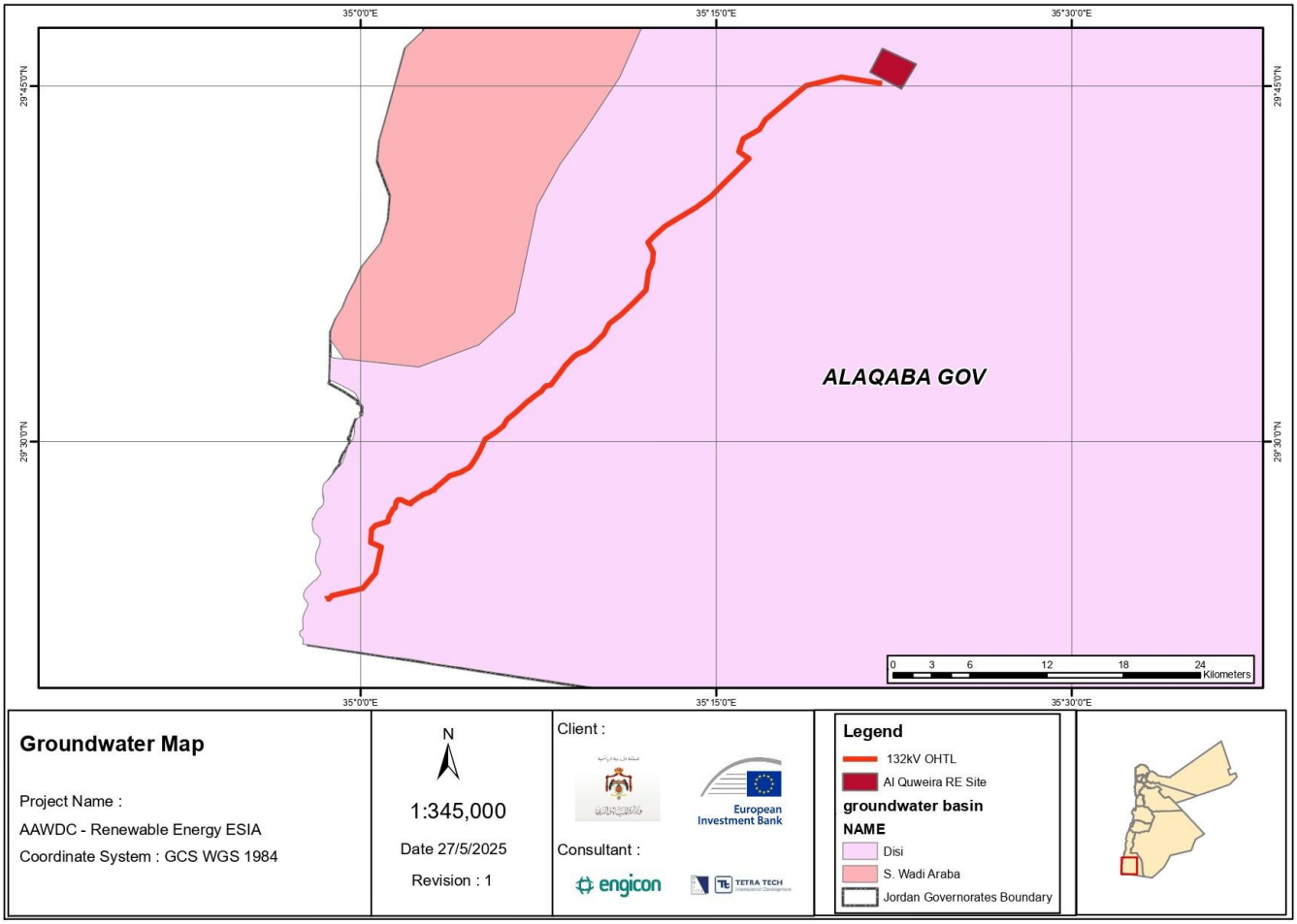


Figure 6-6: Groundwater Basins

6.1.6. Hydrology

Precipitation in the region is typically low and seasonal, occurring primarily during the winter months. Surface water is often in the form of ephemeral streams or wadis that are active only during significant rainfall events.

The site is situated in an area with flat to gently sloping terrain, which limits natural drainage and may lead to surface water accumulation in low-lying areas. Consequently, the implementation of efficient stormwater management systems is critical to mitigate flooding risks and facilitate effective runoff conveyance during heavy rainfall events. Based on a topographic analysis of the project area, the site exhibits a gentle slope from north to south.

6.1.6.1. Rainfall Analysis

Daily rainfall data was collected from the Ministry of Water and Irrigation for two adjacent stations: Ras En-Naqb Gage Station (ED0002) and Quweira Gage Station (ED0004). Rainfall data were available for ED0002 from 1994 to 2018, while rainfall data were available for ED0004 from 2013 to 2024. The locations of the gage stations with respect to the catchment area are shown in Figure 6-7.

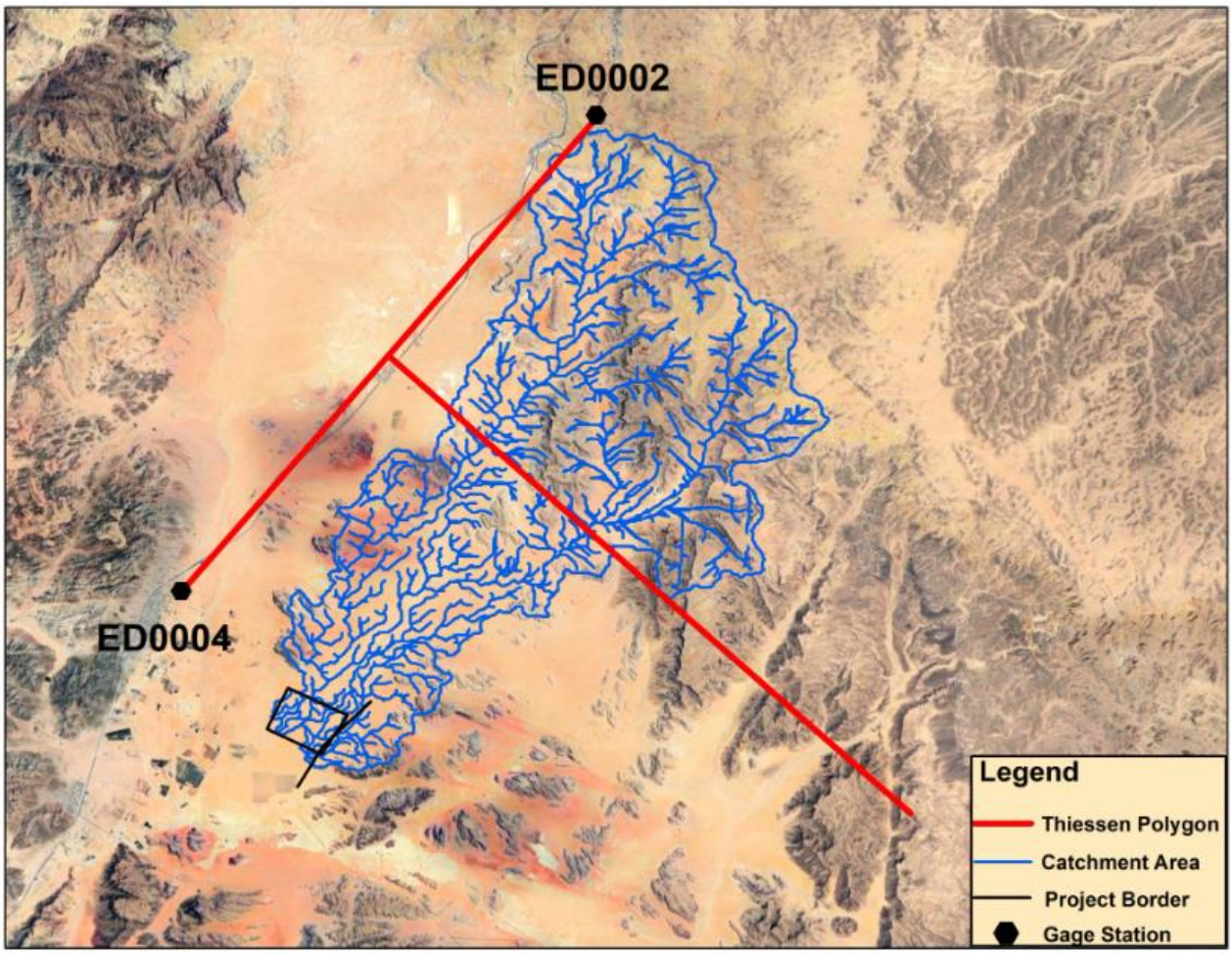


Figure 6-7: Rainfall Gage Stations Representing Catchment Precipitation

Statistical analyses were carried out on the maximum-day precipitation during the available historical period. Standard probability distributions were fitted to the available data, and projections of maximum daily rainfall were developed for return periods from 2 to 100 years, as shown in the following table.

Table 6-1: Projections of maximum daily rainfall

Return Period (year)	Maximum Daily Rainfall (mm)	
	ED0002	ED0004
2	35.45	18.12
5	53.07	29.69
10	64.57	39.12
20	75.55	49.84
50	89.82	66.69
100	100.62	81.99

6.1.6.2. Site Topography

Based on the topography outlined in Section 6.1.1, a minimal gradient suggests limited natural drainage potential, which may influence surface water runoff and the design of drainage systems for the project.

6.1.6.3. Catchment Delineation

The catchment areas and stream networks delineated using Global Mapper are presented in Figure 6-8

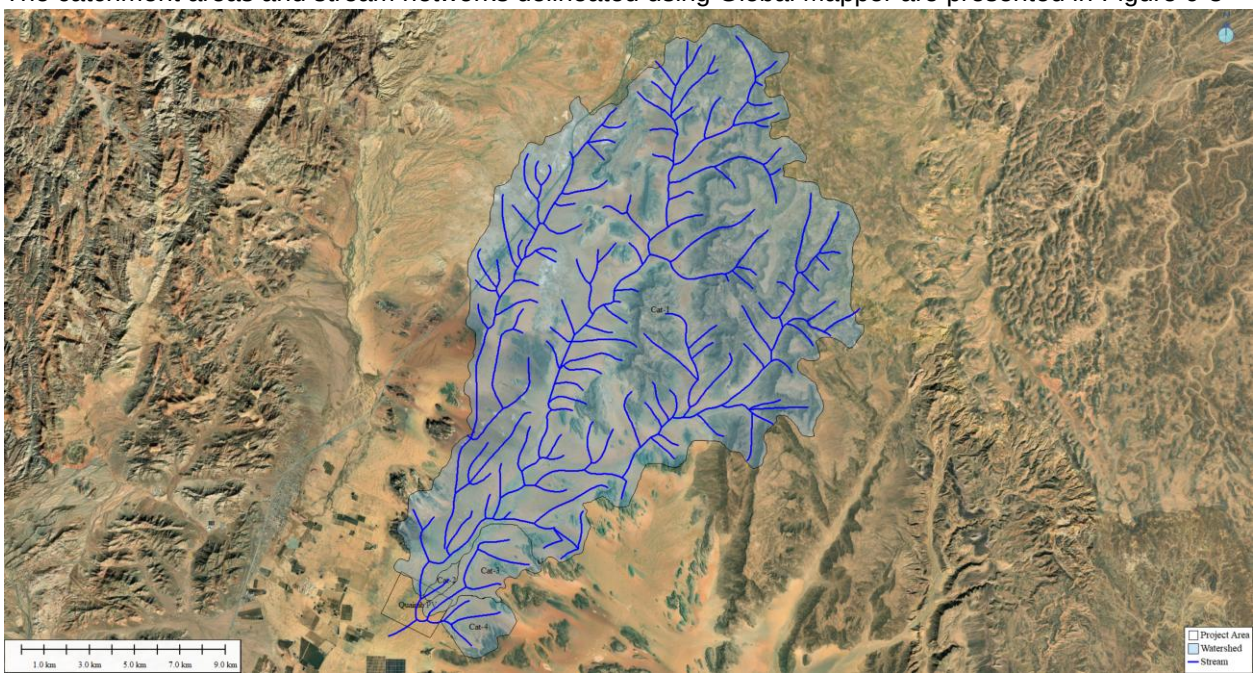


Figure 6-8: Quweira Site Contributing Catchment Areas

The analysis revealed four catchments with a total drainage area of approximately 300 square kilometres that contribute flood flows towards the project. The areas of these catchments are listed in Table 6-2 and their characteristics are detailed in Table 6-3.

Table 6-2: Areas of drainage catchments

Catchments ID	Catchment Area (km2)
CAT-1	282.7
CAT-2	1.1
CAT-1	9.3
CAT-2	6.2
Total	**299.3**

Table 6-3: characteristics of the catchments

Catchment ID	Total Area (km2)	Max Stream Length (m)	Max Elevation	Min Elevation	Average Stream Slope (%)
CAT-1	282.7	59100	1648	804	1.43
CAT-2	1.1	1529	820	805	0.98
CAT-1	9.3	6831	901	804	1.42
CAT-2	6.2	2847	856	803	1.86

6.1.6.4. Hydrological Modelling

There are several possible parameters to be determined in a hydrologic analysis, but most often they include peak flow, runoff volume or the complete hydrograph. The peak discharge is the primary design variable for the design of storm water runoff facilities such as open channels, culverts, storm inlets and pipe systems. Where the duration and storage elements are of concern to the designer, runoff volumes and storm hydrographs become necessary.

Rainfall-runoff modeling has been used to derive the flood hydrographs, which would be generated under the design storm event. The estimation of storm water runoff is based on the Curve Number (CN) Method, developed by the U.S. Soil Conservation Service (SCS), now the Natural Resources Conservation Service (NRCS). This method defines empirical relationships between soil type, land use, antecedent moisture conditions and runoff. The method is discussed in the following paragraphs.

Rainfall Excess

Calculation of the amount of rainfall that exceeds the losses is carried out using the Autodesk SSA software based on the above-mentioned Curve Number method. Accordingly, the calculation of losses and rainfall excess (runoff depth) is summarized in the following table. The calculation has been based on the 100-year 24-hour precipitation projection for Gage Stations ED0002 and ED0004.

Table 6-4: Computation of Losses and Rainfall Excess for 100 yr return period

Catchment ID	Precipitation Depth (mm)	Total Losses (mm)	Runoff Depth (mm)
CAT-1	92.8	35.87	56.94
CAT-2	92.8	31.06	61.74
CAT-1	92.8	31.06	61.4
CAT-2	92.8	31.06	61.4

Temporal Distribution

The total 24-hour precipitation depth of the design storm is converted to a temporal pattern, which will place the peak intensity within the storm duration. The method used to set the temporal pattern is the SCS Type II hypothetical storm. The SCS Type II cumulative curve is commonly used in arid areas to construct the temporal distribution of the design rainfall depth.

Rainfall – Runoff Transformation

The unit hydrograph theory, which is based on the property of proportionality and the principle of superposition, has been used to convert the runoff depths to runoff hydrographs. For this project the SCS dimensionless unit hydrograph method will be used as the synthetic unit hydrograph.

Autodesk SSA was used to estimate the peak flows and flow hydrographs for 1 in 100-year return period. Figure 6-9 shows the hydrographs generated for the four catchments.

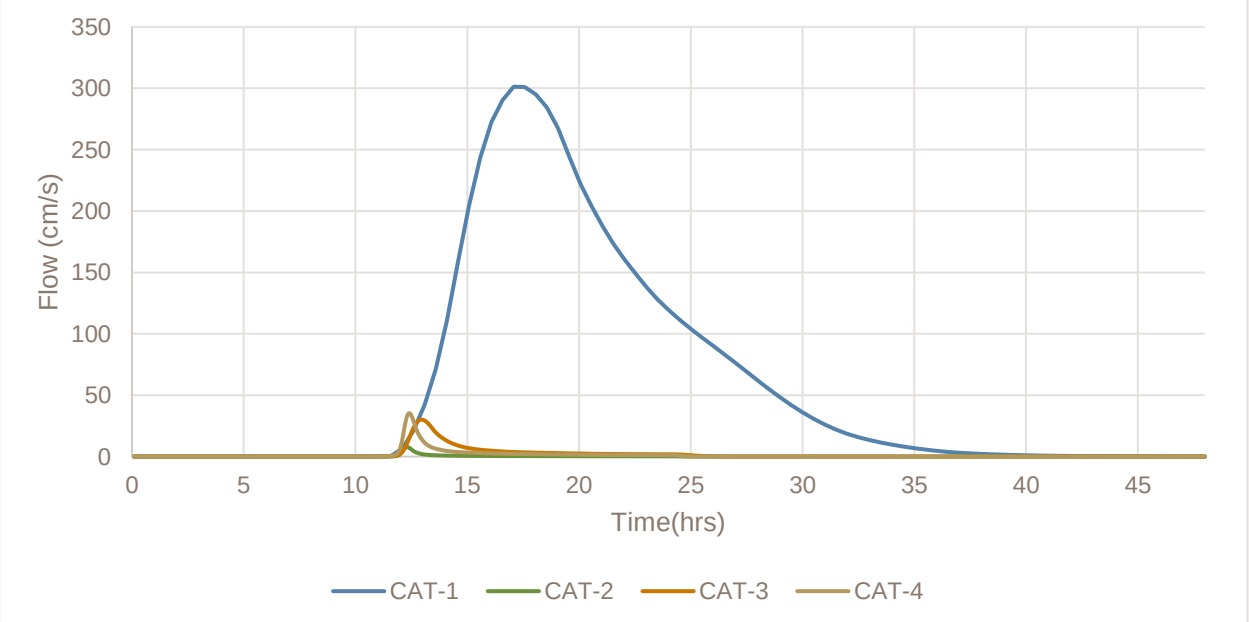


Figure 6-9: 100-year, 24-hour flood hydrographs for Quweira Catchments

6.1.6.5. Flood Assessment

Flow Depth

The following figure provides a detailed depiction of water depths across the catchment areas. The flow depth is represented on a colour scale, with the cyan colour indicating shallow depths, transitioning through blue and yellow for intermediate and deep inundations.

Within the project area, the flow depth varies, with deeper water (blue to yellow regions) predominantly concentrated in the central portion. White streak lines illustrate the direction of water movement, which align with the terrain's natural slopes and converges into defined channels.

The analysis highlights zones within the project site that experience significant water depths, signalling potential flood risks. These conditions are influenced by variations in topography, particularly in the central area, and may pose challenges to critical infrastructure, including solar panels, manholes, cable ducts, and associated facilities. Identifying these high-risk zones is essential for a comprehensive flood risk assessment, pinpointing vulnerable locations, and devising targeted mitigation strategies to minimize the impact of water-related hazards on project infrastructure

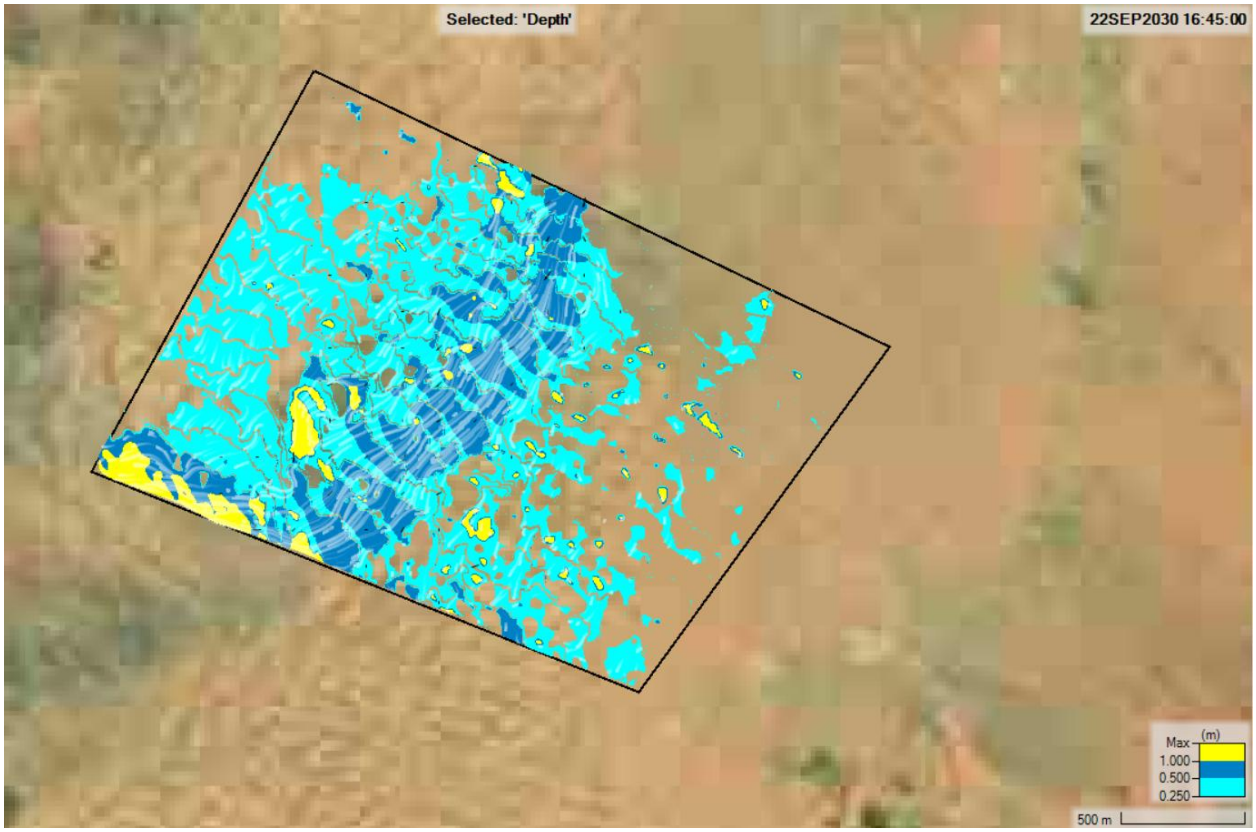


Figure 6-10: Quweira 100-year return period storm - flood depth map

Flow Velocity

The following figure highlights flood velocities which are critical considerations for utilizing the area as a photovoltaic farm. High-velocity zones are marked in yellow, moderate-velocity zones are marked in blue, while the cyan-coloured zones indicate low velocities.

The blue and yellow regions indicate concentrated water flow at potential drainage pathways. These areas pose significant challenges due to erosion risks, potential structural instability, and increased maintenance requirements, thus requiring particular attention to design mitigation measures.

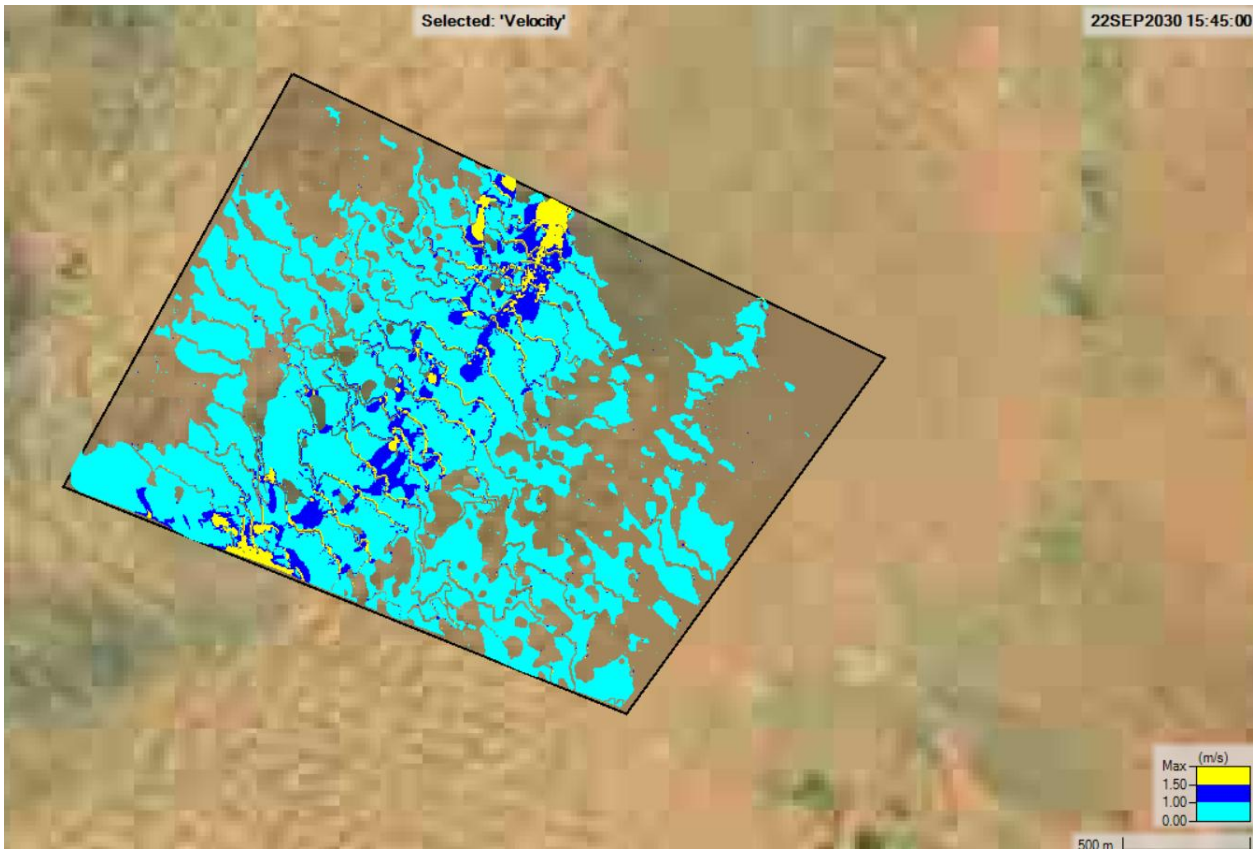


Figure 6-11: Quweira 100-year return period storm - flood velocity map

6.1.6.6. Conclusion

The analysis of flood depths and flood velocities define the site vulnerabilities based on the existing (pre-development) conditions. Deep water flooding and high velocities have been noticed along the drainage paths, especially along the main northeast to southwest water course. These results are influenced by the natural topography and the very large catchment area. It should be emphasized that appropriate drainage designs and flood protection infrastructure will be required in order to mitigate these adverse conditions. It is advisable that development along the floodway of the main wadi and in the low lands be avoided; with site grading and flood mitigation infrastructure, the wadi course will still continue to pass through the middle of the site, and therefore appropriate channelization to limit its flood extent and impact on the site will be required.

6.1.7. Seismicity

The Gulf of Aqaba is a tectonically active region that forms an echelon strike-slip fault system along the plate boundary between Nubia-Sinai and Arabia. It occupies the southern end of the Dead Sea Transform fault (DSTF), with its main pull-apart basins which developed along this fault (Abdelazim, ElGabry, Gobashy, Khalil, & Hussein , 2023). The Gulf of Aqaba is considered the most seismically active area in Egypt and the Middle East region (Abdelazim, ElGabry, Gobashy, Khalil, & Hussein , 2023). The earthquake hazard in Aqaba is classified as medium as shown in Figure 6-12.

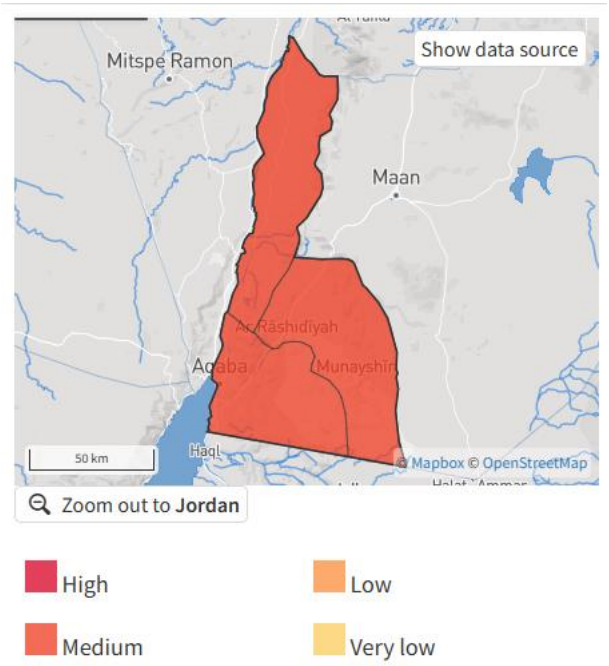


Figure 6-12: Earthquake Susceptibility in Aqaba Governorate (Think Hazard, 2024)

6.2. Biological Environment

The PAI extends from Al-Quwaira to Aqaba in southern Jordan, encompassing a diverse range of landscapes and ecological zones, to facilitate the display of results, the PAI map was divided into six adjacent parts (Figure 6-13). This region is characterized by its arid desert environment, interspersed with rocky terrain, sandy plains, and occasional vegetated patches. It includes key ecological features such as wadis (seasonal watercourses), outcrops, and hills, which provide suitable habitats for various flora and fauna. The PAI is located within two biogeographical zones; the Irano-Turanian and the Sudanian region, which are represented by two vegetation types; Sand Dune and Acacia (Vachellia) & Rocky Sudanian vegetation (Figure 6-14):

1- **The Irano-Turanian region** in Jordan extends across the lower half of the Jordan Valley and reaches Ras An Naqab in the south. Annual rainfall in this region ranges between 150 and 250 mm, and altitudes vary from 400 to 700 m. The soil is primarily loess and/or calcareous, supporting sparse and scattered vegetation. Common plant species include *Retama raetam*, *Ziziphus lotus*, *Artemisia herba-alba*, *Noaea mucronata* and *Anabasis syriaca*.

2- **The Sudanian region** in Jordan spans altitudes ranging from the lowest point on Earth at 420 m below sea level to 150 m above sea level. This region experiences minimal annual rainfall, varying between 50 and 100 mm. Temperatures in the Sudanian region range from 10–29°C in cooler months and 20–35°C during warmer periods. The soils are diverse, consisting of alluvial, saline, sandy, and granitic types (Al-Eisawi, 1996). The vegetation is dominated by species adapted to arid conditions. Notable plant species include *Vachellia tortilis*, *Ziziphus spina-christi*, *Balanites aegyptiaca*, *Moringa peregrina*, *Ochradenus baccatus*, *Haloxylon persicum* and *Calotropis procera*

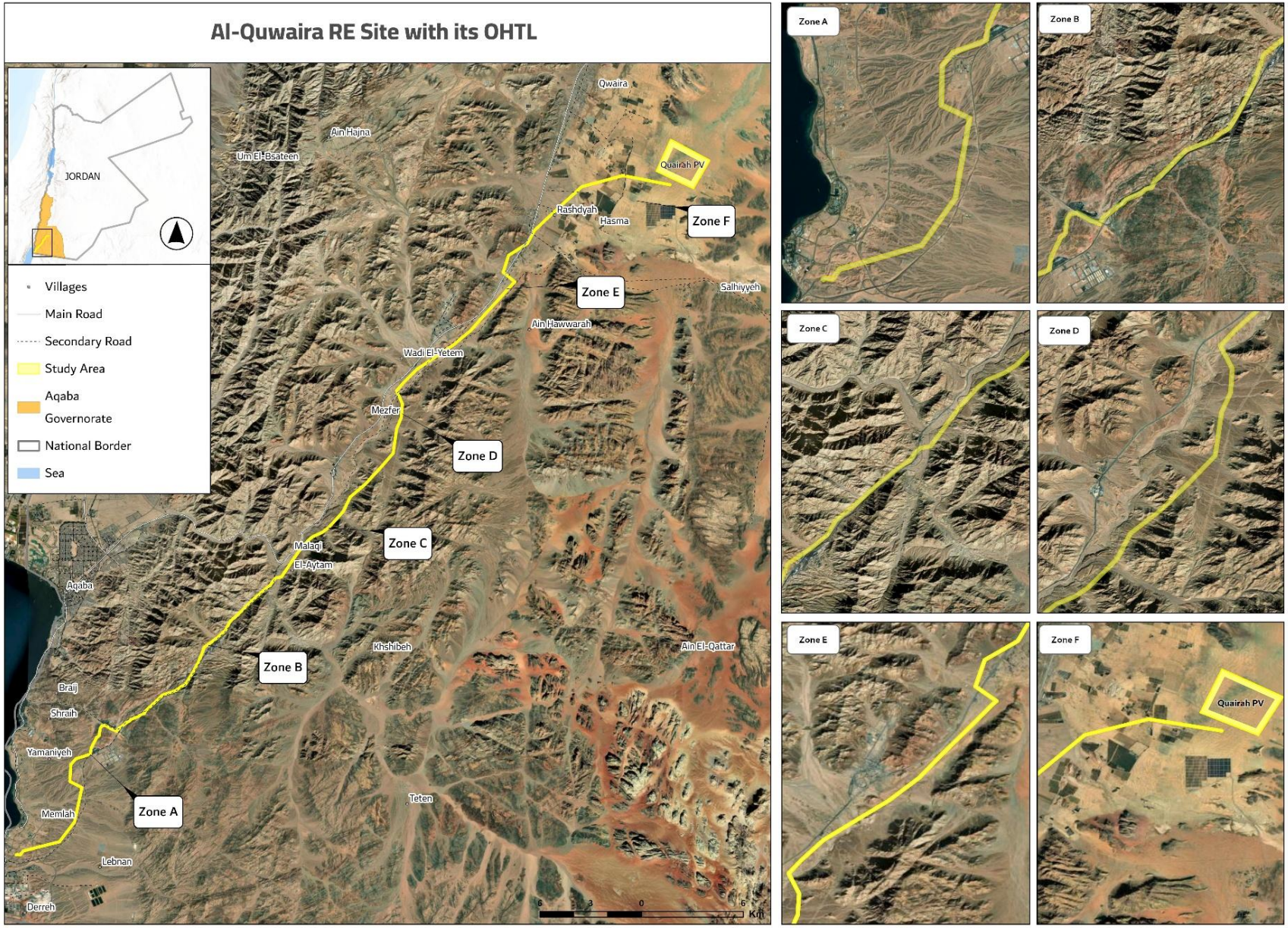


Figure 6-13: PAI and Biodiversity Divisions

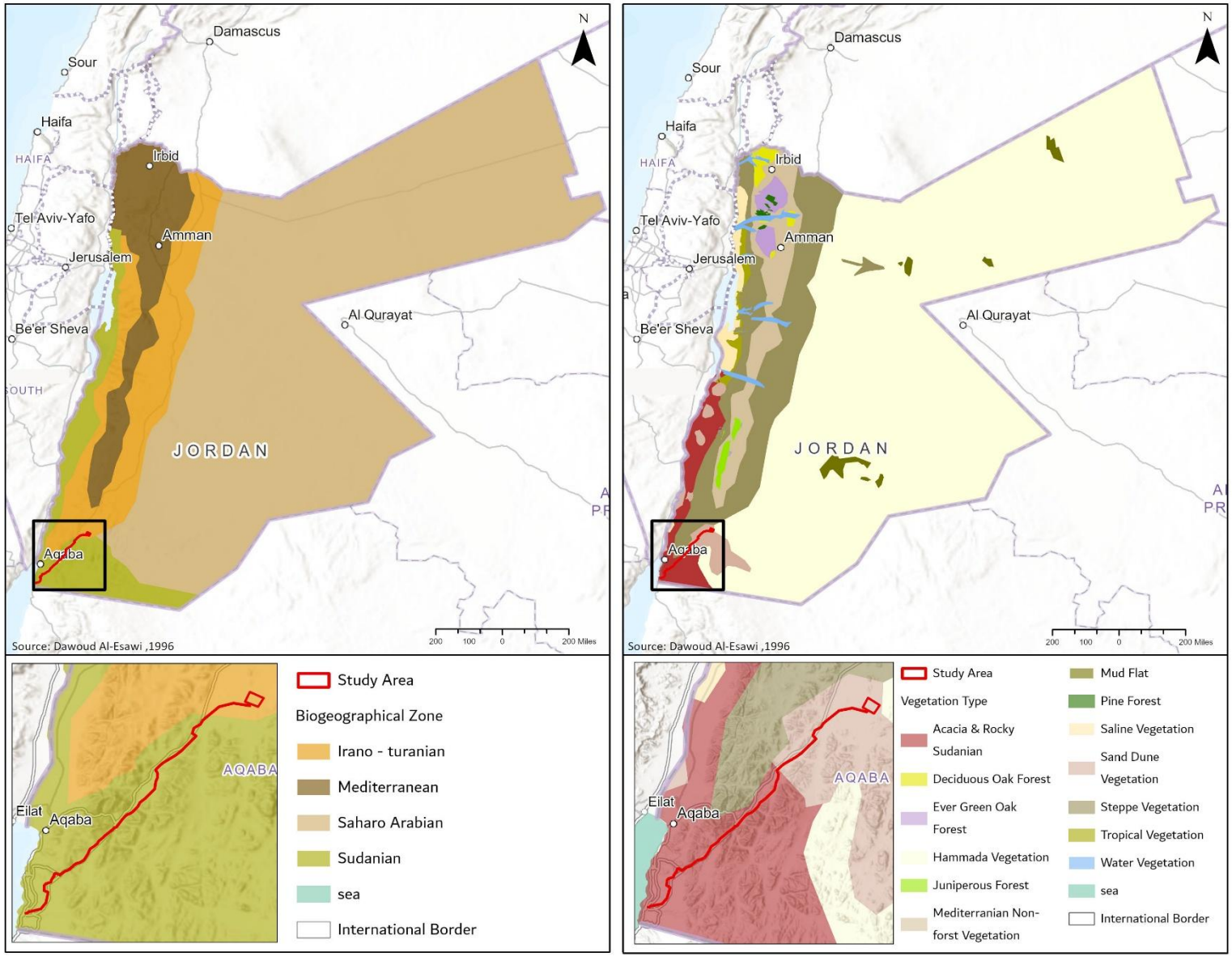


Figure 6-14: PAI within Jordan's Geographic Landmarks (left) and within Acacia (Vachellia) & Rocky Sudanian and Sand Dune Vegetation Zones (right) (Al-Eisawi, 1996).

6.2.1. Ecological Survey Results

An ecological survey was carried out to evaluate and document the biotic environment and key ecological features within the "Al-Quwaira" Renewable Energy Site and the proposed delineation of its OHTL, collectively henceforth referred to as the PAI. The primary objective of the survey was to gain a general understanding of the PAI's fauna, avifauna, and landscape characteristics to inform ecological management and facilitate informed decision-making for future development activities, specifically for biodiversity elements of conservation importance. The methodology of the survey is detailed in Section 4.2.2.2 while the results are presented in the following sections.

6.2.1.1. Landscape

To describe and assess the landscape, the team utilized field tools to provide a comprehensive overview of the site. The site has been generally described as four landscape units (1) Unsettled undulating bare land hills, (2) Rocky rangeland wadis, (3) Cultivated flat open areas and (4) Uncultivated flat sandy clay area described as follows:

1. Unsettled undulating bare land hills

The site is considered to have a difficult, mountainous, undulating terrain cut by a group of long wadis from east to west, most of these wadis are formed by seasonal water flow, they vary in width from 20 m to 300 m and with varying depths sometimes reaching four meters, the slope ranges from 25-40 degrees towards the west (Figure 6-15). The soil is gravelly, sandy, rocky with a low organic content and therefore the vegetation cover is very weak and sparse and consists mainly of a group of trees such as *Vachellia tortilis* and Anabasis species. There are no clear signs of the presence of wildlife. Most of the burrows that were observed for rodents and *Uromastyx aegyptia* are inactive burrows and most of the traces that were observed during the field are for red foxes and stray dogs. Some bird species were also recorded. In general, human use in the area is weak with some places with stockpiles.

Figure 6-15: Unsettled undulating bare land hills

2. Rocky sandy rangeland wadis

The site consists of relatively narrow north to south wadis, slope of 30-45 degree with a width of 15 to 30 m and varying depths, reaching three to four meters in some areas. The wadi consists mainly of gravel, sand and rocks that vary in sizes according to the strength of the seasonal flow. Most human activities were observed include livestock grazing, tents of local people, livestock pens, and medium and high voltage power lines. There is also waste dumping. The vegetation cover is generally weak and scattered (Figure 6-16).

Figure 6-16: Rocky sandy rangeland wadis

3. Cultivated flat open areas

These areas generally consist of open flat areas with mostly clay soil and some sandy patches. The vegetation cover is low due to the high agricultural activity, so that vegetable farms spread throughout the terrain. This is evident in the ploughing of the land and its remaining agricultural mulch in the soil. There are also some simple citrus trees, which are represented by small farms. Some roads are closed as a result of agricultural activities, as farmers create a number of fences or rock barriers to prevent cars from entering their cultivated lands. This pattern extends to the northern area of the project, reaching the end of the corridor to RE site (Figure 6-17).

Figure 6-17: Cultivated flat open areas

4. Uncultivated flat sandy clay area

This is an open, flat area, slightly undulating to the west. The soil is mostly sandy, mixed with clay soil in the form of transverse corridors from the north to the south, which were transported by seasonal floods. The vegetation is sparse in the sandy area and becomes denser in the areas mixed with clay soil. Many animal and bird species have been recorded at the site, and the grazing activity of livestock and camels and off-roads is evident (Figure 6-18).


Figure 6-18: Uncultivated flat sandy clay area

6.2.1.2. Fauna

A total of six mammals and two reptiles were recorded in the PAI. Three rodent species were identified using Sherman traps, while all other species were documented through direct observations or identification of their signs (Table 6-5, Figure 6-19 and Figure 6-20). Regarding mammal species, Gerbillus dasyurus was the only rodent species observed along the OHTL, whereas *Gerbillus dasyurus*, *Gerbillus cheesmani*, *Jaculus loftusi* and *Gerbillus henleyi* were recorded at the Al-Quwaira RE site. Additionally, Feral Dogs and Red Fox (*Vulpes vulpes arabica*) footprints were observed at various locations throughout the study area. Evidence of small mammals, including both active and inactive burrows, was documented across the PAI.

Table 6-5: Fauna species at the Study Area

Common name	Scientific name	Detection method	Count	IUCN Status
Mammals				
Wagner's gerbil	*Dipodillus dasyurus*	Sherman trap	3	LC
Cheesman's gerbil	*Gerbillus cheesmani*	Sherman trap	8	LC
Lesser Egyptian gerbil	*Gerbillus henleyi*	Sherman trap	1	LC
Arabian Jerboa	*Jaculus loftusi*	Footprint	4	LC
Arabian Red Fox	*Vulpes vulpes arabiaca*	Footprint		LC
Feral Dog	*Canis familiaris*	Direct observation & footprint		LC
Herpetofauna				
Short-Toed Rock agama	*laudakia vulgaris*	Direct observation	2	LC
Egyptian spiny-tailed lizard	*Uromastyx aegyptia*	Burrow	8	Vu

*LC: Least Concern VU: Vulnerable

Figure 6-19: Gerbillus dasyurus (top left), Gerbillus cheesmani (top right), Gerbillus henleyi (center left), mostly Jaculus loftusi footprints (center right), Canis familiaris (bottom left) and Vulpes vulpes footprints (bottom right).

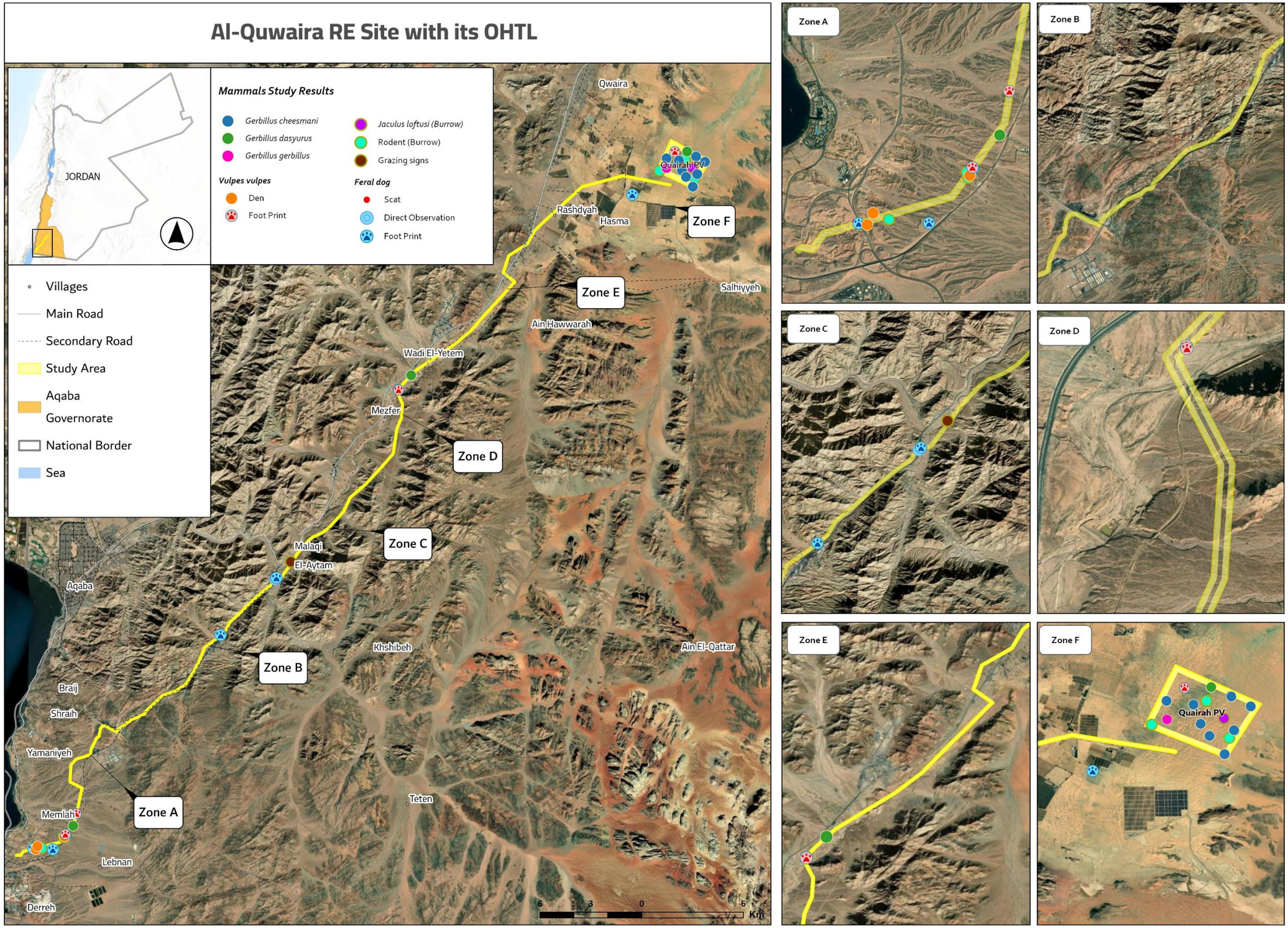


Figure 6-20: Fauna results map

Regarding reptile species, *Uromastyx aegyptia* and *Laudakia vulgaris* were recorded along the OHTL site. Observations of *Uromastyx aegyptia* were limited to inactive burrows, likely due to low temperatures during the survey period. This species is globally classified as Vulnerable on the IUCN Red List of Threatened Species (Version 2022-2) (IUCN, 2023). No herpetofauna were recorded at the Al-Quwaira RE Site (Figure 6-21 and Figure 6-22).

Figure 6-21: Inactive Egyptian spiny-tailed lizard burrow (left) and Short-Toed Rock agama (Right).

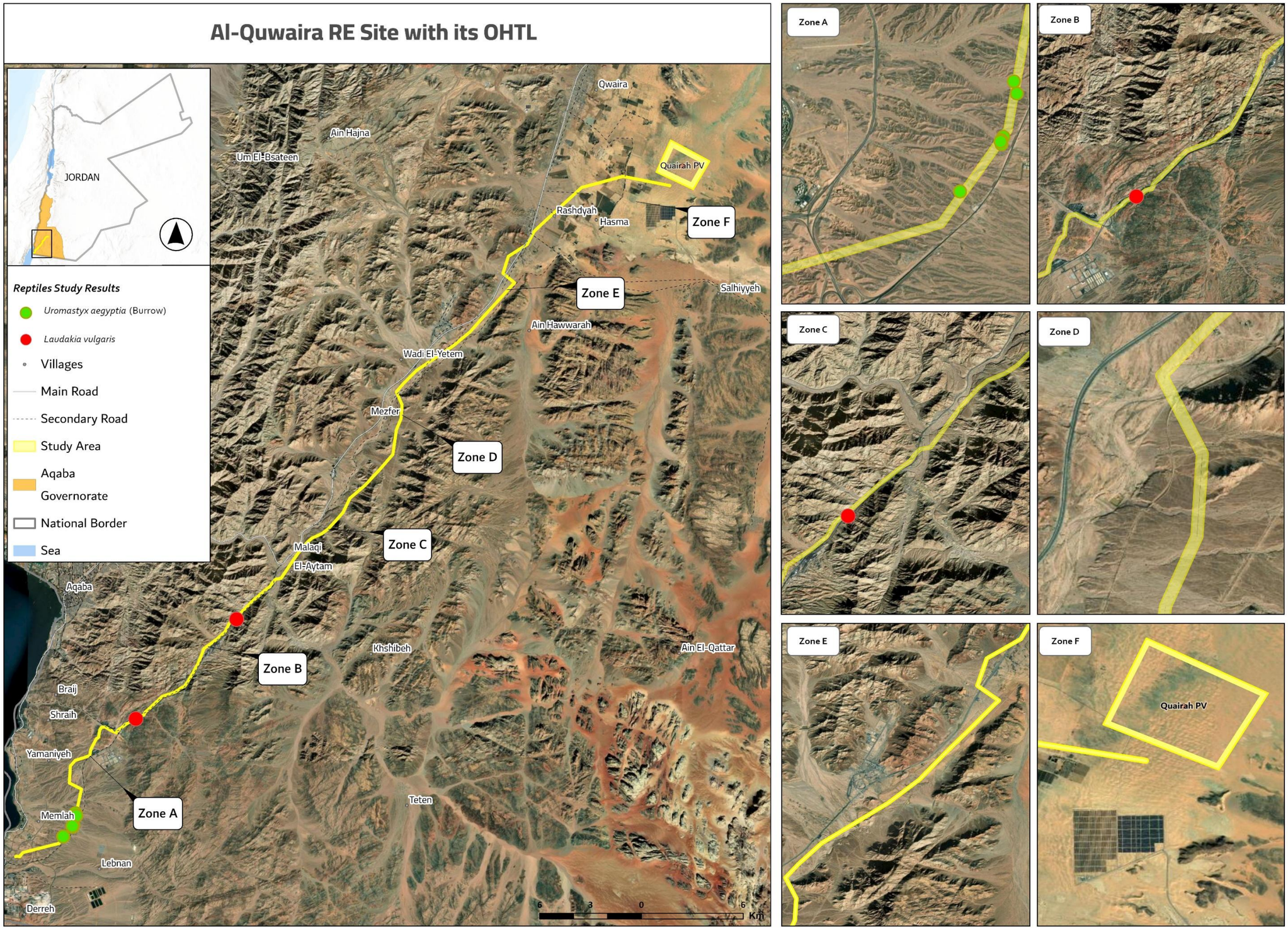


Figure 6-22: Reptile results with Uromastyx aegyptia burrow locations

6.2.1.3. Avifauna

A total of 28 avifauna species were recorded across the PAI (Table 6-6, Table 6-7 , Figure 6-23 and Figure 6-24). A total of 24 of these species were recorded through the OHTL site and nine at Al-Quwaira site. Most species were not classified as threatened, except for the Steppe Eagle (*Aquila nipalensis*), which was observed feeding on goat carcasses discarded at the Al-Quwaira RE Site. This species is listed as Endangered (IUCN, 2021). No sightings of the Sooty Falcon (*Falco concolor*) were recorded in either site. Three inactive raptor nests were observed, though the species responsible for these nests could not be identified.

It is worth noting that the optimal period for conducting Sooty Falcon (*Falco concolor*) surveys is during the summer months. Conducting the survey in the current season (November/December) is not expected to yield extensive data, except for identifying possible burrow sites for the lizard species, making it less advisable. However, due to the time constraints of the study, the survey was carried out in December.

Table 6-6: Bird species recorded at OHTL

Family	Common Name	Count	Scientific Name	Status	IUCN Status	Regional status
Phasianidae	Sand Partridge	7	*Ammoperdix heyi*	Resident	LC	LC
Columbidae	Rock Dove	5	*Columba livia*	Resident	LC	LC
Columbidae	Laughing Dove	3	*Spilopelia senegalensis*	Resident	LC	LC
Columbidae	Eurasian Collared dove	73	*Streptopelia decaocto*	Resident	LC	LC
Podicipedidae	Little Grebe	8	*Tachybaptus ruficollis*	Passage migrant, summer visitor, Resident	-	LC
Accipitridae	Long-legged Buzzard	1	*Buteo rufinus*	Resident	LC	LC
Falconidae	Common Kestrel	2	*Falco tinnunculus*	Resident, Passage migrant	LC	LC
Corvidae	Fan-tailed Raven	8	*Corvus rhipidurus*	Resident	LC	LC
Sturnidae	Tristram's Starling	26	*Onychognathus tristramii*	Winter visitor	LC	-
Hirundinidae	Eurasian Crag Martin	8	*Ptyonoprogne rupestris*	Passage migrant, Winter visitor	LC	LC
Motacillidae	White Wagtail	1	*Motacilla alba*	Passage migrant, Winter visitor	LC	-
Sylviidae	Graceful Prinia	2	*Prinia gracilis*	Resident	LC	LC
Phylloscopidae	Common Chiffchaff	1	*Phylloscopus collybita*	Passage migrant,	LC	-

Family	Common Name	Count	Scientific Name	Status	IUCN Status	Regional status
				Winter visitor		
Pycnonotidae	White-spectacled Bulbul	1	*Pycnonotus xanthopygos*	Resident	LC	LC
Nectariniidae	Palestine Sunbird	1	*Cinnyris osea*	Resident	LC	LC
Passeridae	Spanish Sparrow	27	*Passer hispaniolensis*	Resident	LC	LC
Fringillidae	Trumpeter Finch	2	*Bucanetes githagineus*	Resident	LC	LC
Muscicapidae	European Stonechat	2	*Saxicola rubicola*	Passage migrant	LC	-
Muscicapidae	White-crowned Wheatear	8	*Oenanthe leucopyga*	Resident	LC	LC
Muscicapidae	Mourning Wheatear	1	*Oenanthe lugens*	Resident	LC	LC
Muscicapidae	Blackstart	7	*Oenanthe melanura*	Resident	LC	LC
Meropidae	Arabian Green Bee-eater	3	*Merops cyanophrys*	Resident	LC	LC
Alaudidae	Crested Lark	4	*Galerida cristata*	Resident	LC	LC
Alaudidae	Desert Lark	25	*Ammomanes deserti*	Resident	LC	LC

Table 6-7: Birds recorded at the Al-Quwaira site

Family	Common Name	Count	Scientific Name	Status	IUCN Status	Regional status
Accipitridae	Steppe Eagle	4	Aquila nipalensis	Passage migrant, Winter visitor	Endangered	Endangered
Alaudidae	Crested Lark	1	Galerida cristata	Resident	LC	LC
Alaudidae	Greater Hoopoe-Lark	1	Alaemon alaudipes	Resident	LC	LC
Columbidae	Rock Dove	38	Columba livia	Resident	LC	LC
Corvidae	Fan-tailed Raven	1	Corvus rhipidurus	Resident	LC	LC
Muscicapidae	White-crowned Wheatear	1	Oenanthe leucopyga	Resident	LC	LC

Family	Common Name	Count	Scientific Name	Status	IUCN Status	Regional status
Muscicapidae	Isabelline Wheatear	1	Oenanthe isabellina	Passage migrant, Winter visitor, summer visitor	LC	LC
Muscicapidae	Eastern Black-eared Wheatear	2	Oenanthe melanoleuca	Passage migrant, summer visitor	LC	LC
Muscicapidae	Blackstart	3	Oenanthe melanura	Resident	LC	LC

Figure 6-23: Steppe Eagle (top left), Crested Lark (top right), Spanish Sparrow (center-left), White crowned wheatear (center-right)) Eastern Black-eared Wheatear (bottom left), Eurasian Collared-dove (bottom right)

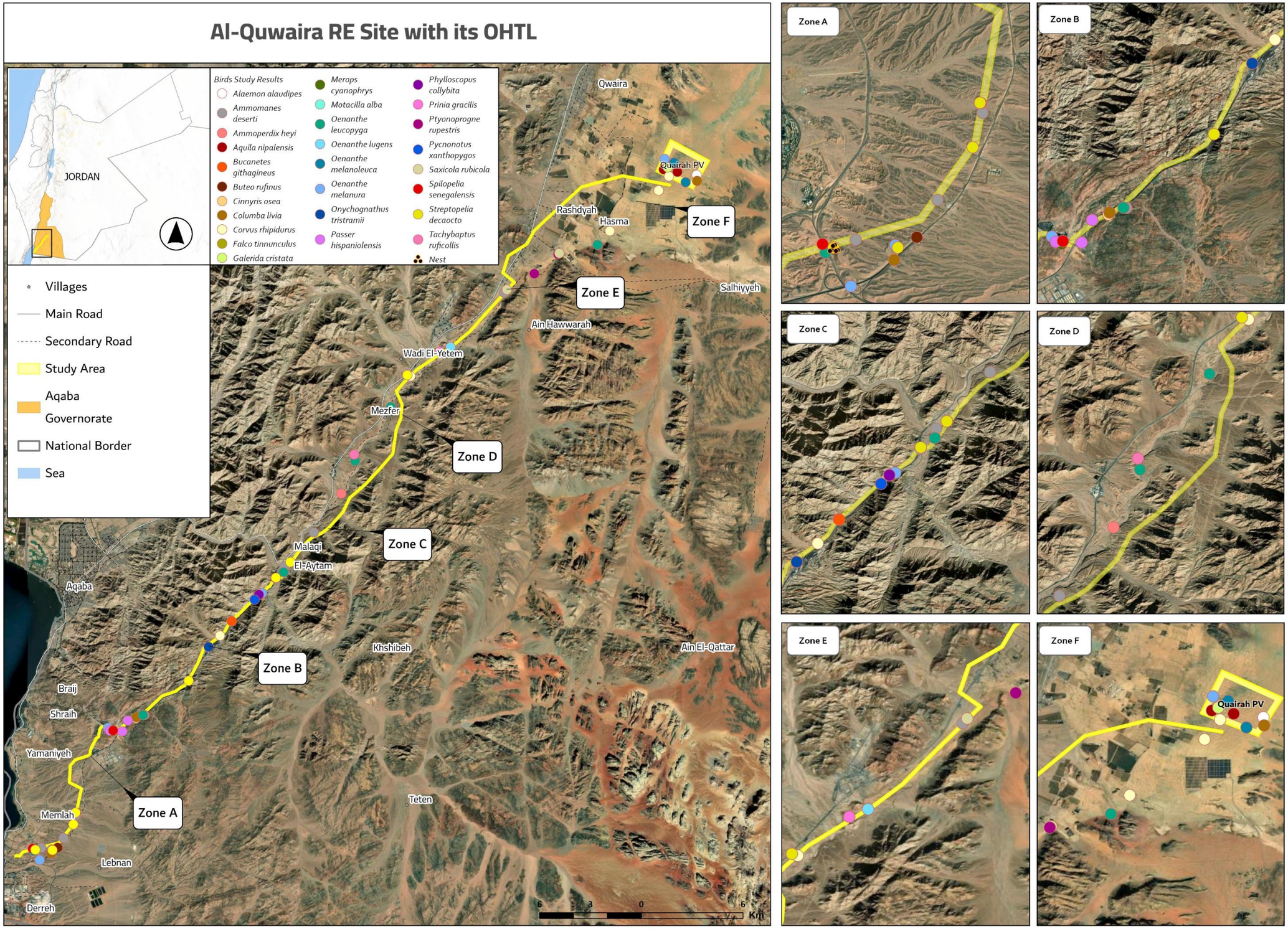


Figure 6-24: Avifauna results map

6.2.1.4. Limitations

At the beginning of the southern route, the team was unable to enter the border area and the customs checkpoint. As a result, the survey was limited to the area from the opposite direction, maintaining a distance of 200 meters from the starting point. While following the route, the team encountered several difficulties in reaching the proposed line due to the rugged terrain and the accumulation of rocks in the wadis. Additionally, barriers and bulldozing activities in the area further hindered access to the corridor, as did the soil and rock barriers created by farmers. Some sections of the track also intersected with the main highway.

6.2.1.5. Recommendations

Conduct a follow-up survey during the hotter season to reassess the status of *Uromastyx aegyptia* burrows across the project area. This seasonal survey will help confirm whether active populations are present, as the species is more likely to be active and visible in higher temperatures. The results will ensure accurate population assessments and guide the implementation of mitigation measures to protect this Vulnerable species.

6.2.2. Protected Areas and Key Biodiversity Areas

Al-Quweira RE Site and its OHTL corridor are not located in any area of biodiversity importance. However, they are adjacent to the northern borders of Hisma Basin Rum KBA/IBA and Wadi Rum Protected Area (5 km), which is also a UNESCO World Heritage Site. The OHTL corridor does not pass through any area of conservation importance either, but it passes just outside from the north-western border of Wadi Rum Protected Area buffer zone (Figure 6-25).

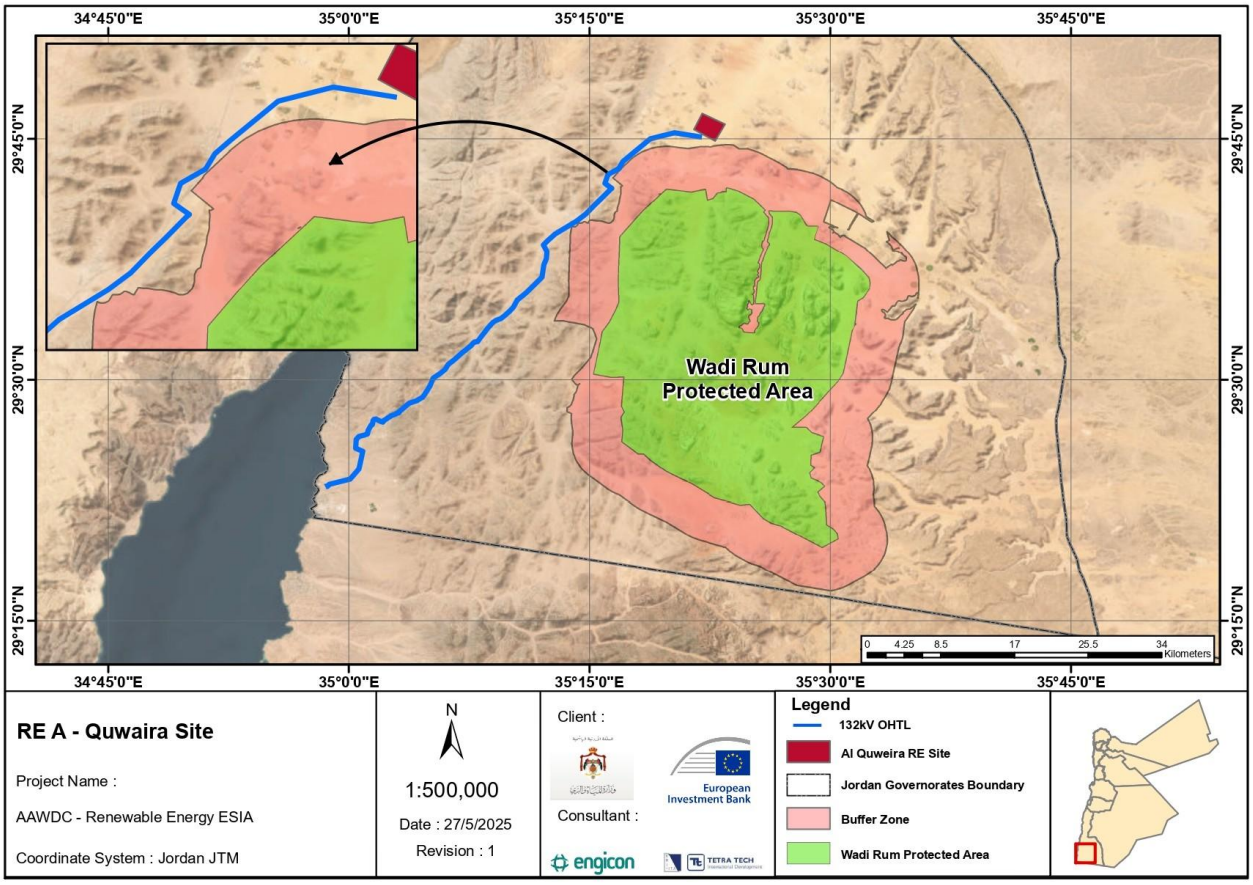


Figure 6-25: Wadi Rum Protected Area and its Buffer Zone (Source: RSCN)

6.2.3. Critical Habitat Assessment

The Critical Habitat Assessment (CHA) aligns with the EIB Environmental and Social Standards, more specifically with Standard 4 on Biodiversity and Ecosystems. Standard 4 focuses on the protection and

conservation of biodiversity and ecosystems, with particular attention to critical habitats. The standard ensures that EIB-financed projects do not have significant adverse impacts on biodiversity and promote the sustainable use of natural resources. Key criteria for identifying critical habitats include areas of high biodiversity value, habitats listed in Annex I of the EU Habitats Directive, and habitats supporting significant populations of species of conservation concern. This standard applies to all projects financed by EIB in EU, EFTA, Candidate and potential Candidate countries were these projects "*shall comply with applicable national and EU environmental legislation*". [1]

All projects located in countries other than the abovementioned "*shall comply with national legislation and this Standard which reflects the core principles and essential procedural elements laid down by EU legislation and policies, as well as international good practices to the extent that they relate to the protection and conservation of biodiversity, ecosystems and ecosystem services that EIB considers relevant to achieve no loss of biodiversity and a Net Positive Impact on biodiversity, where required*".[1]

The standard requires an assessment process involving the identification of ecologically appropriate areas of analysis (EAAA)[2] and the application of the mitigation hierarchy to avoid, minimize, and offset impacts on these habitats. In addition, the standard emphasizes the importance of stakeholder consultation, data collection, and monitoring to ensure effective biodiversity management throughout the project's lifecycle. It aims to align EIB projects with international best practices and EU legislation, promoting a balance between development and environmental conservation. By adhering to this standard, the EIB aims to contribute to the protection of global biodiversity and the sustainable use of ecosystem services, ultimately supporting broader environmental and social objectives.

Paragraph (16) of the standard explains that 'Critical Habitat' is the most sensitive of the high-value biodiversity features and is defined as comprising one of the following:

A. A highly threatened and/or unique ecosystem;
B. A habitat of priority and/or significant importance to critically endangered, endangered or vulnerable species, as defined by the IUCN Red List of threatened species and in relevant national legislation;
C. A habitat of priority and/or significant importance to a population, range or distribution of endemic or restricted-range species, or highly distinctive assemblages of species;
D. A habitat required for the survival of migratory species and/or congregator species;
E. Biodiversity and/or an ecosystem of significant social, economic or cultural importance to local communities and indigenous groups;
F. A habitat of key scientific value and/or associated with key evolutionary processes.

The sections below aim to determine whether these criteria apply to any of the habitats within the RE Site or the OHTL Corridor and are thus considered "Critical Habitats" as defined by EIB.

6.2.3.1. Critical Habitat Assessment Results for the RE Site

Criterion A: Highly threatened and/or unique ecosystem

The RE Site is located in the Irano-Turanian biogeographical region biogeographical region, which is defined as Syrian Xeric Grasslands and Shrublands Ecoregion (WWF, 2018). The Syrian Xeric Grasslands and Shrublands Ecoregion is located in the Temperate Grasslands, Savannas and Shrublands Biome in the Palearctic Realm According to Olson & Dinerstein (2003), the ecoregions in which the RE Site is located is not considered to be in any of the listed threatened ecoregions of the world. Additionally, the field assessments of the primary habitats across RE Site suggest that none of the habitats encountered meet the Criterion. The Project area thus does not qualify for **Highly threatened and/or unique ecosystem criteria** (Table 6-8).

Table 6-8: Summary of assessment of habitats in the project site against Criterion a of EIB S4

Definition	Assessment
Risk of significantly decreasing in area or quality	The general development in the region might decrease the extent and the quality of some shrub patches, but, given the

[1] EIB Environmental and Social Standards – Standard 4;
https://www.eib.org/attachments/publications/eib_environmental_and_social_standards_en.pdf#page=31&zoom=100,93,96
[2] features that may require additional studies or targeted mitigation

	wide distribution of this vegetation type, it is not currently considered to be at significant risk
Small spatial extent	The habitat is widespread
Containing unique assemblages of species including assemblages or concentrations of biome-restricted species (fine scale)	The vegetation type does not support unique assemblages or concentration of biome-restricted species
Red List of Threatened Ecosystems	**Assessment**
Reduction in geographic distribution	The ecosystem is expansive and is not believed to be facing any reduction in distribution
Restricted geographic distribution	The habitat is widespread
Environmental degradation	The RE Site development might lead to habitat degradation but this will be limited to individual projects elements and is not believed to lead to large-scale degradation of the ecosystem
Disruption of biotic processes or interactions	No evidence
Quantitative analysis that estimates the probability of ecosystem collapse	No evidence

Based on the above, it can be concluded that criterion A of EIB Standard 4 "**Highly threatened and/or unique ecosystem**" is not triggered.

Criterion B: Habitat of priority and/or significant importance to critically endangered, endangered or vulnerable species, as defined by the IUCN Red List of threatened species13 and in relevant national legislation

No species meets the threshold for Criterion B of EIB Standard 4 Based on available literature and the IUCN Red List of the Globally Threatened Species (2025), three Endangered species have their distribution range overlapping with the location of the RE Site; Egyptian Vulture *Neophron percnopterus*, Steppe Eagle *Aquila nipalensis* and Saker Falcon *Falco cherrug*. A single individual of one species of the three; Steppe Eagle, was recorded during the field assessments. Generally, none of the species across the RE Site can be considered to be of significant importance to the species mentioned. Based on this, the site does not qualify for the subject Criterion B.

Criterion C: Habitat of priority and/or significant importance to a population, range or distribution of endemic or restricted-range species, or highly distinctive assemblages of species

None of the species recorded in RE Site from field assessment or literature, meet the endemic/restricted-range species definition. The Project area does not qualify for the subject Criterion C

Criterion D: Habitat required for the survival of migratory species and/or congregatory species

Ecological and avifaunal assessments at the RE Site have not indicated that the Project Site provides any habitats supporting globally significant migratory or congregatory species. The topography and landscape of the RE Site does not form any significant features that is exceptionally suitable for migratory soaring birds. Similarly, none of the habitats at the RE Site provide attractions for congregatory species, such as waterbirds.

According to the International Biodiversity Assessment Tool (IBAT), the RE Site does not overlap with any Key Biodiversity Areas (KBAs, while it is adjacent to Hisma Basin – Rum IBA/KBA). The RE Site is 4.8 km to the north of the boundaries of the KBA. The RE Site is also 5.7km to the north of the northern boundaries of Wadi Rum Protected Area, Figure 6-26. Wadi Rum Protected Area is an internationally designated protected area with a surface area of 741.8 km^2 (Protected Planet, 2025). Although the IBA is identified as an IBA with importance for migratory soaring birds (MSBs), it is well documented that MSBs use the site on passage and it does not include any stopover or bottlenecks. Based on all of the above, the project site and its immediate surroundings are not believed to trigger Criterion D of the EIB Standard 4

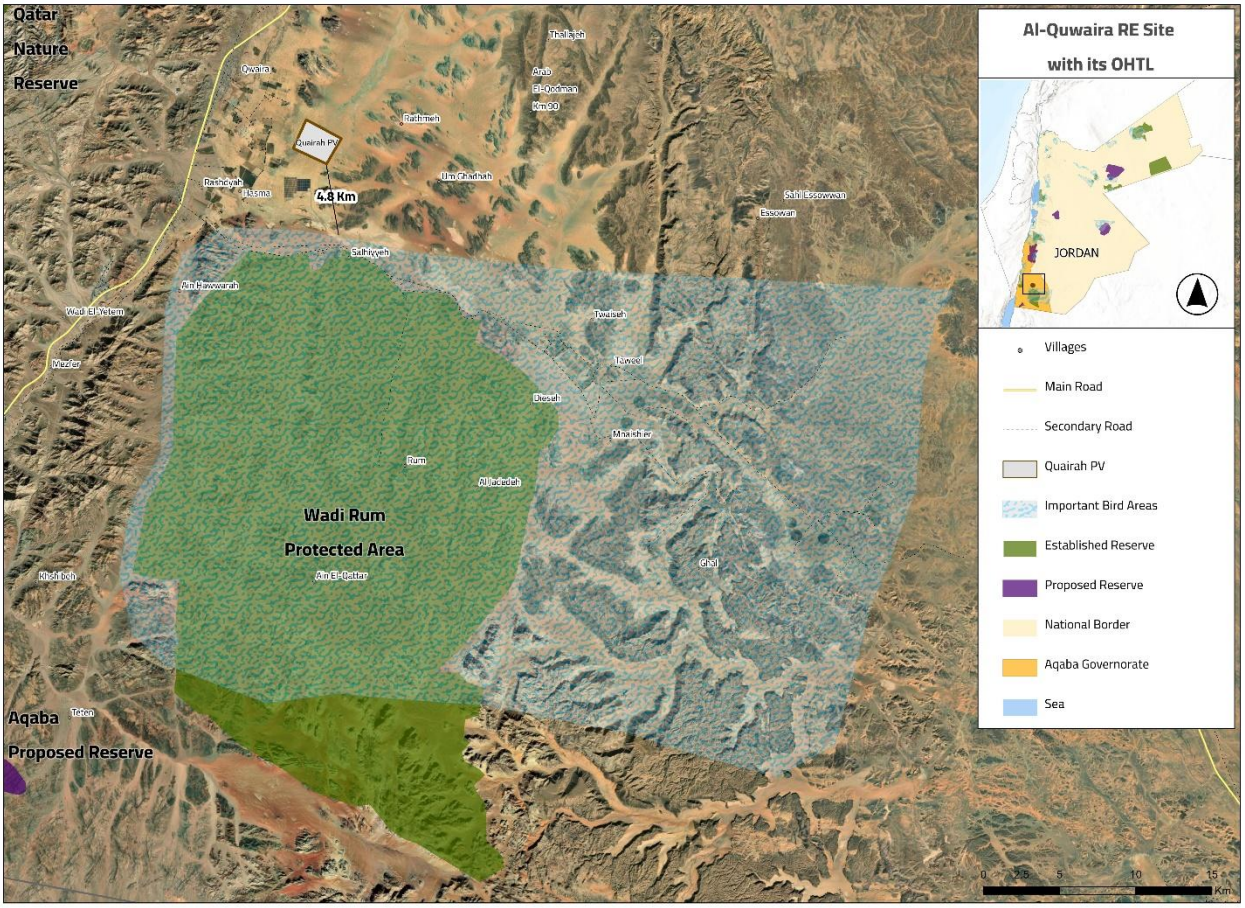


Figure 6-26: The location of the RE Site in reference to the location of Wadi Rum Protected Area and Hisma Basin – Rum IBA/KBA

Criterion E: Biodiversity and/or an ecosystem of significant social, economic or cultural importance to local communities and indigenous groups

The subject study areas and habitats not used by indigenous peoples *or by* local communities **to obtain essential or priority benefits**. Therefore, the Project area does not qualify for Criterion E.

Criterion F Habitat of key scientific value and/or associated with key evolutionary processes.

The key evolutionary processes may operate at various spatial scales, in the sense of EIB Standard no.4 these are usually considered at a relatively fine scale rather than broad biogeographic regions (e.g. an individual mountain that may have acted as a glacial refugium and thus hosted the evolution of a suite of endemic species). No quantitative significance thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement. Areas associated with key evolutionary processes were screened using expert advice.

Given the very sparse vegetation, composed mainly of widespread desert plant species with no evidence of local endemism, and the low density of animal species, it is very unlikely that any key evolutionary processes could occur in the RE Site. Therefore, the RE Site does not qualify for the subject Criteria F.

6.2.3.1.1. Critical Habitat Results for the OHTL

Criterion A: Highly threatened and/or unique ecosystem

The OHTL runs across two biogeographical regions. The Irano-Turanian biogeographical region and Sudanian biogeographical region are defined as Syrian Xeric Grasslands and Shrublands Ecoregion and Red Sea-Arabian Desert Shrublands Ecoregion respectively. The Syrian Xeric Grasslands and Shrublands Ecoregion is located in the Temperate Grasslands, Savannas and Shrublands Biome while the Red Sea-Arabian Desert Shrublands Ecoregion is located in the Desert and Xeric Shrublands Biome in the Palearctic Realm. According to Olson & Dinerstein (2003), both ecoregions in which the Project Site is located are not considered to be in any of the listed threatened ecoregions of the world. Additionally, the field assessments of the primary habitats

across RE Site suggest that none of the habitats encountered meet the Criterion. **The Project area thus does not qualify for the subject Criteria A**

Table 6-9: Summary of assessment of habitats in the project site against Criterion A

Definition	Assessment
Risk of significantly decreasing in area or quality	The general development in the region might decrease the extent and the quality of some shrub patches, but, given the wide distribution of this vegetation type, it is not currently considered to be at significant risk
Small spatial extent	The habitat is widespread
Containing unique assemblages of species including assemblages or concentrations of biome-restricted species (fine scale)	The vegetation type does not support unique assemblages or concentration of biome-restricted species
Red List of Threatened Ecosystems	**Assessment**
Reduction in geographic distribution	The ecosystem is expansive and is not believed to be facing any reduction in distribution
Restricted geographic distribution	The habitat is widespread
Environmental degradation	The OHTL development might lead to habitat degradation but this will be limited to individual projects elements and is not believed to lead to large-scale degradation of the ecosystem
Disruption of biotic processes or interactions	No evidence
Quantitative analysis that estimates the probability of ecosystem collapse	No evidence

Based on the above, it can be concluded that criterion A is not triggered

Criterion B: Habitat of priority and/or significant importance to critically endangered, endangered or vulnerable species, as defined by the IUCN Red List of threatened species13 and in relevant national legislation

No species meets the threshold for Criterion B of the EIB Standard 4. Based on available literature and the IUCN Red List of the Globally Threatened Species (2025), three Endangered species have their distribution range overlapping with the location of the RE Site; Egyptian Vulture *Neophron percnopterus*, Steppe Eagle *Aquila nipalensis* and Saker Falcon *Falco cherrug*. Generally, none of the species across the OHTL can be considered to be of significant importance to the species mentioned. Based on this, the site does not qualify for the subject Criterion B.

Criterion C: Habitat of priority and/or significant importance to a population, range or distribution of endemic or restricted-range species, or highly distinctive assemblages of species

None of the species recorded along the OHTL from field assessments or literature, meet the endemic/restricted-range species definition. The Project area does not qualify for Criterion C.

Criterion D: Habitat required for the survival of migratory species and/or congregatory species

Ecological and avifaunal assessments at the OHTL have not indicated that the Project Site provides any habitats supporting globally significant migratory or congregatory species. The topography and landscape of the OHTL does not form any significant features that is exceptionally suitable for migratory soaring birds. Similarly, none of the habitats at the RE Site provide attractions for congregatory species, such as waterbirds.

According to the International Biodiversity Assessment Tool (IBAT), the OHTL does not overlap with any Key Biodiversity Areas (KBAs, while it is adjacent to Hisma Basin – Rum IBA/KBA). The closest the OHTL to the IBA/KBA is 0.5 km. Also, the least distance between the OHTL and the borders of Wadi Rum Protected Area is 3.4, while it is located 7.1 km away from the proposed Aqaba Mountains Protected Area, Figure 6-27. Wadi Rum Protected Area is an internationally designated protected area with a surface area of 741.8 km^2 (Protected Planet, 2025). Although the IBA/KBA is identified as an IBA with importance for migratory soaring birds (MSBs), it is well documented that MSBs use the site on passage and it does not include any stopover or bottlenecks. On the other hand, it is well documented that MSBs use the wadis through which the OHTL is proposed for passage but on high altitudes.

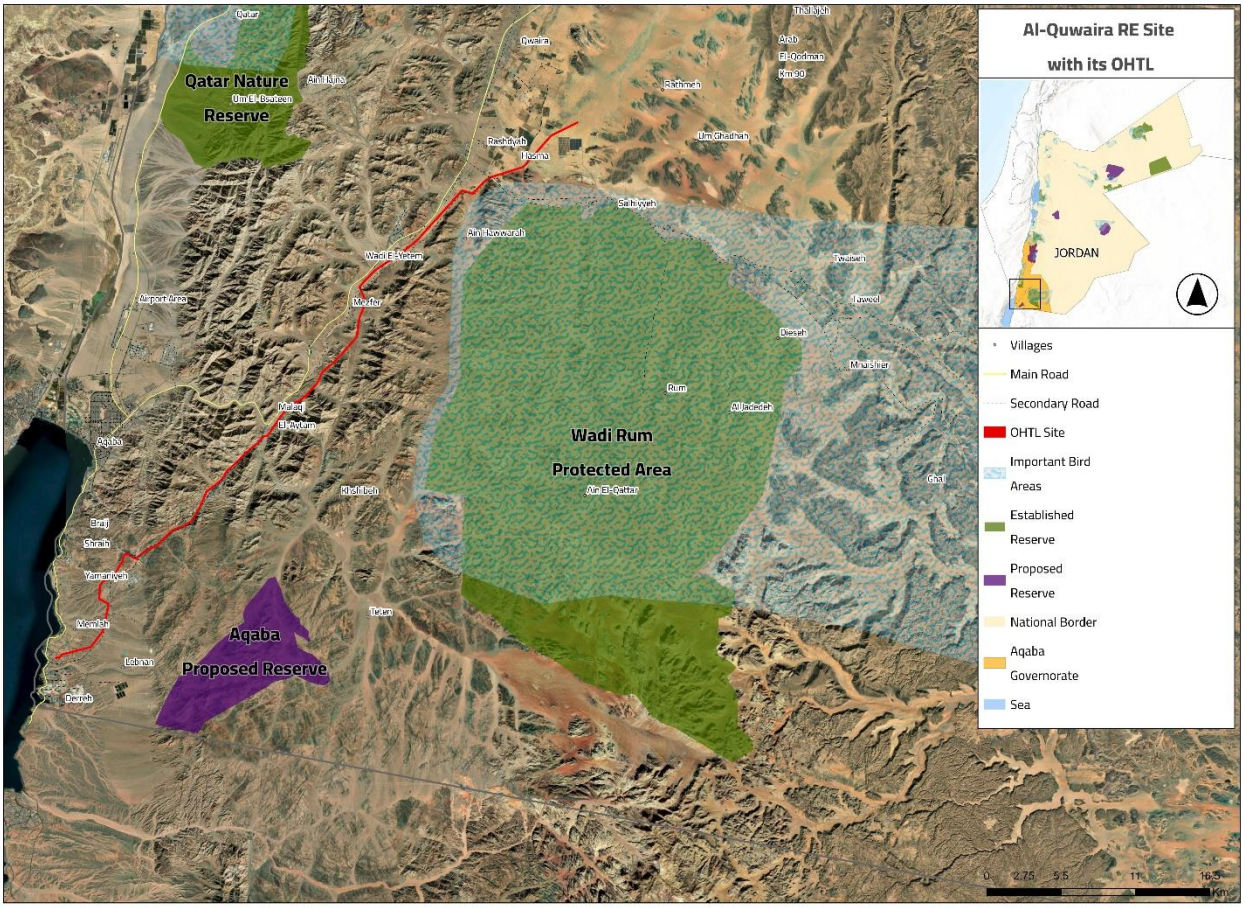


Figure 6-27: The OHTL alignment in relation to Wadi Rum Protected Area, Hisma Basin – Rum IBA/KBA and the proposed Aqaba Mountains Protected Area

Based on all of the above, the project site and its immediate surroundings are not believed to trigger criterion D of the EIB Standard 4

<u>Criterion E: Biodiversity and/or an ecosystem of significant social, economic or cultural importance to local communities and indigenous groups</u>

The subject study areas and habitats not used by indigenous peoples *or by* local communities **to obtain essential or priority benefits**. Therefore, the Project area does not qualify for Criterion E.

<u>Criterion F Habitat of key scientific value and/or associated with key evolutionary processes.</u>

The key evolutionary processes may operate at various spatial scales, in the sense of EIB Standard 4 these are usually considered at a relatively fine scale rather than broad biogeographic regions (e.g. an individual mountain that may have acted as a glacial refugium and thus hosted the evolution of a suite of endemic species). No quantitative significance thresholds exist for this criterion, so there is a reliance on expert opinion and qualitative value judgement. Areas associated with key evolutionary processes were screened using expert advice.

Given the very sparse vegetation, composed mainly of widespread desert plant species with no evidence of local endemism, and the low density of animal species, it is very unlikely that any key evolutionary processes could occur in the Project area. Therefore, the Project area does not qualify for Criterion F.

6.2.3.2. Natural Habitat and Modified Habitat

6.2.3.2.1. Criteria

As explained above, **EIB Environmental Standard 4** includes criteria specific to the **EU Habitats Directive Annex I** and **high biodiversity value areas.** The EU Habitats Directive (Council Directive 92/43/EEC) aims to protect over a thousand species and 230 habitat types across Europe. **Natural habitats** under this directive means terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural. **Critical habitats** under this directive are those listed in Annex I, which include habitats

of significant importance for the conservation of natural habitats and wild fauna and flora. These habitats are essential for maintaining or restoring a favourable conservation status for the species they support.

6.2.3.2.2. Natural Habitat and Modified Habitat Results for the RE Site and the OHTL

Based on the field assessments that have been carried out at the RE Site and also based on the literature, the RE Site encompasses mostly Natural Habitat - particularly shrubland desert habitats with low shrub vegetation cover. On the other hand, the OHTL crosses a variety of habitats ranging from undulating hills, rocky wadis and uncultivated sandy flats, in addition to cultivated open flat areas, Figure 6-28.

Figure 6-28: Habitats along the OHTL

6.2.3.3. Priority Biodiversity Features

6.2.3.3.1. Criteria

EIB Standard 4 considers other biodiversity as a priority for conservation, and thus a priority to consider in mitigation planning. These standards require 'No Net Loss', and preferably a 'Net Gain', for priority biodiversity. This biodiversity comprises those features that are of high irreplaceability and/or vulnerability, but not sufficient to qualify an area as Critical Habitat.

EIB Standard 4 emphasises that the promoter of an EIB financed project shall not implement any project activities unless all of the six conditions explained in the standard are met. The second and third conditions are focusing on ensuring that the project "*does not lead to measurable adverse impacts that will result in any detrimental effect on the ecological and conservation status of the critical habitat…",* and "*does not lead to a net reduction*[3] *in the population of any vulnerable, endangered or critically endangered species over a reasonable period of tim*e".

In this regard, it is important to note that the **EU Habitats Directive** identify **priority natural habitat types** as "*natural habitat types in danger of disappearance, which are present on the territory referred to in Article 2 and for the conservation of which the Community has particular responsibility in view of the proportion of their natural range which falls within the territory referred to in Article 2; these priority natural habitat types are indicated by an asterisk (*) in Annex I*".[4]

6.2.3.3.2. Priority Biodiversity Features (PBF) Results

As mentioned, earlier assessment undertaken at the Project Site and the study area as a whole did not identify natural habitat types in danger of disappearance, which are present on the territory referred to in **Article 2** and in the **Annex I to the EU Habitats Directive**. The assessment also did not identify any vegetation or natural habitat present in the vicinity of the Project that are identified as threatened in Jordan (under national regulations). Therefore, no habitat types qualify for the priority natural habitat types under EIB/EU Habitats Directive.

PBF Criterion i: Threatened habitat

As mentioned, earlier assessment undertaken at the Project Site and the study area as a whole did not identify any vegetation or ecosystems present in the vicinity of the Project that might be threatened. Therefore, no vegetation type qualifies for Criterion i under Priority Biodiversity Features.

PBF Criterion ii: Vulnerable species

Eleven globally Vulnerable (VU) species are known to be present at the Project Site and its vicinity, Table 6-10

Table 6-10: Globally Vulnerable (VU) species that are known to be present at the Project Site and its vicinity (IUCN, 2021)

Class	Scientific Name	Common English Name	Local Status (Project Site)	Notes on triggering Criterion ii (Y/N)
Mammalia	*Capra nubiana*	Nubian Ibex	Extant (Resident)	No, the species is known to be present in the mountains but not along the flatter Project Site or the wadis along the OHTL
Aves	*Aquila heliaca*	Eastern Imperial Eagle	Extant (Non-breeding, passage)	No, although the Project Site is located along the passage migration of the species and also the wintering area, the species is known to be a rare passage migrant and mainly winters in open areas in Eastern Jordan
	Clanga clanga	Greater Spotted Eagle	Extant (Passage)	No, the Project Site is located along the migration passage of the species but the species is known as being a very rare passage migrant in southern Jordan
	Falco concolor	Sooty Falcon	Extant (Breeding)	Yes, the Project Site is located in the breeding range of the species in Southern Jordan

[3] EIB standard 4 explains that "Net reduction" is a singular or cumulative loss in individuals that impacts on the species' ability to persist at the global, and/or national/regional scales for many generations or over a long period of time. The scale (i.e. global and/or national/regional) of the potential net reduction is determined based on the species' listing on either the (global) IUCN Red List and/or on the national/regional lists. For species listed on both the (global) IUCN Red List and the national/regional lists, the net reduction is based on the national/regional population.
[4] EU Habitats Directive https://eur-lex.europa.eu/eli/dir/1992/43/oj/eng

Class	Scientific Name	Common English Name	Local Status (Project Site)	Notes on triggering Criterion ii (Y/N)
	Falco vespertinus	Red-footed Falcon	Extant (passage)	No, the species is not congregatory and is known to migrate on broad fronts without concentrating along bottlenecks (del Hoyo et al, 1994)
	Chlamydotis macqueenii	Asian Houbara	Extant (Non-breeding)	No, an extremely rare species that has not been recorded in the area in decades
	Calidris ferruginea	Curlew Sandpiper	Extant (passage)	No, a rare passage migrant that is only recorded in wetlands
	Calidris falcinellus	Broad-billed Sandpiper	Extant (passage)	No, a rare passage migrant that is only recorded in wetlands
	Pluvialis squatarola	Grey Plover	Extant (passage)	No, an uncommon passage migrant that is only recorded in wetlands
	Streptopelia turtur	European Turtle-dove	Extant (breeding)	No, the Project Site is located along the southernmost breeding range of the species is known to be present in densely vegetated areas, mainly arboreal species and therefore could present, in very small numbers at the Project Site
Reptilia	*Uromastyx aegyptia*	Egyptian Spiny-tailed Lizard	Extant (Resident)	Yes, the species is known to be present along the rocky and gravel wadis in the southern part of the OHTL. Burrows the species were recorded during the field surveys.

Based on the above, two species still stand out as species that require consideration as globally Vulnerable species that are known to be present in the Project Site.

PBF Criterion iii: Significant biodiversity features identified by a broad set of stakeholders or governments

Available data shows that none of the globally threatened species; Critically Endangered (CR), Endangered (EN) and Vulnerable (VU), are present in significant numbers in the Project Site and its vicinity, however two species are confirmed to be present in the Project Site (Egyptian Spiny-tailed Lizard and Sooty Falcon). Literature and the recent ecological assessments have not shown that any of the species discussed reach the thresholds of any of the criteria and therefore the area does not qualify as Critical Habitat because migratory species do not use it as a stop-over during migration in significant numbers while resident species are not known to be present in significant numbers in any part of the Project Site and its vicinity.

PBF Criterion iv: Ecological structure and functions that are vital to maintaining the viability of biodiversity

As is the case for migratory birds reaching Critical Habitat thresholds, migratory birds qualifying as Priority Biodiversity Features do not appear to stop over within the Project area. Therefore, the Project area does not include ecological functions essential for the viability of the migratory bird species and does not qualify under Criterion iv.

Regarding the Vulnerable species listed, none of which are believed to be present in significant numbers at the Project Site and its vicinity due to the reasons listed in Table 6-10. Therefore, the study area does not qualify under Criterion iv.

6.2.3.4. Conclusion

The Teams' findings indicate that no endangered species were observed at the project site that would trigger the **designation of a Critical Habitat**. but it is located close to one IBA/KBA, an established protected area (Wadi Rum Protected Area) and Aqaba proposed Reserve (as shown in Figure 6-27).

Although the Project Site is not believed to host significant numbers of any globally threatened species since most of the species are known to be recorded there on passage and the habitats at the Project Site does not support congregatory species or bottlenecks for Migratory Soaring Birds (MSBs. However, two globally threatened species have been confirmed or are likely to be present at the Project site:

- **Egyptian Spiny-tailed Lizard:**

- The presence of this species was confirmed during field surveys through the identification of its burrows, although direct sightings were not recorded due to the timing of the survey, which fell outside the species' active season.
- The population size within the project area is currently unknown, and further research is necessary to determine its population size and its significance.
- It is recommended to conduct targeted surveys during the spring and summer months when the species is more active.

- **Sooty Falcon**
  - While the species was not observed during the field surveys, the nearby mountains of Aqaba are known breeding grounds for the Sooty Falcon.
  - To confirm the presence and assess the breeding population of the species, surveys should be carried out during its breeding season, which extends from May to September.

In Natural Habitat, no net loss is required where feasible. No net loss is required, and preferably a net gain, for priority biodiversity features. Based on this, the Project should aim to avoid all impacts on – and thus achieve no net loss for any of the globally threatened species identified to be present at the Project Site and special efforts should be made to avoid and minimise negative impacts on the species and its habitats.

Based on all of the above and building on the comprehensive literature review and recent ecological assessments undertaken, **it can be concluded that no endangered species were observed at the project site that would trigger the designation of a Critical Habitat.** Saying that, it would still be highly recommended undertaking the surveys mentioned earlier to assess the populations of both globally threatened species that are known to be present at the Project Site.

6.3. Socio-Economic Conditions

6.3.1. Population and Demographics

The nearest village to the RE site is Al-Quweira village, located about 5.6 km away. However, the OHTL corridor passes through three built up areas which are Rashadeyeh, Um El-Basateen and Rea' Sa'adeh as shown in Figure 6-29. In addition, the villages of Ain Hawara, Mezfer and Al-Quweira are located near the OHTL corridor but are not crossed by it. Table 6-11 provides detailed information on the population in those areas (Department of Statistics, 2023; Irada, 2023).

Table 6-11: Population within the Project Area (Department of Statistics, 2023)

District	Town	Male	Female	Total	Households
Aqaba District	Mezfer	164	144	308	60
	Re'a Sa'adeh	325	2	327	-
Al-Quweira District	Ain Hawara	5	5	10	2
	Al-Quweira	7,689	6,597	14,286	2,592
	Rashdyah	2,286	1,845	4,131	772
	Em El-Bsateen	128	613	255	358

The Jordanian Hashemite Fund for Human Development (Aqaba Development Centre) reported that by the end of 2022, the Syrian refugee population in Aqaba Governorate had reached 950 individuals. Of these, 150 were residing in Al-Quweira district, while 800 were in Aqaba district (Irada, 2023).

The average household size in Quweira district is 5.4 persons per household compared to 4.9 for Aqaba Governorate, both of which are higher than the national average of 4.8 persons. The demographic dependency ratio in Aqaba Governorate is 75.2% and 73.2% for Al-Quweira District, which is also higher than the national rate of 61.4%.

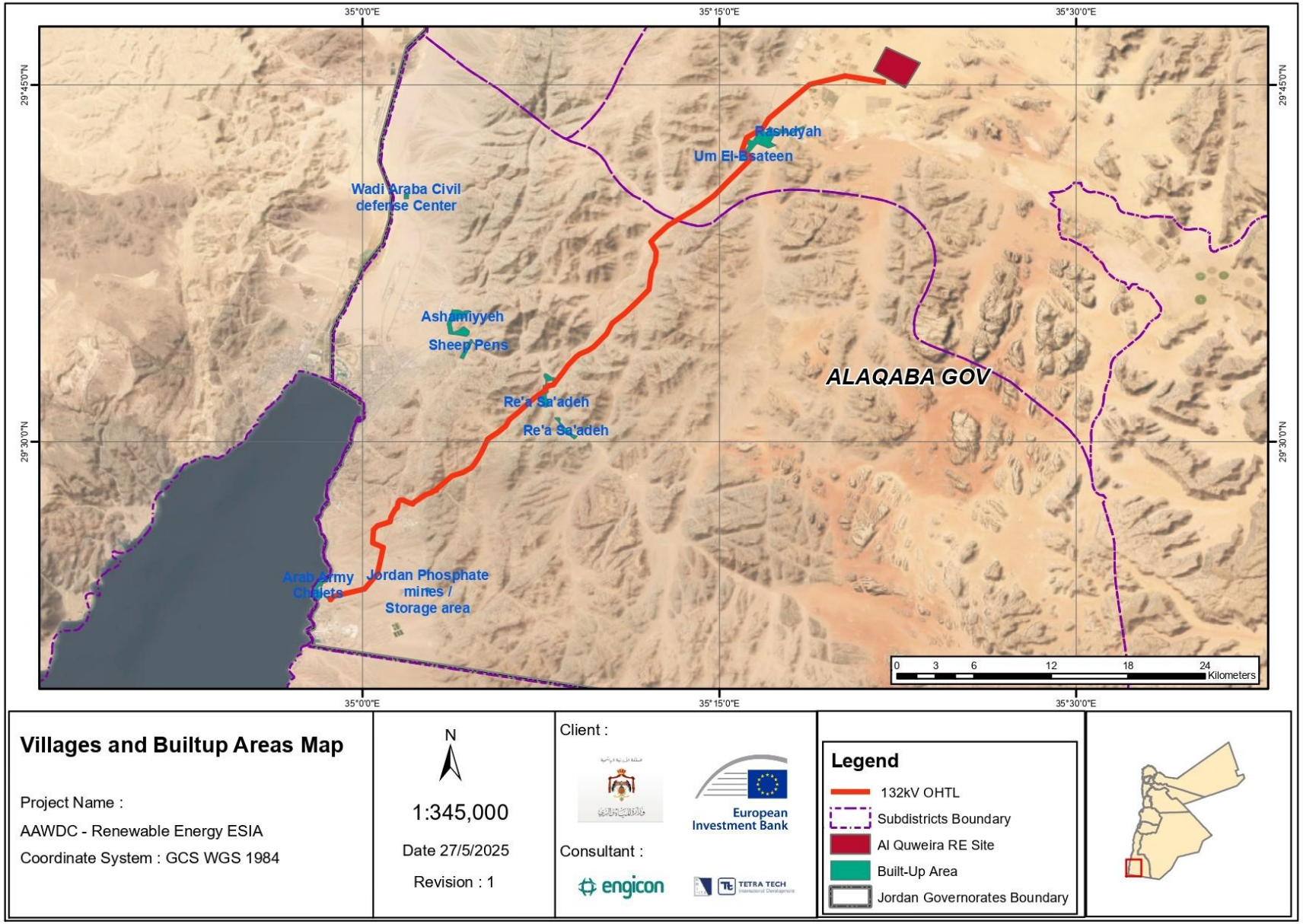


Figure 6-29: Built Up Areas

In terms of age distribution more than half of the population falls within the age group of 15-64 years, at 57.1% for Aqaba Governorate and 57.7% for Al-Quweira District , which is lower than the national level of 61.4% as shown in Table 6-12 (Irada, 2021).

Table 6-12:Demographic and Household Data in Aqaba Governorate and Al-Quweira District (Irada, 2021)

Administrative Divisions	Average Household Size (Persons)	Number of Households	Demographic Dependency Ratio (%)	Population Distribution by Age Group (%)		
				Under 15 years	(15-64) Years	Over 65 years
Aqaba Governorate	4.9	43,604	75.2	40.6	57.1	2.4
Al-Quweira District	5.5	4713	73.2	39.6	57.7	2.7

6.3.2. Economic Activities

The unemployment rate in Aqaba Governorate in 2023 was reported as 18.5%, lower than the national average of 22%. Female unemployment rate, at 33.2% was more than double that of males (18.5%) (Ministry of Labour, 2023). Underserved areas in Aqaba faces higher levels of poverty and unemployment than the city of Aqaba, with a rate of 31.1% for Al-Quweira in 2010, the most recently available data. Many young people favour secure government jobs over entrepreneurship or private sector work, especially in rural areas, limiting the growth of small and medium-sized enterprises. Employment opportunities with adequate wages are scarce (Irada, 2023)

At the Aqaba Governorate level, labour force concentration was highest in specific sectors, based on the most recent data available for 2017–2019. These are the public administration, defence, and social security sector, accounting for the largest share (24.6% of the workforce), followed by the transportation and storage sector (23.2% of the labor force), the wholesale and retail trade, vehicle, and motorcycle repair sector (10.6%),and education sector (10.1%). Additionally, the transformative industries sector employed 6.9% and the tourism sector accounted for 3.9% of Aqaba's workforce (Ministry of Planning and International Cooperation, 2019). No detailed information was available at the village and district levels, noting that it is assumed that the majority of the labour force employed in the private sector, especially the services industry, is in the city of Aqaba.

Table 6-13 shows the average annual expenditure and income for individuals and families in Aqaba Governorate and Al-Quewira District for 2013, the latest available data (Irada, 2021). Compared to the national averages, Aqaba Governorate's average family expenditure (10,077.4 JD) is slightly below the national average (10,251.6 JD), while its income (9,446.5 JD) is higher than the national average (9,258 JD). In contrast, Al-Quweira District reports significantly lower averages, with family expenditure at 6,446.5 JD and income at 6,480.6 JD, both well below the national figures, noting that the average income in both Aqaba and Al-Quweira are higher than the average expenditure while the opposite is true for the national average.

Table 6-13: Average Annual Expenditure and Income in Aqaba Governorate (Irada, 2021) (Irada, 2023).

Administrative Divisions	Average annual expenditure (Jordanian Dinar)		Average annual Income (Jordanian Dinar)	
	Per Family	Per Person	Per Family	Per Person
Aqaba Governorate	10,077.4	1,909	9,446.5	1,817.5
Al-Quweira District	6,446.5	1,053.3	6,480.6	1,095.1
Jordan	10,251.6	2,021.2	9,258	1,857.2

6.3.3. Poverty

Based on the latest available information dating back to 2010, the poverty rate in Aqaba Governorate in 2010 was 19.2%, higher than the national average of 14.4% at the time. The poverty gap rate stood at 4.3%, with 26,104 individuals classified as poor, accounting for about 3% of the total poor population in Jordan. Aqaba Governorate has three identified poverty pockets, including Al-Quweira District, where the project is located, and where the poverty rate is 31.1% (Department of Statistics, 2010).

6.3.4. Education

Aqaba's education sector includes a range of public, private, and military schools serving diverse student populations. The governorate has 87 public schools enrolling 37,652 students, comprising 24 boys' schools, 10 girls' schools, and 53 mixed-gender schools (Irada, 2023).

In higher education, Aqaba district hosts four universities that offer a range of academic programs. Public institutions include the University of Jordan (Aqaba Branch) and Al-Balqa Applied University (Aqaba College). In the private sector, Aqaba University of Technology and Aqaba University of Medical Sciences (Irada, 2023).

Al-Quweira District lacks higher education institutions, such as colleges or universities, with its education sector solely focused on school-level education. It is home to 13 public schools, serving 3,490 students across 144 classrooms, and one private school, which accommodates 140 students in 6 classrooms. In addition to these, the district also has 7 kindergartens (Irada, 2021).

6.3.5. Health

The healthcare sector in Aqaba district comprises a range of public, military, and private facilities. In the public sector, Aqaba has two comprehensive health centres, four primary health centres, and one subsidiary health centre. Laboratory services are available at eight facilities, most of which are located in Aqaba, including one military and one private laboratory. The district is served by 71 pharmacies, meeting the pharmaceutical needs of the community. Additionally, Aqaba has nine maternal and child health centres. The healthcare workforce includes 38 general practitioners and 60 specialists, all based in Aqaba, serving the health needs of the district's residents (Irada, 2023).

The healthcare infrastructure in Al-Quweira District is distributed across public, military, and private sectors, providing essential services to the community. The public sector includes 1 comprehensive health center, 1 primary health centre, 4 secondary health centres, 2 laboratories, 6 pharmacies, 1 dental clinic, 6 general medicine clinics, and 5 maternal and child centres. The military sector offers a single comprehensive health centre, secondary health centre, laboratory, pharmacy, and maternal and child center. The private sector is minimal, consisting of 2 pharmacies and 1 general medicine clinic (Irada, 2021).

6.3.6. Land Use

At Al-Quwaira RE site (Figure 6-30), grazing by livestock and camels is widespread. Vehicle off-road tracks are a common feature, reflecting regular human activity and movement in the area. Additionally, the western part of the site shows evidence of older cultivated activities, suggesting localized agricultural use in the past.

Figure 6-30: Land Use within the RE Site

The OHTL corridor experiences more intensive land use (built up areas, roads, agricultural lands). It is crossed by high - and medium-voltage power lines and a gas pipeline, highlighting its role in supporting infrastructure. The corridor also includes high grazing activity by the local community and is notably impacted by waste dumping through the presence of stockpiles and wastewater (Figure 6-31).

Figure 6-31: Land Use within the OHTL Corridor

The RE Site is located inside ASEZA's Buffer Zone for Wadi Rum Protected Area, more specifically within the "Medium Development: Limited to Non-consumptive Tourism" land use zone. A small part of the OHTL corridor passes through the same zone and crosses south-westward into another land use zone that is

defined as “Low Development Except Within Regulated Urban Settlement” (

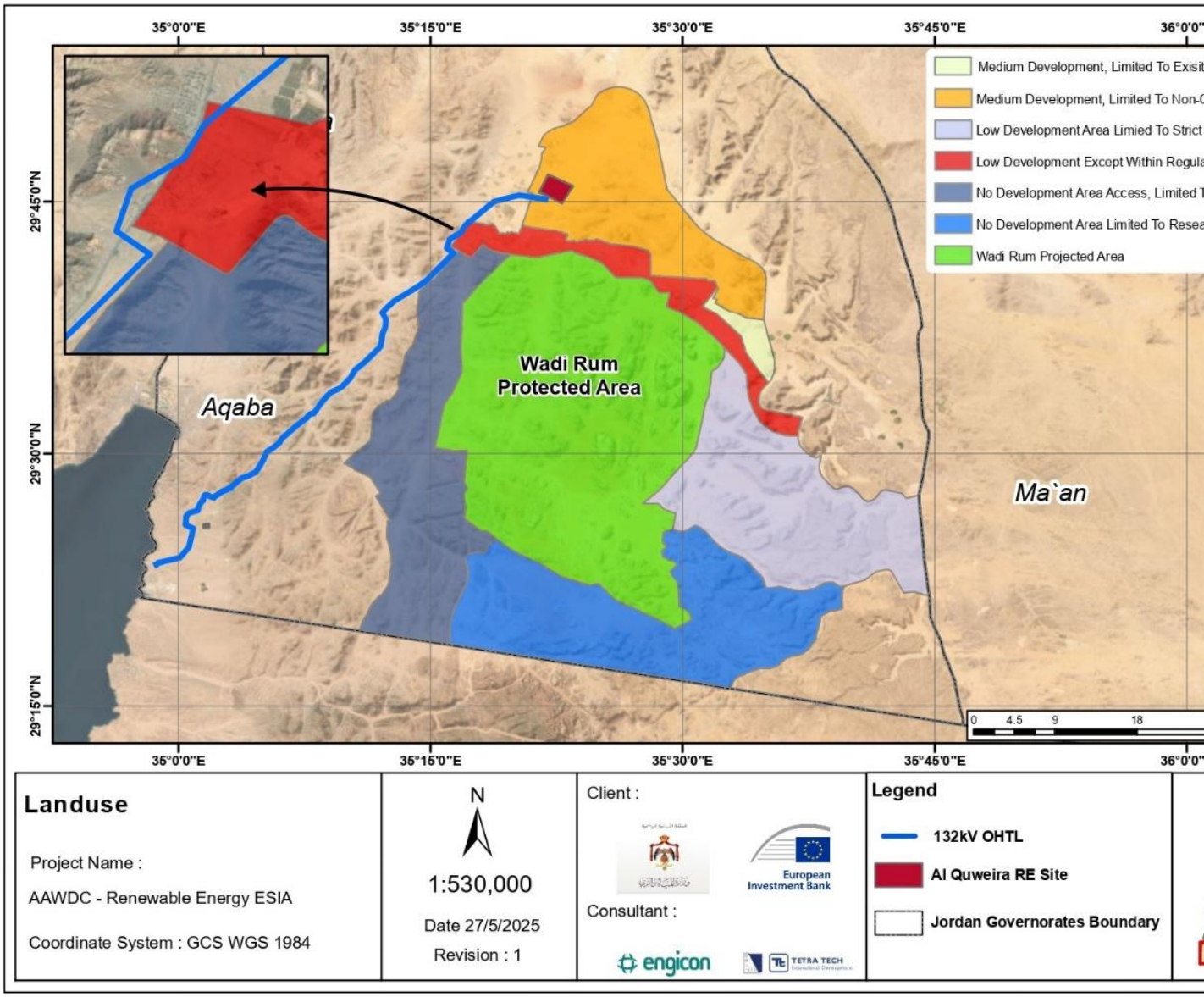


Figure 6-33). Additional discussions are required with ASEZA to determine the type of activities permitted within these zones. However, it should be mentioned that during the field visit, it was found that an operational solar energy park was located inside this Medium Development Zone. The facility is called Al-Quweira 103 Mwp PV Power Plant and it is located around 2 km away from RE Site (Figure 6-32), also known as the Sheikh Zayed Solar Power Complex which is owned by the MEMR (Global Energy Monitor, 2018).

Figure 6-32: PV Plant near Al-Quweira RE site

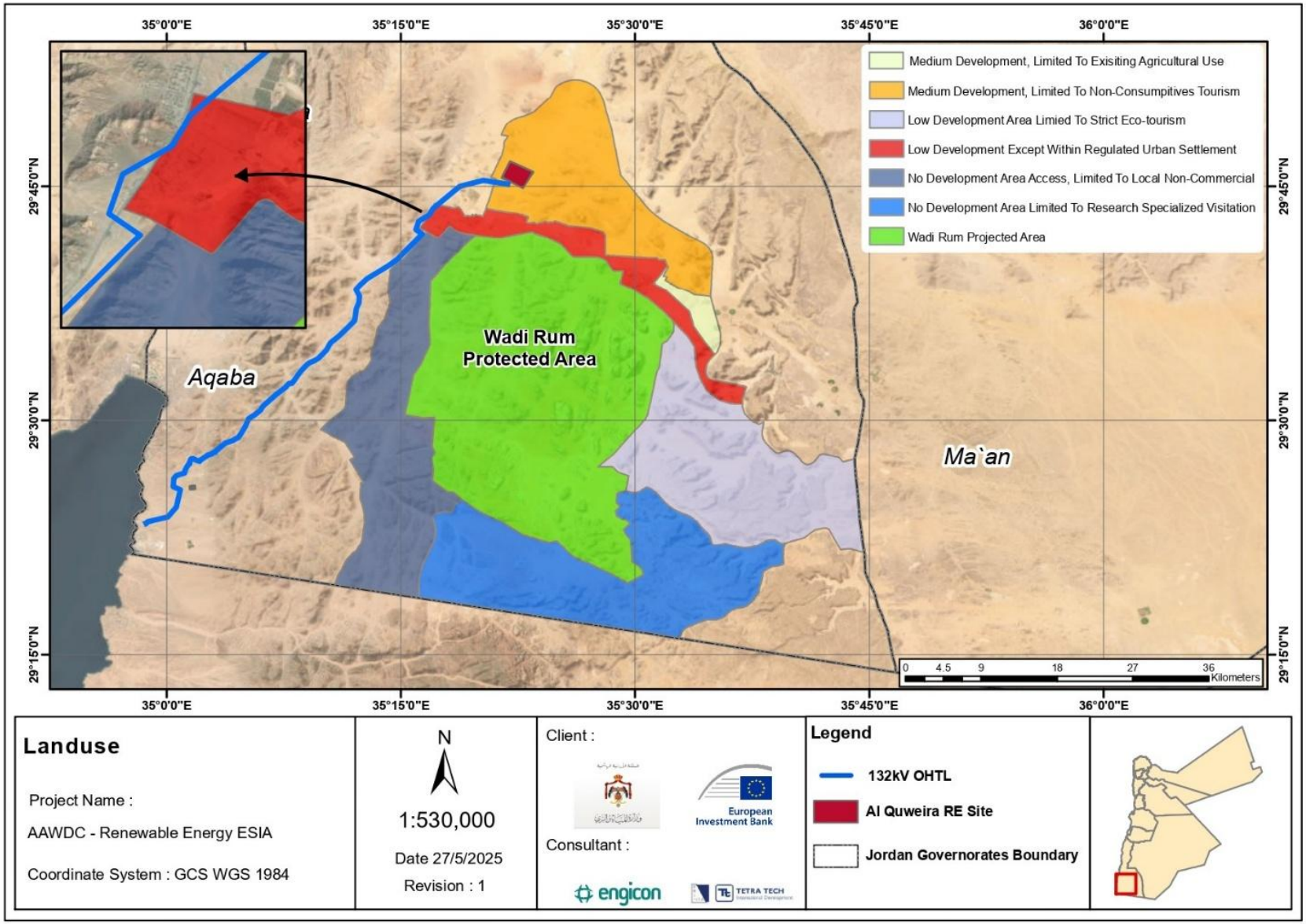


Figure 6-33: Land use of Wadi Rum Protected Area Buffer Zone, Source: ASEZA

The land use zones mentioned earlier are also divided into more detailed land use sub-zones. The RE Site is located inside the sub-zone that is defined as Touristic Project Area, while the OHTL delineation crosses that sub-zone and into a sub-zone called Buffer Zone Area. and then finally into a sub-zone called Research Area

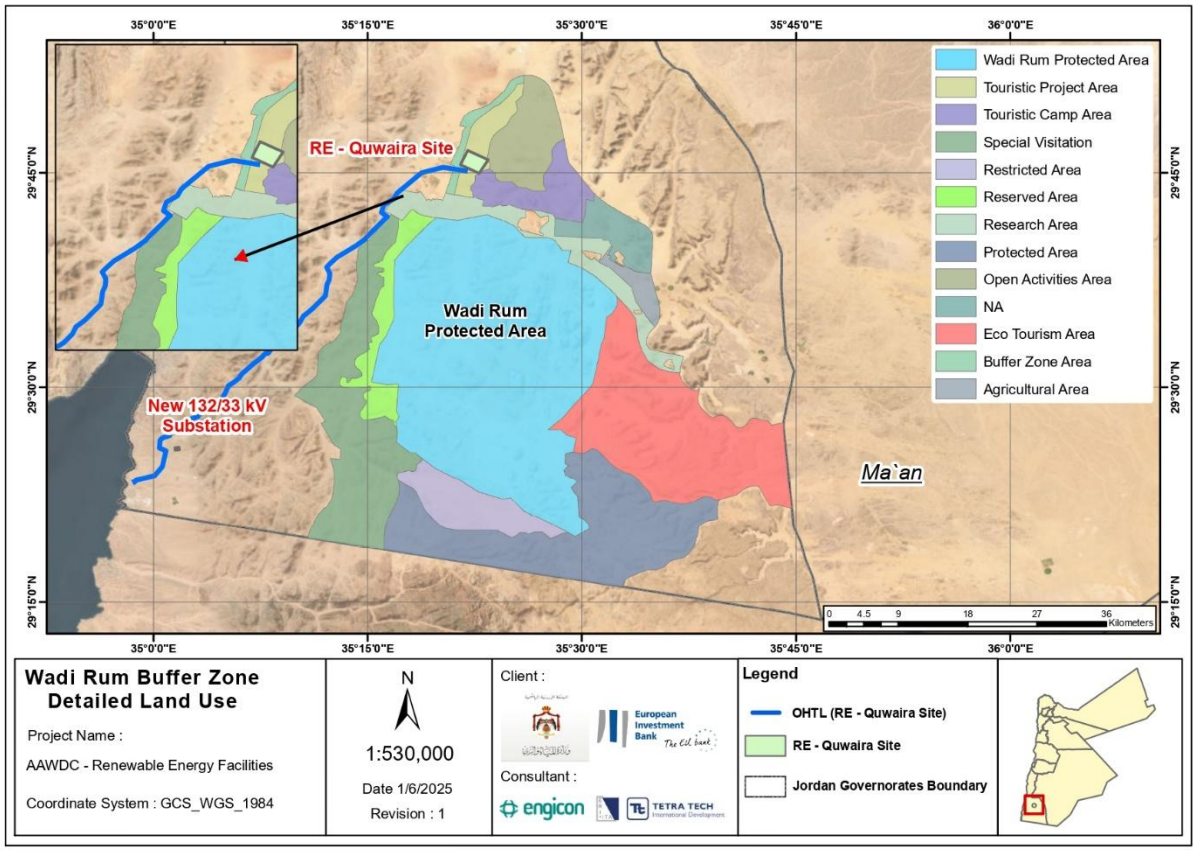


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Figure 6-34).

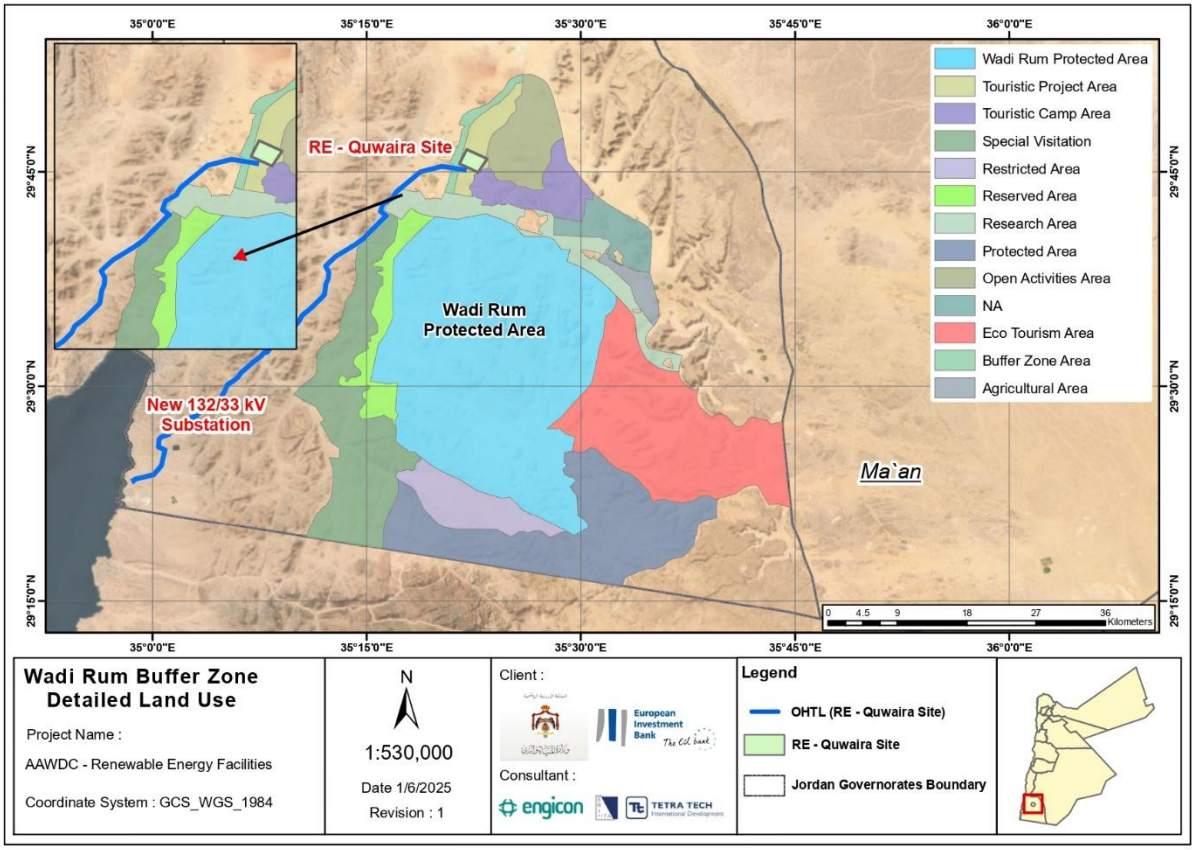

Figure 6-34: Detailed Land use of Wadi Rum Protected Area Buffer Zone, Source: ASEZA

The OHTL corridor includes several facilities and establishments, including transportation and public services such as gas stations, bus stations, fire stations, and the customs department. It also encompasses educational institutions like Aqaba University of Technology and Aqaba Medical Sciences University, technology and rehabilitation facilities such as the Aqaba Digital Hub and Aqaba Rehabilitation Centre, security and enforcement establishments, as well as industrial and commercial entities.

As previously mentioned, the OHTL route was modified to avoid passing through the buffer zone of the Wadi Rum Protected Area. A site visit to observe land use along this route was conducted on May 28, 2025 and is described below:

1. Agricultural Lands

During the site visit, several agricultural lands were observed in the vicinity of the proposed OHTL. Some of these lands were actively cultivated with potatoes, while others appeared to have been ploughed but had not been used for cultivation for a considerable period. The proposed OHTL is planned to pass over or near these agricultural areas at multiple locations.

Figure 6-35: Land use of New OHTL Route - Agricultural Lands

2. Existing Power Infrastructure

The proposed OHTL corridor will intersect or run adjacent to other existing overhead transmission lines and various power lines in several sections.

Figure 6-36: Land use of New OHTL Route – Existing Power Infrastructure

3. Religious Structures

Two mosques were identified in close proximity to the proposed OHTL corridor; however, one mosque seemed to be abandoned and not in use.

Figure 6-37: Land use of New OHTL Route – Religious Structures

4. Abandoned Structures:

Several abandoned structures were found near the proposed path of the OHTL. Although these structures are not currently in use, their presence may still be relevant from a land use, heritage, or safety perspective and should be documented accordingly during the detailed design.

Several abandoned hangars were also observed near the unused mosque. Although the area appeared deserted, it was noted that a guard was residing on the property. The guard stated that the hangars were originally developed for a poultry farm that was never completed or put into operation. It was also noted that the guard uses a tent on the premises to host guests whenever they visit.

5. Figure : Land use of New OHTL Route – Abandoned StructuresFuel Stations

Two petrol stations are located less than 500 meters of the proposed OHTL route.

Figure 6-38: Land use of New OHTL Route – Fuel Stations

6. Industrial Area

The proposed OHTL route passes through the Quwaira International Industrial Estate, which appeared unoccupied during the site visit. However, future development is anticipated within the estate. Additionally, a building belonging to the Electricity Distribution Company is in the area.

Figure 6-39: Land use of New OHTL Route – Industrial Area

As previously mentioned, the RE site location is owned by the MWI, eliminating the need for land acquisition at that specific site. However, the OHTL will pass through various lands, including both private and public properties. At this stage, the exact locations of the towers and the specific areas of land to be acquired remain undetermined. These details will be finalized by NEPCO and MWI at a later stage. For the purpose of this assessment, the ESIA team has assumed a 100-meter corridor for the OHTL where the towers may be located. Approximately 183 land plots within the OHTL corridor are privately owned and located outside municipal boundaries.

The project area is in close proximity to the designated Wadi Rum Filming Area, which spans approximately **240.34 km^2**, overlapping with it by an area of **0.11 km^2**. The filming area is recognized as one of the primary filming locations in Jordan, as highlighted by the Royal Film Commission (2025). Wadi Rum—often referred to as the "Valley of the Moon"—is renowned for its dramatic sandstone mountains, sweeping red sands, and distinctive rock formations. Its otherworldly landscape has made it a highly sought-after location for filmmakers, (Royal Film Commission , 2025).

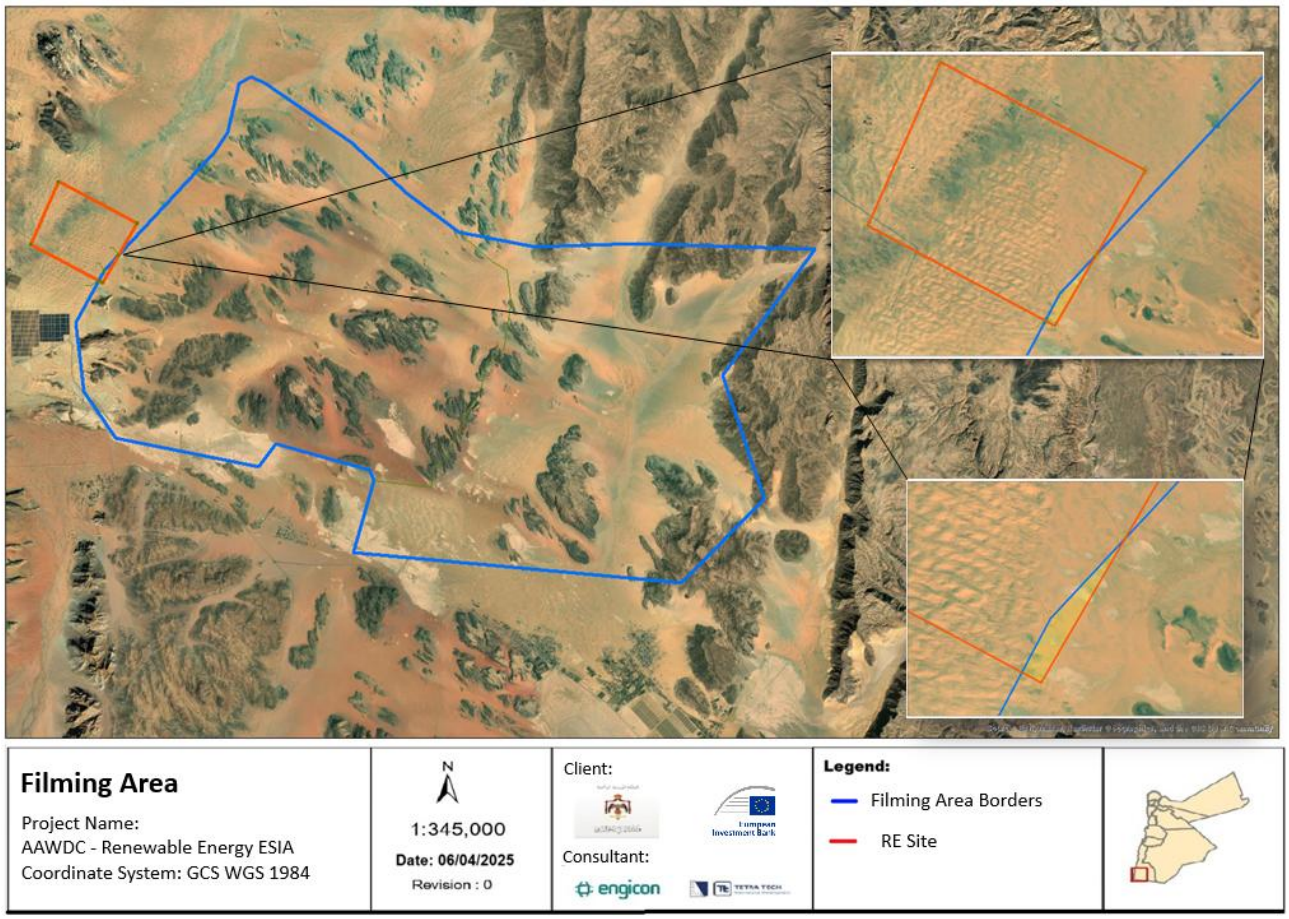

Figure 6-40: Filming Area

It is worth noting that the BOT Contractor will not construct any part of the PV plant within the area that intersects with the designated filming area in Wadi Rum.

6.3.7. Infrastructure

6.3.7.1. Water Supply

The main water source in Aqaba Governorate is groundwater, particularly from the Disi aquifer, one of Jordan's most vital water sources. Water is supplied to the central areas of Aqaba through 30 wells, with 21 wells dedicated to providing approximately 19 million cubic meters annually for drinking, industrial, commercial, and tourism purposes. Additionally, water is transported to Aqaba via a 65-kilometer natural-flow pipeline from the Disi aquifer, supplying nearby towns, villages, and collection tanks

Table 6-14and Table 6-15. (Irada, 2023)

Table 6-14: Key indicators for Water Sector in Aqaba District

Indicator	Aqaba District	Wadi Araba District	Total
Number of artesian wells	1	9	10
Number of dams and their storage capacity	0	1	1/ Capacity of 250,000 cubic meters
Number of operational pumping stations	8	6	14
Percentage of the population served by the water network	100%	100%	100%
Sewage networks / length in kilometres	332.8	-	332.8
Number of technical stations	2	-	2

Table 6-15: Key Indicators for Water Sector in Al-Quweira District

Indicator	AL-Quweira District
Number of artesian wells	4
Number of dams and their storage capacity	-
Number of operational pumping stations	7
Percentage of the population served by the water network	100%
Sewage networks / length in kilometres	-
Number of technical stations	-

6.3.7.2. Roads

Aqaba Governorate is connected by a network of main and secondary roads that connect several areas within the governorate and link it to the rest of Jordan (Irada, 2021) as shown in Table 6-16 and Figure 6-41.

Table 6-16: Roads Network in Aqaba

Road Types	Al-Quweira District
Main Roads	127 km
Secondary Roads	8 km
Local Roads	22 km
Agricultural roads	27 km
Total	184 km

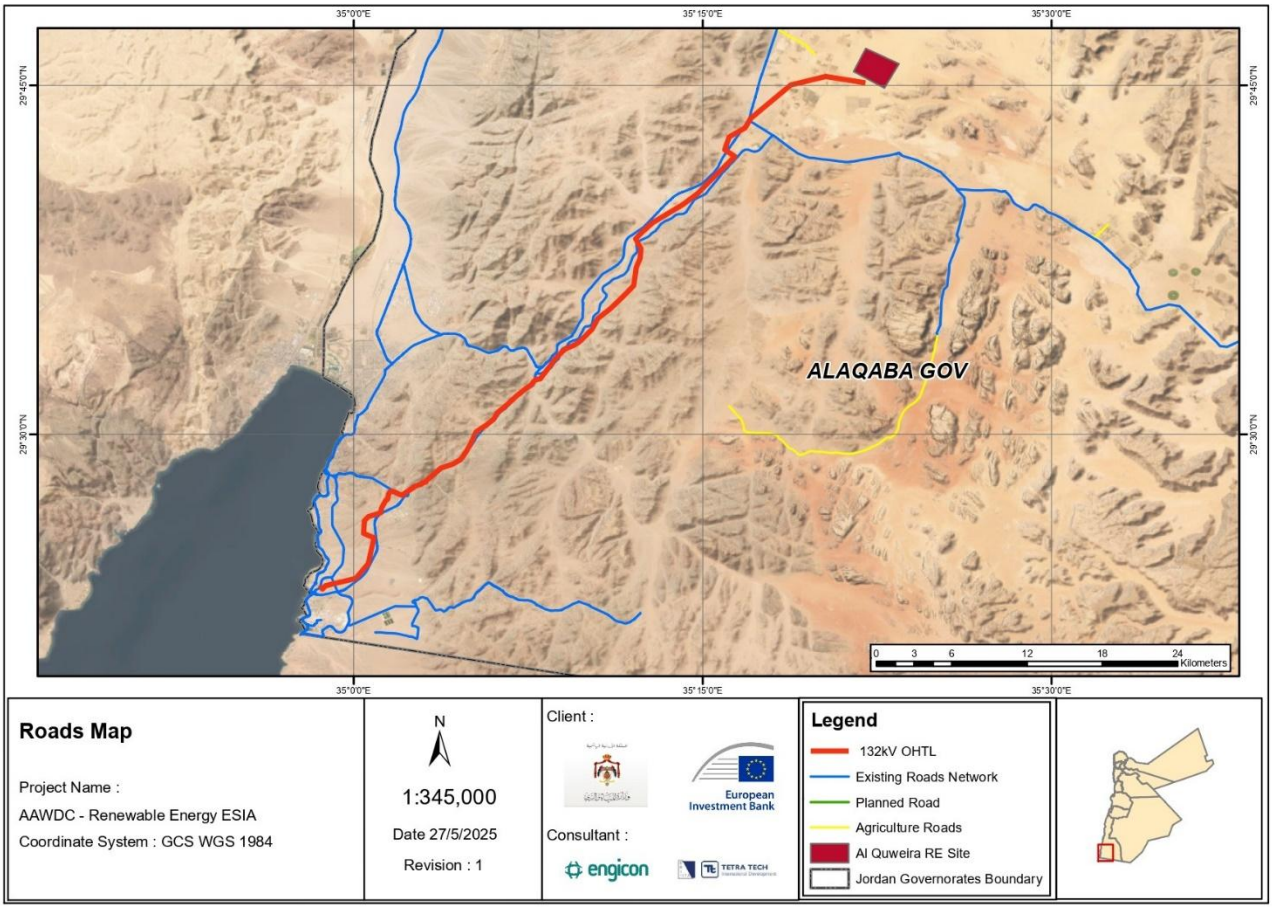

Figure 6-41: Main and Agricultural Roads in the Project Area

6.3.7.3. Wastewater

The Aqaba wastewater management capabilities were enhanced in 2021 with the establishment of a Wastewater Treatment Plant (Figure 6-42), designed to handle up to 28,000 m³/day. This facility incorporates advanced technology for wastewater recycling, odour and temperature control, electricity generation, and biogas utilization. (Irada, 2023)

Al-Quweira District rely on septic tanks for wastewater collection and disposal due to their limited population sizes. (Irada, 2023)

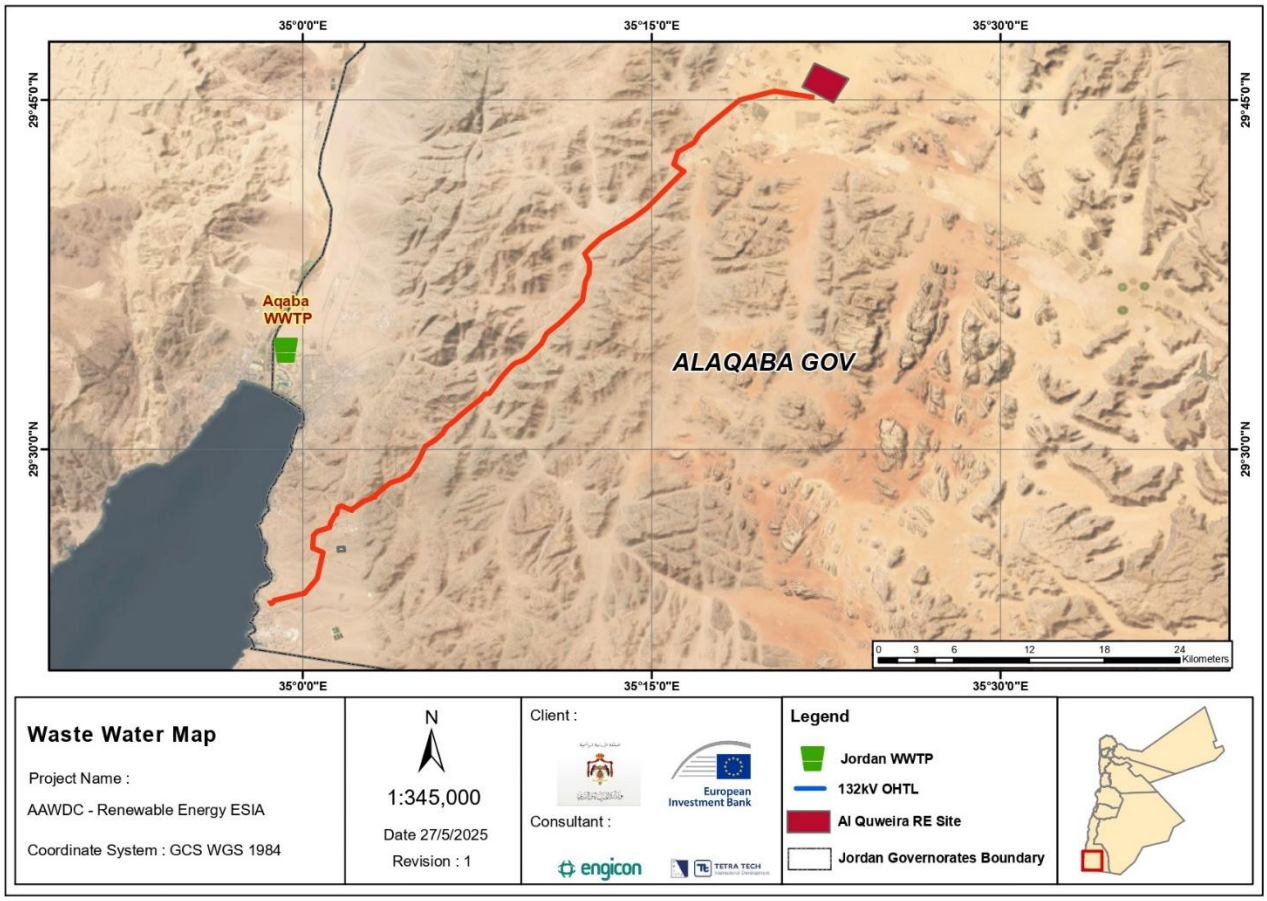

Figure 6-42: Nearest wastewater Treatment Plant

6.3.7.4. Solid Waste

The Al-Quweira district dumpsite has been officially closed under the Ministry of Local Administration's Solid Waste Management Plan. The nearest alternative is the Aqaba landfill (Figure 6-43), located 50 kilometres from the RE site (Alghad, 2023).

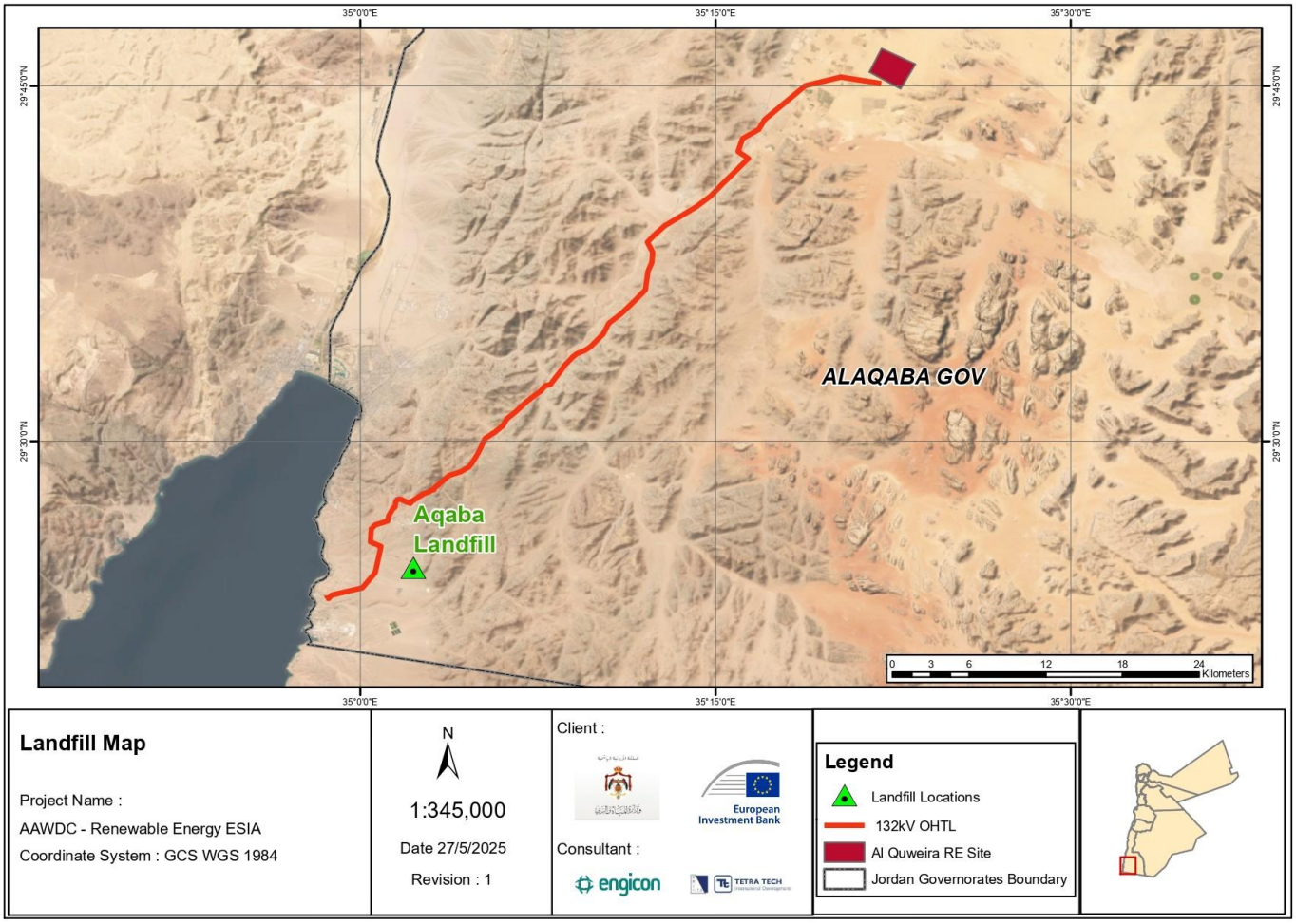

Figure 6-43: Nearest Landfill

6.3.8. Gender Aspects

Al Quweira district has witnessed progress in gender equality with attention given to improving women's education and their integration into the labour market in various fields. Women within Al-Quweira district generally prefer to work in the health and education sectors. The district has the Princess Basma Center, with branches extending throughout the district, offering various activities and training for the women's sector, in addition to charitable and cooperative associations, with women participating in their membership (Irada, 2021).

The main challenges facing the women sector in Al-Quewira District and Al-Aqaba are (Irada, 2021) (Irada, 2023):

- Limited availability of targeted programs and institutions dedicated to addressing and activating women's sector issues.
- Persistent negative societal attitudes towards women's participation in the workforce, particularly in the private sector.
- A strong preference among women for employment in the public sector, especially in fields such as education, healthcare, and administration.
- Low participation of women in establishing cooperative associations.
- A tendency among private sector employers to prioritize hiring men over women.
- Elevated unemployment rates among educated women within the district.
- The disparity in wages between men and women, especially in private sector institutions.

- Limited engagement of women in establishing small, medium-sized, or home-based businesses of their own.
- A noticeable preference by private sector institutions to employ men instead of women.
- Low interest among women in founding cooperative associations, with a stronger inclination towards charitable sector work.
- High unemployment rates among women in Aqaba Governorate.

ASEZA has recently launched the "Nashmiyah Project" initiative, which aims to empower women and support them in achieving self-reliance. The initiative specifically targets the most disadvantaged women who endure severe financial and psychological challenges, along with substantial social pressures (Aqaba Special Economic Zone Authority).

6.4. Cultural Heritage

No significant archaeological sites have been identified within the RE Site. However, several archaeological sites are found along the OHTL corridor, most of which are of low significance. No such site is located close enough to the OHTL corridor to be affected by it. Some sites feature scattered flint and pottery fragments, with protection zones ranging from 5 to 50 meters, as stipulated by the Antiquities Law No. 21 of 1988

A total of 13 sites were recorded inside/near the OHTL corridor through a literature review. Figure 6-44 and Table 6-17 present these sites, along with their characteristics and significance.

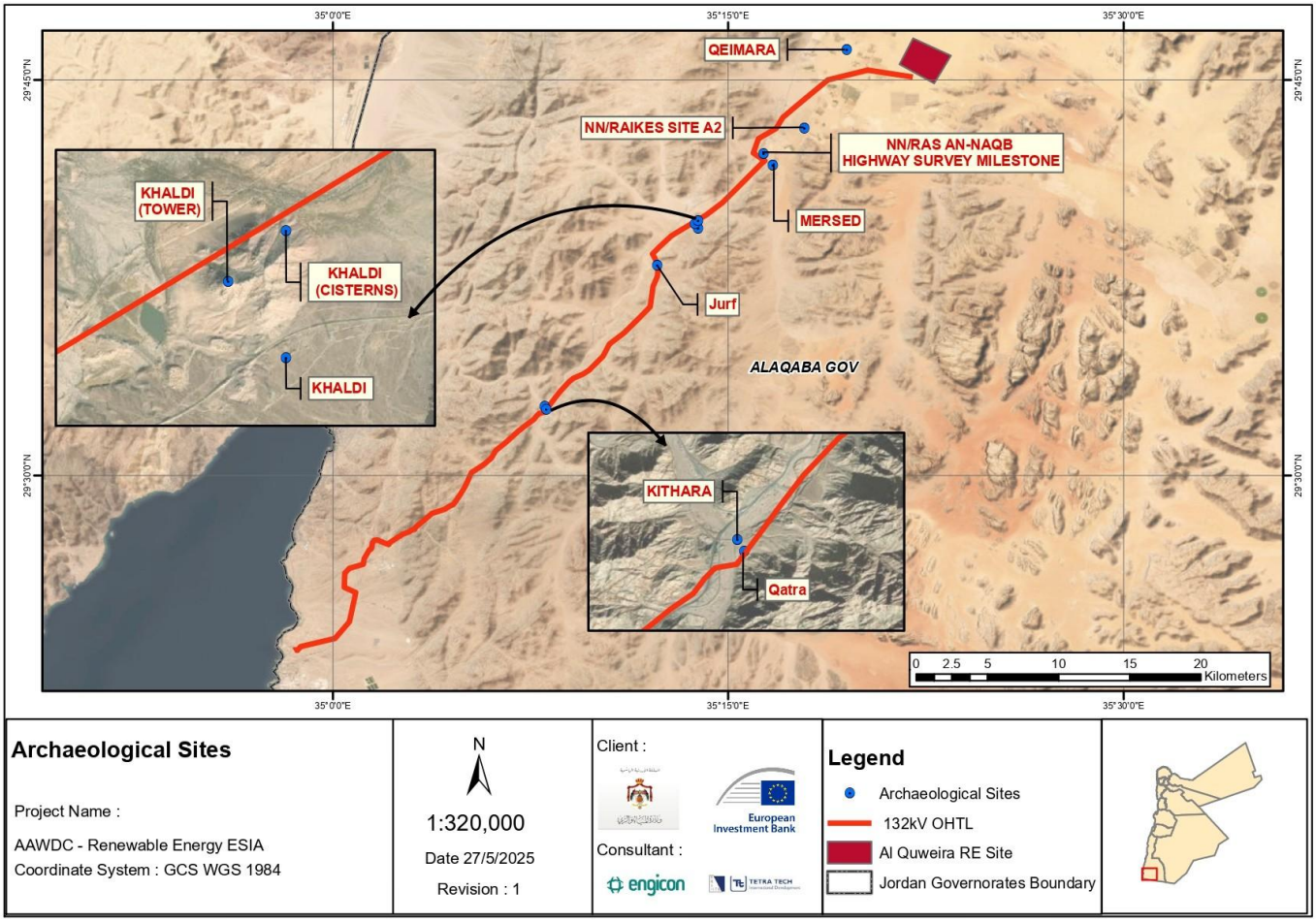

Figure 6-44: Archaeological Sites near the OHTL

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Table 6-17: Archaeological Sites Located within the PAI and their Properties

No	Site Name	Coordinates (Long Lat)	Date	Current Situation	Note	Threatened	Not Threatened
1.	MERSED	35.27829 29.6961	Roman/ Nabataean	Good preserved	Tower Scatter Sherd/Flint Surface Scatter	Not Protected	Not Excavated
2.	NN/RAS AN-NAQB HIGHWAY SURVEY MILESTONE	35.2721 29.70332	Unspecified/Unknown Period	Washed Away	Milestone and Latin Inscription	Not Protected	Not Excavated
3.	Qeimara	35.32484 29.76926	-	-	-	-	-
4.	NN/RAIKES SITE A2	35.29794 29.71954	Unspecified/Unknown Period	Washed Away	-	Not Protected	Not Excavated
5.	Jurf	35.20493 29.63296	Roman/ Nabataean	Very poor Condition	The settlement, Fortified/ Sherd/Flint Surface Scatter	Not Protected	Not Excavated
6.	KHALIDI	35.23075 29.65642	Roman/ Nabataean/ Byzantine	Very poor Condition	tombstones, Greek inscriptions, Caravansera, Castrum	Not Protected	Excavated
7.	KHALDI (TOWER)	35.22869 29.65912	Roman/ Nabataean	Very poor Condition	Tower and Scatter sherd		
8.	KHALDI (CISTERNS)	35.23075 29.66093	Nabataean	Very poor Condition	Water Structure, Cistern	Not Protected	Not Excavated
9.	KITHARA	35.13375 29.54363	Roman/ Byzantine	Good Condition	Castrum and Sherd/Flint Surface Scatter	Not Protected	Excavated
10.	Qatra	35.13478 29.54182	Modern	Mostly Washed Away	Village	Not Protected	Partly demolished

A site visit was conducted to investigate the sites identified in Table 6-17. The site visit found that five sites were categorized as "Washed Away Sites," indicating that they have been removed and no longer exist. Six sites fall under the "Very Poor Condition" category, as they still exist but are in a severely deteriorated state. Lastly, two sites were classified as "Good Preserved Sites," meaning they are still well-preserved.

In addition, three points along the corridors cross the Jordan Hijaz Railway (JHR), under the jurisdiction of the Jordan Hijaz Railway Corporation (JHRC). The JHR was constructed in the 1900s by the Ottomans and is considered part of the country's cultural heritage. The railway, however, is not operational.

The coordinates of the points are listed in Table 6-18.

Table 6-18: Coordinates of the Intersections between Corridors and JHR

Cross Point No.	Coordinates (Lat Long)
1	29°38'15.48"N 35°12'11.82"E
2	29°33'28.57"N 35° 8'53.01"E
3	29°32'46.97"N 35° 8'18.67"E

Table 6-19 shows the types of the presented archaeological sites in the project area

Table 6-19: Types of Represented Sites Found During Field Operations

No	Type	Site Name
1	Settlement Sites	Jurf; Qatra
2	Tomb	KHALIDI
3	Water Installations	RAKHEMTEIN; KHALDI (CISTERNS)
4	Flint Scatter	MERSED; Jurf; KHALDI (TOWER); KHALDI (CISTERNS);
5	Inscription	HADBET AL-HAMRA; KHALIDI
6	Burial, Cairn/Tumulus	HADBET AL-HAMRA; RAKHEMTEIN
7	Castrum	KITHARA
8	Tower	MERSED; RAKHEMTEIN; KHALDI (TOWER)

The two sites that were found in good, preserved condition during the fieldwork but are not threatened directly or indirectly by the project activities are:

- Mersed dated to Roman-Nabatean periods. The site is located on top of a high mountain served as a watch tower during the Nabataean and Roman eras possibly constructed during the building of the Via Nova Triana (The Roman Road).
- Kithara dated to Roman-Byzantine periods. The site is far from the OHTL corridor, it was previously negatively impacted in 1985 by the construction of the Aqaba Phosphate railway line. Recently, the site was partly excavated and documented as caravanserais.

7. Environmental and Social Impacts

7.1. Environmental and Social Impacts During Construction

7.1.1. Physical Environment

7.1.1.1. Soil

Impact

The project will be implemented at several locations having different soil characteristics. Therefore, the soil quality and morphology may be significantly disturbed during construction activities such as those needed for installing the OHTL towers and related infrastructure. Potential impacts include **soil compaction**, which reduces water infiltration, root penetration, soil aeration, and **blockage of natural drainage patterns** caused by the movement of heavy machinery, vehicles, and workers on-site.

Soil erosion is another concern, often resulting from vegetation clearing (particularly in areas around the towers, and part of the RE site), removal of the topsoil layer, and land grading during site preparation. This erosion can lead to the loss of fertile topsoil and sedimentation in nearby water bodies, further degrading land quality.

Improper housekeeping practices during construction, such as the **disposal of waste on land**, could exacerbate soil contamination and pollution. Soil contamination may also occur due to **accidental spills** of oils, fuels, or chemicals from construction equipment and machinery, or from improper disposal of **construction-related wastewater**. Additionally, if vegetation is not promptly restored, soil ecosystems may face long-term degradation, reducing the area's overall soil productivity and ecological balance.

Mitigation Measures

Soil disturbance and contamination risk can be reduced by applying the following measures:

- Schedule construction activities to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle movement.
- Preserve existing vegetation to the extent possible and ensure revegetation when possible.
- Immediately remediate any localized erosion during excavation and drilling activities (if any).
- Prepare and abide by a Pollution Prevention Management Plan and a Waste Management Plan.
- Reinstate the project area to its original condition after completion of the works.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Local	Local
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.1.1.2. Water Resources

Impact

Contamination of surface and groundwater may occur as a result of seepage from domestic or construction wastewater, accidental spills of fuels, oils, or chemicals, and diversion of contaminated rainwater runoff from the construction site. In flood-prone areas, improper management of generated wastewater, combined with inadequate handling and storage of hazardous materials, could lead to the infiltration of pollutants into the soil, potentially affecting underlying groundwater resources. The presence of the Disi Groundwater Basin, a non-renewable and strategically vital aquifer. However, the basin is protected by an impermeable geological layer, which limits direct contamination.

Water is also needed for different processes in the construction activities, such as concrete mixing, cleaning of tools and the used machinery, dust suppression, ground works activities and for potential testing of the newly constructed supplies. The construction phase will also require the consumption of water for domestic usages by the workers. If conservation measures are not in place, water consumption at the construction site may thus be overused causing overexploitation of water resources.

Mitigation Measures

In an effort to reduce the project's impacts on water quality during construction, the contractor must implement the following mitigation measures:

- Prepare and abide by a **Spill Prevention and Management Plan**
- Abide by measures for **proper disposal of wastewater**.
- Abide by **Waste Management Plan**
- Schedule works during dry season **if possible**.

Several mitigation measures can be implemented by the contractor to reduce natural resource depletion and consumption. These measures include:

- Reduce water wastage whenever possible
- Whenever possible, use dry-cleaning instead wet cleaning
- Regular site inspection to detect water leakages
- Raise awareness among workers on water conservation measures

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Local	Local
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.1.1.3. Energy Resources

Impact

Energy consumption during the construction phase will mostly be from generators installed at the construction sites offices for energy supply and construction vehicles including for supply of construction material. Fuel and oils are needed for the generators and for operation and maintenance of machinery engines and vehicles on and off site. If generators and engines are left running without being used in any activity, overconsumption and depletion of fuel is expected. This impact will last for the duration of the construction works.

Mitigation

Several measures can be implemented by the Contractor to reduce energy consumption at the site. These measures include:

- Regularly maintain the generators, vehicles, and construction machinery
- Shut down lighting at site offices during the night
- Switch off machinery and equipment when not in use
- Raise awareness among site staff on energy conservation

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Local	Local
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.1.1.4. Air Quality

Impacts

The machinery and vehicles used during the construction phase will produce exhaust emissions and gases that can temporarily affect local air quality. Exhaust gas emissions will also result from the power generators that will be utilized during the construction phase. In general, these exhaust gases contain particulate matter, Benzene, Toluene, Xylenes, Ozone, Nitrogen Oxides, and Sulphur Oxides, Carbon Dioxide and Carbon Monoxide. In addition, VOC might be released from storage of fuel and other chemicals.

Excavation activities, site preparation, and other earthwork activities along with the movement and transportation of heavy machinery on the site, generate particulate emissions such as dust that can affect local air quality. The significance of dust emissions is highly dependent on the wind conditions during the construction phase. Open burning of solid waste or other material on site, if allowed, could release emissions accompanied by toxins.

The improper storage and disposal of solid waste along with the improper discharge of wastewater will lead to odour emissions.

Mitigation

To minimize impact on air quality during construction, the Contractor should undertake the following activities:

- Implement the **dust suppression measures**.
- Regularly maintain all vehicles and construction machinery
- Prepare and abide by **Spill Prevention and Management Plan**
- Abide by measures for proper disposal of wastewater
- Abide by **Waste Management Plan**

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Local	Local
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.1.2. Biological Environment

Impacts

During construction of the RE site and its associated OHTL, several biodiversity impacts are anticipated due to various project activities. The removal of natural habitats from the sites will result in the permanent loss of land usable by native plants in areas that will be covered by solid surfaces or landscaped areas.

The construction of OHTL infrastructure may require the clearing of vegetation, which could disturb wildlife and potentially affect threatened species, including the Vulnerable Egyptian spiny-tailed lizard (*Uromastyx aegyptia*) and Sooty Falcon (*Falco concolor*). Nesting sites of seabirds in the landing area may also be impacted, leading to a loss of breeding grounds. Construction activities, such as excavation, levelling, and vegetation removal, may disturb avifauna and other wildlife, causing temporary habitat loss and triggering behavioural changes in response to sediment plumes, noise, vibrations, and increased human presence.

Additionally, the use of heavy machinery and increased human activity during construction may result in disturbances to fauna, including avifauna, which could cause stress, displacement, and altered feeding or breeding behaviours.

There is also a potential risk of hunting and active taking of wildlife by construction workers or others present on-site. This could pose a significant threat to local fauna, particularly to vulnerable or endangered species, such as the Egyptian spiny-tailed lizard (Uromastyx aegyptia) and Sooty Falcon (*Falco concolor*), that rely on the project area. Hunting or capturing wildlife can lead to population declines, disrupt ecological balance, and violate local and international conservation laws.

Mitigation

- Use existing roads and infrastructure where possible to avoid creating new access routes.
- Conduct vegetation clearance in phases to reduce the area affected at any given time.
- Rehabilitate disturbed areas not covered by permanent infrastructure with native vegetation.
- Conduct additional pre-construction ecological surveys to identify sensitive species, nesting sites, and critical habitats during other seasons to form a holistic understanding of the ecology of the area.
- Implement monitoring programs during construction to track wildlife activity and adapt practices accordingly.
- Restrict noisy or vibration-inducing activities to periods when wildlife activity is minimal
- Use low-noise machinery and install vibration dampening equipment to minimize disturbances.
- Prepare and abide by Spill Prevention Plan
- Avoid and strictly prohibit wildlife persecution, hunting, and all forms of animal and plant collection and active taking.
- Strictly prohibit tree cutting by the project staff and workers and apply fines and charges on non-compliance by the staff.
- Conduct a follow-up survey during the hotter season to reassess the status of *Uromastyx aegyptia* burrows across the project area.
- Conduct a survey for Sooty Falcons (*Falco concolor*) during the summer months

- Design and implement an extensive terrestrial biodiversity monitoring program as part of project requirements to assess environmental conditions before, during, and after the completion of the construction works so that the 'new' baseline post-operation conditions are determined.

- **Summary of Impact Assessment**

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3. Socio-Economic Environment

7.1.3.1. Economic Activities

Impacts

Construction of the RE Site and OHTL is considered an economic opportunity for the selected contractor and their subcontractors. Local businesses may also benefit from construction activities through selling raw materials, equipment, machinery and goods. In addition, the project will create jobs for the local community with varying skill requirements. The presence of workers within the communities could increase local business opportunities. This impact is, however, temporary and jobs will be discontinued as soon as construction works are complete.

In addition, as a result of the works on the OHTL in the area, surrounding businesses and visitors using common roads may be disrupted.

Mitigation

The Contractor should implement the following:

- Transparent recruitment procedure
- Local hiring and skills development strategy to encourage local employment and manage expectations

As mentioned earlier, surrounding businesses and visitors using common roads may be disrupted during construction phase. As such the Contractor must ensure that excavation works in the concerned towns are not blocking access to local businesses by owners and visitors. This can be done by:

- Install temporary structures from the road where pipe laying is being done to local businesses
- Inform local businesses owner about construction activities and schedule
- Proper communication and coordination with affected owners

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium

Parameter	Assessed Impacts	Residual Impacts
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.2. Labour Influx and Social Tensions

Impacts

Social tensions may arise, if a significant portion of job opportunities are offered to foreign workers recruited for the Project, as Jordanian workers may perceive that such job opportunities could have been filled by them. Social tensions between national and foreign workers may also arise if they are not equally compensated as per the scale of market price rates. Moreover, labour influx may also lead to social interactions between workers and the surrounding communities leading to culturally insensitive behaviours and incidents such as gender-based violence, sexual abuse and exploitation and sexual harassment incidents.

Mitigation

The contractor shall ensure the following:

- Give priority work for local community members and provide vocational training if possible, to improve their skillset.
- Draft a Code of Conduct for workers and ensure that workers sign and understand the Code of Conduct.
- Develop and implement a Grievance Redress Mechanism and respond to culturally insensitive behaviours and incidents as a matter of priority.
- Coordinate and implement public awareness campaigns for workers regarding dealing with the local population to minimize friction caused by contacts between the construction workforce and communities.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.3. Working Conditions

Potential recruitment of minors in hazardous tasks may occur during the construction phase, along with risks of gender discrimination in hiring. While child and forced labour are not expected, concerns such as unequal pay, unfair treatment, and wage disparities between local and foreign workers could arise.

Gender discrimination may limit job opportunities for women and result in non-compliance with labour equality regulations. Wage gaps and unfair treatment of subcontracted or temporary workers could create social tensions and lower worker morale.

Mitigation

The following preventive and mitigation measures are recommended:

- Implement and abide by Labour Conditions specified in the Project ESMP.
- Prohibit child and forced labour in the project as defined by the ILO, Jordanian legislation.
- Abide by ILO Standards.
- Coordinate and implement public awareness campaigns for workers and the communities

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.4. Land Acquisition, Land Use and Aesthetics

Impacts

The construction of the RE site and the OHTL will result in a change in land use. The installation of the OHTL and towers will traverse various types of land, including vacant virgin land, rocky terrain, and private lands used for diverse activities.

As a result, land acquisition associated with the OHTL, and towers will have economic impacts on landowners. To address these impacts, a comprehensive Land Acquisition Plan (LAP) and/or Resettlement Action Plan (RAP) will need to be developed during the detailed design phase to ensure fair and transparent processes and minimize adverse effects on affected stakeholders.

Additionally, the presence of construction activities is expected to create visual intrusion, particularly near residential areas and locations frequented for recreational activities. This impact may affect the aesthetic value of the surroundings and the experience of those using the area for tourism or leisure purposes and the filming area.

Mitigation

All lands in the project area of the Project components shall be acquired and compensated according to the Real Estate Ownership Law No. 13 of 2019 and its amendments and EIB Standard 6 for Involuntary Resettlement by following the Land Acquisition and Resettlement Policy Framework for the AAWDC project. A Resettlement Action Plan needs to be developed for the RE Component after completing the final design of the RE Site and its OHTL. Mitigation measures include:

- Coordination with the Department of Lands and Survey shall be made so that all related land use will be with the permission of the landowner and/or land user and compensation is provided at full replacement cost or as agreed through an open market transaction.
- Monitoring procedures shall be put in place ensuring that negotiations occurred and the agreed compensation to private landowners will be provided in a timely manner for the purpose of securing that their living standard and income opportunities remain at their pre-Project levels.
- A grievance mechanism shall be put in place that receive complaints on land acquisition matters.
- The BOT Contractor will be responsible to cover any occupancy indemnities for the extraction or use of construction materials, and the cost of acquiring the necessary land to stockpile excess backfill material.

- The BOT Contractor will be responsible to cover any damage suffered by the owners or users of the land as a result of a serious misconduct by his construction personnel.
- Once the final affected land plots are identified, the BOT Contractor will be responsible for preparing and adhering to a comprehensive Resettlement Plan to ensure fair and transparent processes in line with the Land Acquisition and Resettlement Policy Framework for the overall project.
- The BOT Contractor shall coordinate with ASEZA, the Royal Film Commission and the Wadi Rum Film Centre prior to commencing any construction activities. This coordination aims to ensure that no filming is scheduled within the designated area during the construction period and that the planned activities will not interfere with or impact the integrity of the filming zone.

Furthermore, the following must be implemented to mitigate the impacts of visual intrusion due to the presence of construction activities on site, especially near residential areas:

- Install adequate fencing around construction sites
- Organize stock piling scheduling works to minimize the construction area

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.5. Infrastructure and Public Services

Impacts

As part of the OHTL crosses residential areas, temporary disruption or disturbance to local road networks and services provided within the vicinity of the sites such as the electricity network, water supplies and telecommunication services might occur as a result of the excavation works.

During construction, the use of public utilities such as water supply and waste disposal for construction activities and by workers is likely to be limited but is still expected to result in minor and temporary pressures on these systems.

Mitigation

- Develop and implement a **Traffic Management Plan** to minimize disruptions to local road networks.
- Schedule excavation and construction activities during off-peak hours to reduce traffic congestion.
- Provide clear signage and alternative routes for vehicles and pedestrians in affected areas.
- Coordinate with local authorities to ensure timely notification of road closures or diversions.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low

Parameter	Assessed Impacts	Residual Impacts
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.6. Traffic

Impacts

A short-term increase in the amount of traffic is expected to occur within the project area. In fact, the construction activities require the transportation of materials and equipment carried by trucks and large vehicles thus leading to traffic congestion. In addition, the closure of certain roads/lanes may also lead to traffic congestion. Furthermore, there is a risk of materials falling from vehicles during transportation potentially causing accidents and leading to disruption in traffic.

Mitigation

The contractor should develop and abide by a **Traffic and Transport Management Plan** that would ensure smooth traffic along the local road network especially in residential areas. The Plan shall be in line with the local traffic regulations. In addition to proper warning signs, a worker should be positioned on the road near an active construction area to warn the passing cars and ensure the traffic is not blocked. If blocking a road is necessary, an alternative route should be clearly marked. The contractor should also ensure that any material transported by trucks is well covered along transportation.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Local	Local
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.1.3.7. Public Health and Safety

Impacts

During the construction phase, the local community may be exposed to several health and safety risks due to excavation works, the operation of heavy machinery, and increased construction-related activities, particularly in areas near residential neighbourhoods and along the OHTL route. Construction activities are likely to generate elevated levels of dust and noise, which could cause respiratory and other health problems, as well as nuisance to residents living in close proximity to the construction sites. Additionally, installation activities for the OHTL and its associated components may require temporary road closures or narrowing of existing roads, leading to traffic congestion and delays that impact nearby towns. The increased movement of construction vehicles and machinery on local roads could heighten the risk of traffic accidents, posing safety concerns for the local community. Furthermore, improper handling of construction materials or hazardous substances could exacerbate public health risks if not managed properly.

Mitigation

The contractor shall be responsible for the protection of public health from any danger associated with construction activities, the safe and easy passage of pedestrians and traffic management within project area. Therefore, a **Health and Safety** plan should be developed and implemented, in addition to a **Site Security Management Plan**

Measures to be implemented to safeguard local community members and the public should include the following:

- Fence the construction area from all sides to prevent access to the site.
- Prohibit unattended/unauthorized public access.
- Install proper fences marked by red warning lights at night around excavations, material dumps or other obstructions at the construction sites
- Install warning signs of excavation and construction activities at the external part of the site and at a distance of 100 meters.
- Equip Project drivers with telephones for contacting the emergency services to enact the Emergency Preparedness and Response Plan (EPRP) if necessary, in case of emergency.
- Manage the grievance mechanism through which community members can make complaints about Project activities.
- Address potential increase in demand for local health facilities from in-Project migration arising from the construction workforce and support to health facilities located in the Project area (e.g. in terms of infrastructure, equipment, staff or financial/running costs).

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.8. Occupational Health and Safety

Impacts

Accidents and injuries to workers may be caused from several construction activities including site preparation and excavation works. This might lead to transportation accidents, falls, electric shock, mishandling of machinery and other construction related accidents. For example, the high noise generated from the machinery could damage the hearing of the workers; and dust generation from the different construction activities, and movement and transportation may cause respiratory problems for workers on site if appropriate personal protection equipment is not being used. In addition, natural environmental challenges such as extreme cold conditions, heat stroke or snake bites might cause health problems to onsite workers.

There are also risks of injuries to workers from accidents with public and private vehicles which are driving near construction sites. Without effective barriers and safety signs in place, there are risks of vehicles driving into construction areas such as into excavated sites. Furthermore, there is a risk of spreading diseases between workers on site or at worker camps.

During the construction phase of the OHTL, additional occupational health and safety impacts primarily arise from working with high-voltage equipment, heavy machinery and at heights. Workers may face risks such as electrical hazards, including electrocution and arc flashes, as well as hazards associated with the erection of towers, tensioning of cables, and handling heavy loads.

Mitigation

The contractor shall be responsible for the protection of public health from any danger associated with construction activities, traffic management within project area and the safe and easy passage of pedestrians, Therefore, a **Health and Safety** plan should be developed and implemented, in addition to a **Site Security Management Plan**

To protect the rights of workers, the contractor should adopt human resource policies and procedures that are in accordance with national laws and the International Labour Organisation's Core Labour Standards to which Jordan is a signatory. The BOT contractor shall ensure the workers' health and safety against possible accidents and injuries as a result of different construction activities. As such the following mandatory mitigation measures shall be incorporated into the Health and Safety Plan and implemented:

- Workers shall wear personal protective equipment (PPE) including hard hats, safety glasses, slip resistant boots, and masks;
- First aid kit shall be available at each working site;
- At least one onsite worker trained in basic first aid shall be present onsite. If number of workers in one site exceeds 50 and less than 500, appoint a full-time nurse and a part time doctor.
- Chemicals stored onsite shall be labelled and handled properly;
- All electrical tools and equipment shall be maintained and checked regularly for any defect;
- The contractor shall conduct training and awareness meetings including safety toolbox talks, correct use of PPE, health and safety procedures, and handling hazardous material containers and related wastes.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.9. Solid Waste

Improper solid waste disposal could lead to various detrimental environmental impacts including pollution of water and soil resources within and beyond the project area. A detailed description of the sources of solid waste during project construction shall be provided by the contractor.

Impacts

Solid Waste

Solid waste will be generated from the implementation of the proposed project, for example inter alia piles of sand and dirt due to excavation, debris, cement and their resulting empty bags. In addition, domestic waste will be generated from workers on site. Inappropriate waste handling and improper disposal practices of construction waste may result in soil, ground and surface water contamination due to leaching and runoffs, leading to a reduction in overall soil and water quality. In addition, these materials could be directly discharged into nearby wadis within the project area thus polluting surface water especially during the wet season.

Hazardous Waste

Hazardous waste generated during the construction project can pose significant environmental risks if not properly managed. Such waste may include fuels, oils, chemical containers, and solvents used in construction activities. Improper handling or disposal of these materials can lead to soil and surface water contamination through spills, leaks, or runoff, especially during the wet season. Inadequate waste management practices could result in long-term degradation of soil and water quality, emphasizing the need for stringent hazardous waste handling, storage, and disposal measures.

Mitigation

- Waste segregation and labelling
- Prepare and abide by a waste management plan
- Prepare and abide by a spill prevention and response
- Dispose the hazardous waste through licensed facilities

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.10. Wastewater Generation

Major construction activities that lead to the generation of wastewater include:

- Domestic wastewater
- Washing of machinery;
- Maintenance of heavy machines and vehicles that generate wastewater contaminated with oil and grease;
- Excavation of the site thus generating runoffs contaminated with suspended solids, especially during rainy days;
- Storm water runoff that contains high amounts of oil, grease and suspended solids

This wastewater may pollute nearby water bodies and soils if not discharged and managed properly.

In addition, the implementation of the proposed project will require a high number of daily workers who will generate a significant amount of domestic wastewater. Disposal of the generated domestic wastewater may cause water and soil contamination if not disposed of correctly.

Mitigation

To ensure that generated solid waste and wastewater during the construction phase do not have a negative impact on the surrounding environment, the following measures should be adopted by the Contractor:

- Prepare and abide by a **Waste Management Plan**
- Ensure that constructed septic tanks during the construction phase are well contained and impermeable to prevent leakage of wastewater into soil and groundwater; and ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing
- Hire a private contractor for the collection of generated wastewater from the site to an authorized WWTP, such that the tankers must have a GPS system installed to track their movement
- Prohibit illegal disposal of wastewater to land

- Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and discharged into authorized WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.1.3.11. Cultural Resources

Impacts

None of the listed archaeological sites within this zone are located near areas where project excavation or construction activities will occur. As such, no adverse impacts on such cultural heritage and archaeological sites and resources are expected to occur during the Project Activities. However, due to the presence of archaeological sites within the area, unknown artifacts may be uncovered during excavation activities.

On the other hand, the OHTL will cross Al Hijaz Railway, which is considered as cultural site, at three points. NEPCO must take necessary precautions to avoid any disturbances to these sites.

In addition, construction activities considered to be a source of vibration and dust resulting from the drilling operations vehicles movements that may affect nearby sites. Construction activities associated with the RE Site and OHTL, including excavation, drilling, and vehicle movement, pose potential risks by generating vibration, dust, and noise, which could affect the integrity of archaeological features and the visual and environmental setting of the area.

Mitigation

Mitigation measures for the impacts on archaeology and cultural heritage during construction include the following:

- Ensure all chance finds of cultural heritage are reported immediately to DoA, excavation stopped, and contractor awaits instructions from DoA.
- Ensure coordination between the Contractor and DoA.
- Leave a 15-m buffer zone around each site.

Summary of Impact Assessment

Parameter	Assessed Impact	Residual Impact
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Moderate	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**

Parameter	Assessed Impact	Residual Impact
Duration	Short-term	Short-term
Extent	Site	Site
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.2. Environmental and Social Impacts During Operation

7.2.1. Physical Environment

7.2.1.1. Soil

Impacts

Areas around maintenance pathways, access roads, and equipment pads may be subject to soil compaction due to repeated vehicular and personnel movement during the operational phase. Compacted soil reduces water infiltration, alters soil structure, and impairs vegetation regrowth, potentially leading to long-term degradation of soil quality. Additionally, accidental spills or leaks of maintenance fluids such as oils, lubricants, or chemicals from equipment used for maintaining the PV panels or OHTL can result in localized soil contamination. Improper disposal of operational waste, including batteries or damaged equipment, may further exacerbate soil pollution, posing risks to soil health and potentially affecting the surrounding environment.

Mitigation Measures

Soil disturbance and contamination risk can be reduced by applying the following measures:

- Prepare and abide by a **Pollution Prevention Management Plan** and a **Waste Management Plan**.
- Reinstate the project area to its original condition after completion of the maintenance works.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Local	Local
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.2.1.2. Water Resources

Impacts

During the operation phase, water will primarily be used for cleaning the PV arrays, which is expected to occur approximately 12 times a year, potentially contributing to the depletion of local water resources.

Mitigation Measures

Priority must be given to the use of dry-cleaning methods, which do not entail the use of water and involve robots mounted on module rows or dry brushes.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low

Parameter	Assessed Impacts	Residual Impacts
Intensity	**Medium**	**Low**
Duration	Long-term	Long-term
Extent	Local	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.2.1.3. Energy Resources

The operational phase of the project offers significant positive impacts on the energy sector, primarily by contributing to the generation of clean, renewable electricity. This reduces reliance on conventional fossil fuel-based power generation, thereby lowering GHG emissions and contributing to climate change mitigation especially within the SWRO Site. The project can help stabilize electricity costs for the project over time, as solar energy has minimal operational costs compared to fluctuating fossil fuel prices.

The operation of the RE Site also involves auxiliary energy demands for activities such as panel cleaning, equipment maintenance, and the functioning of monitoring systems. Though this energy usage is minor compared to the total energy generated, it should be factored into the project's overall energy balance.

Summary of Impact Assessment

Parameter	Assessed Impacts
Nature	Beneficial
Type	Direct
Magnitude	Medium
Likelihood	High
Intensity	**High**
Duration	Long-term
Extent	National
Scale	**Medium**
Significance	**High Positive Impact**

7.2.1.4. Air Quality

The operation of the PV plant and OHTL primarily has positive impacts on air quality by reducing GHG emissions and pollutants associated with fossil fuel-based energy production especially within the SWRO Site. Minimal emissions are expected from vehicles used during maintenance activities.

Summary of Impact Assessment

Parameter	Assessed Impacts
Nature	Beneficial
Type	Direct
Magnitude	Medium
Likelihood	High
Intensity	**High**
Duration	Long-term
Extent	national
Scale	**Medium**

Parameter	Assessed Impacts
Significance	**High Positive Impact**

7.2.2. Biological Environment

Impacts

During the operation phase, impacts on the biological environment are expected to be lower than during construction but still present important considerations. Routine maintenance activities, human presence, and vehicular movement may cause minor disturbances to local fauna. While these disturbances are likely to be short-term and of low significance, they could still affect both site-level and local ecosystems by disrupting natural behaviours or temporarily displacing wildlife.

The presence of permanent infrastructure, such as the PV plant structures, OHTL towers, and any abandoned piles of construction waste or materials, could obstruct the natural movement of wildlife. These barriers may disrupt ecological linkages and movement corridors. Such disruptions can have cascading effects on the local ecological balance.

A significant concern during operation is the risk of collision and electrocution for large-sized birds, such as the Endangered Steppe Eagle (*Aquila nipalensis*), which may interact with OHTL infrastructure. Raptors and other bird species that use the towers for perching or hunting are particularly vulnerable. Bird fatalities from collisions with wires or electrocution can contribute to population declines and impact avifauna at both local and regional levels.

Additionally, the potential for illegal hunting or active taking of wildlife by operational staff or visitors poses a risk to the region's biodiversity. This is especially critical for vulnerable species like the Egyptian spiny-tailed lizard (*Uromastyx aegyptia*), which is already under pressure from habitat loss and human activities. Such illegal activities can further threaten the ecological integrity of the area.

Mitigation Measures

- Limit human activity and vehicular movement to designated areas to minimize disturbances to wildlife.
- Schedule maintenance activities during daylight hours to reduce disruption to nocturnal species.
- Remove any abandoned construction waste, materials, or piles that could obstruct wildlife movement corridors.
- Install bird diverters, reflectors, or other visual markers on OHTL wires to reduce collision risks for large bird species.
- Avoid and strictly prohibit wildlife persecution, hunting, and all forms of animal and plant collection and active taking.
- Design and implement an extensive terrestrial biodiversity monitoring program as part of project requirements to assess environmental conditions before, during, and after the completion of the construction works so that the 'new' baseline conditions before operation commences are determined.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**

Parameter	Assessed Impacts	Residual Impacts
Significance	**Moderate**	**Low**

7.2.3. Socio-Economic Environment

7.2.3.1. Economic Activities

Impacts

The operation and maintenance of the PV plant and OHTL will create direct employment opportunities for local communities, primarily for security staff (guard) and O&M personnel responsible for monitoring and maintaining the facilities.

Summary of Impact Assessment

Parameter	Assessed Impacts
Nature	Beneficial
Type	Direct
Magnitude	Low
Likelihood	High
Intensity	**Medium**
Duration	Long-term
Extent	Site
Scale	**Medium**
Significance	**Moderate Positive Impact**

7.2.3.2. Land Acquisition, Land Use and Aesthetics

Impacts

The presence of OHTL towers may reduce the value of nearby lands, which could affect property owners and land use in the surrounding areas. The reduction in land value could be particularly significant in residential areas or regions with high tourism potential.

The project's visible infrastructure, including the PV arrays and OHTL towers, may also significantly impact the aesthetic value of the landscape. This is particularly important in areas of high scenic or cultural value where the visual presence of the infrastructure may detract from the natural beauty of the region.

Mitigation

- Engage with local tourism authorities and residents to identify ways to mitigate aesthetic concerns.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local

Parameter	Assessed Impacts	Residual Impacts
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.2.3.3. Infrastructure and Public Services

Impacts

Periodic maintenance activities may lead to localized wear and tear on access roads due to the movement of vehicles and equipment. The use of public utilities, such as water and sanitation services for operational staff, may place minor, localized pressure on these systems, particularly in areas with limited capacity.

Mitigation

- Develop and implement a **Traffic Management Plan** to minimize disruptions to local road networks.
- Scheduled maintenance of the OHTL infrastructure
- Provide clear signage and alternative routes for vehicles and pedestrians in affected areas.
- Coordinate with local authorities to ensure timely notification of road closures or diversions.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	Medium	Low
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Local	Local
Scale	**Low**	**Low**
Significance	**Low**	**Negligible**

7.2.3.4. Public Health and Safety

Impacts

During the operation and maintenance phases of the PV plant and OHTL, there are potential public health and safety concerns that need to be addressed. One notable issue is the phenomenon of corona discharge from OHTL, which occurs when the electric field strength around the conductors exceeds the breakdown strength of air. This can result in audible noise, electromagnetic interference, and the production of ozone and other ionized particles. While these effects are typically localized and within regulatory safety limits, prolonged exposure to high levels of ozone or electromagnetic fields could raise health concerns among nearby residents, particularly in areas where OHTL passes close to residential zones or public spaces.

Additionally, maintenance activities involving heavy machinery and vehicles could pose safety risks to nearby communities, especially where access roads overlap with public roads or residential areas. The risk of electrical hazards, such as electrocution or fires, exists if unauthorized access to OHTL infrastructure occurs or if tampering takes place.

Mitigation

Measures to be implemented to safeguard local community members and the public should include the following:

- Conduct routine monitoring of electromagnetic fields to ensure compliance with safety standards and address any community concerns.
- Prepare and abide by **Health and Safety** plan.

- Place clear and visible signage warning of potential electrical hazards and restricting access to operational areas.
- Develop and implement **Emergency Response Plans** to handle incidents such as fires, electrocution, or spills promptly and effectively.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.2.3.5. Occupational Health and Safety

Impacts

During the operation and maintenance phases of the PV plant and OHTL, potential occupational health and safety impacts primarily arise from working with high-voltage equipment, heavy machinery, and **at heights**. Workers may face risks such as electrical hazards, including electrocution and arc flashes, especially during maintenance of OHTL infrastructure. Exposure to electromagnetic fields and corona discharge effects, such as noise and ozone generation, may also pose health risks. Additionally, working at heights on transmission towers increases the likelihood of falls, while handling hazardous materials like oils and cleaning agents introduces risks of chemical exposure or spills.

One of the primary occupational health and safety risks in this Project is **working at heights**, particularly during maintenance of transmission towers and OHTL. Workers face a heightened risk of falls, which can result in severe injuries or fatalities Climbing transmission towers, handling heavy tools at elevated positions, and working on elevated PV panels increase the likelihood of slips, trips, and falls.

Noise from machinery and equipment, along with physical strain from repetitive tasks or working in extreme weather conditions, could further impact worker health.

Mitigation

The following mandatory mitigation measures shall be incorporated into the Health and Safety Plan and implemented:

- Workers shall wear personal protective equipment (PPE) including hard hats, safety glasses, slip resistant boots, and masks;
- First aid kit shall be available at each working site;
- At least one onsite worker trained in basic first aid shall be present onsite. If number of workers in one site exceeds 50 and less than 500, appoint a full-time nurse and a part time doctor.
- The contractor shall conduct training and awareness meetings including safety toolbox talks, correct use of PPE, health and safety procedures, and handling hazardous material containers and related wastes.
- Require **two-person teams** for all high-altitude maintenance tasks to ensure safety and emergency support.
- Restrict work at heights **during adverse weather conditions**

- Use **engineered climbing systems** such as fixed ladders with safety cages, vertical lifelines, or ladder fall arrest systems on transmission towers.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

7.2.3.6. Solid and Hazardous Waste Management

Impacts

Solar panels generally have a 20 to 30-year lifespan, but during their operational period, some panels may require disposal due to damage, malfunction, or inefficiency. Broken or damaged panels are classified as hazardous waste and should be managed and disposed of as such. One of the primary concerns in solar panel disposal is the presence of hazardous materials such as cadmium, silicon, silver, lead, and other traces of tin that cannot be recycled (Sharma, Hari Bhakta; Vanapalli, Kumar Raja; Barnwal, Vikram Kumar; Dubey, Brajesh; Bhattacharya, Jayanta, 2021). Improper disposal of the PV panels, transformers and other electrical components can lead to the leaching of these toxins into the soil and water, causing long-term environmental harm. The disposal process for these electrical components needs to address the recovery of these materials to minimize environmental impact. However, from Jordan's regulatory point of view, there is no guidance on the disposal of solar panels.

Improper solid waste disposal and inappropriate discharge of wastewater could lead to various detrimental environmental impacts including pollution of water and soil resources within and beyond the project area. A detailed description of the sources of wastewater and solid waste during project construction shall be provided by the contractor.

Mitigation

To ensure that generated solid waste and wastewater during the construction phase do not have a negative impact on the surrounding environment, the following measures should be adopted by the Contractor:

- Prepare and abide by a **Waste Management Plan**
- Prohibit illegal disposal of broken or damaged solar panels onto the land.
- The damaged panels will be stored at the Al-Swaqa Landfill, managed by the Ministry of Environment, until they can be reused or properly disposed of alongside other similar waste. It is worth noting that this is currently the only available method for managing the damaged PV panels in Jordan. The BOT Contractor shall develop their own mechanism for disposing of them after replacement.

Summary of Impact Assessment

Parameter	Assessed Impacts	Residual Impacts
Nature	Adverse	Adverse
Type	Direct	Direct

Parameter	Assessed Impacts	Residual Impacts
Magnitude	Medium	Low
Likelihood	High	Medium
Intensity	**Medium**	**Low**
Duration	Short-term	Short-term
Extent	Regional	Local
Scale	**Medium**	**Low**
Significance	**Moderate**	**Low**

8. Environmental and Social Management Plan for the AAWDCP – RE Component

8.1. E&S Management Policy Statement at Project Promoter's Level

The following statement sets out the Project Promoter's (MWI) management commitment regarding the environmental and social management of aspects related to the Ministry's operations.

Effective environmental and social management is a priority to the Jordanian MWI and its mission. We are committed to protect the environment and social welfare through strict compliance with environmental and social laws, regulations, and efficiency in the conduct of our operations.

As part of our ongoing efforts, we will:

- Comply with national environmental laws and regulations and international agreements.
- Seek and strive to minimize the environmental impact of our operations through regular evaluation, restoration, and efficient use of natural resources.
- Implement sustainable environmental practices, including the acquisition of bio-based, environmentally friendly, energy-efficient, water-efficient, and recycled-content products, whenever possible.
- Conduct audits to measure environmental performance and establish accountability to correct deficiencies.
- Continuously improve environmental performance through appropriate policies, procedures, training, and recognition of excellence.
- Prepare for emergencies in order to minimize environmental and social impacts.
- Emphasize on pollution prevention, environmentally preferred products, and sustainable business practices with our building managers, contractors, and suppliers.
- Incorporate and enforce appropriate performance clause(s) in contracts with concessionaires and contractors that specify environmental protection and compliance.
- Keep our workplace free of health and safety hazards and prevent injuries and illnesses.
- Continually evaluate our safety performance and make improvements where necessary to maintain a safe workplace. Through routine and effective training and diligent implementation of our safety program, including all policies and procedures of the MWI, we will maintain the safety of our employees and full compliance with all applicable health and safety laws and regulations.
- Implement and maintain this Environmental and Social Management Plan developed for the AAWDC Project – RE Component as the primary management tool related to our operations and activities for the Project and strive to expand it in the overall spectrum of our operations and activities.

All managers and employees, including those involved in the implementation of the AAWDC – RE Component Project, will strive to carry out these tasks.

A corresponding policy statement shall be adopted in the Construction and Operation ESMPs to be developed and implemented by the BOT Contractor / NEPCO, their Engineering, Procurement and Construction (EPC) Contractor and the Project Operator throughout the AAWDC – RE Component Project contract duration.

8.2. Scope, Objectives and Targets of the Project ESMP

8.2.1. Scope

Pursuant to the preceding E&S Management Policy, it is considered that the MWI shall endeavour, in all of its operations, including the implementation of the AAWDC – RE Component Project, to prevent personal injuries

and ill health for its direct and indirect employees and the public, as well as damage to the environment, social welfare, existing utilities, and property.

To this effect, the detailed Construction and Operation ESMPs shall be informed by and form an integral part of the AAWDC – RE Component Project detailed design and shall be designed and implemented by the BOT Contractor and NEPCO as a means of integrated management of Project-related construction and operation activities and providing a planning approach to prevent associated adverse environmental and social impacts associated with Project implementation. Both Construction and Operation ESMPs are meant to be live documents that shall be reviewed on a regular basis and updated when necessary, throughout the project duration.

Furthermore, this Project ESMP is, as shall be the BOT Contractor and NEPCO's Construction and Operation ESMPs, developed in compliance with the national legal requirements and associated provisions and the EIB and USAID E&S standards as applicable.

It is noted that the BOT Contractor is obligated to abide by all local laws and regulations addressing environmental protection, pollution prevention, health and safety matters at his construction sites both during construction and after the commencement of Project operation activities. In all construction cases, the legal responsibility and liability shall lie with the site construction manager and the legal representative of the BOT Contractor. Similarly, during Project operation, the legal responsibility and liability shall lie with the site operation manager and the legal representative of the BOT Contractor (Operator).

Given the above, this Project ESMP aims to provide a systematic approach to environmental management and a framework to protect the physical and social environment and respond to changing environmental conditions in balance with socio-economic needs by unifying and highlighting Project related construction and operation related key ESHS management aspects for seawater abstraction, desalination, and product water conveyance, which the BOT Contractor and NEPCO shall incorporate into his Construction and Operation ESMPs and to which MWI shall be especially alert in its continuing effort to ensure optimal ESHS management performance and promote environmental sustainability. During the detailed design of the AAWDC– RE Component Project, this Project ESMP will be updated as needed and will include the roles and responsibilities elaborated within the structure established by the BOT Contractor.

8.2.2. Objectives and Targets

The following ESHS objectives and targets are developed for the AAWDC – RE Component Project for adoption by the BOT Contractor (Table 8-1 below refers).

Table 8-1: ESHS Objectives and Targets for the AAWDC Project

R.n.	Objective	Target	Target Date
1.	Prevent or minimise to insignificant levels any pollution to surface water, groundwater, air, and soil receptors	Provisions of appropriate pollution prevention measures to all Project related sites during construction and operation and detailed in the Construction and Operation ESMPs	End of each calendar year throughout the Project's contract duration
2.	Prevent or minimise to insignificant levels any impacts/disruptions to existing utilities, and community livelihood and mobility	Appropriate socioeconomic impacts mitigation measures to all Project related sites during construction and operation and detailed in the Construction and Operation ESMPs	End of each calendar year throughout the Project's contract duration
3.	Avoid environmental non-conformances	Appropriate environmental monitoring and reporting to all Project related sites during construction and operation and detailed in the Construction and Operation ESMPs	End of each calendar year throughout the Project's contract duration
4.	Develop and implement hazardous materials and waste management procedures	Appropriate hazardous materials and waste management procedures in place to all Project related sites during construction and operation and detailed in the Construction and Operation ESMPs	End of each calendar year throughout the Project's contract duration

R.n.	Objective	Target	Target Date
5.	Develop and implement emergency response procedures	Appropriate emergency response procedures in place to all Project related sites during construction and operation and detailed in the Construction and Operation ESMPs	According to milestones set out the approved Construction and Operation ESMPs
6.	Develop and implement social engagement procedures	Appropriate social engagement procedures and related grievance mechanism in place to all Project related sites during construction and operation and detailed in the Construction and Operation ESMPs	End of each calendar year throughout the Project's contract duration
7.	Provide ESHS training	Project BOT Contractor provides ESHS training based on his approved Construction and Operation ESMPs	According to milestones set out the approved Construction and Operation ESMPs
8.	Conduct Risk Assessments	Risk Assessments (RAs) are done for each Project related construction site during construction and to each Project site during operation	RA conduct and review according to the Project contract implementation schedule and approved Construction and Operation ESMPs comprising Health and Safety (H&S) Management Plans
8.	Avoid fatality	Zero fatalities to all Project related sites throughout the Project's contract duration (construction and operation)	End of each calendar year throughout the Project's contract duration
9.	Prevent falls from heights	Use inspected, fit for purpose scaffolds Encourage the use of safety harnesses throughout the Project lifespan	End of each calendar year throughout the Project's contract duration
10.	Minimise lost time injuries	Lost time injuries: Maximum of 1 lost time injury per Project related site at the end of each calendar year during construction and operation	End of each calendar year throughout the Project's contract duration
11.	Minimise minor injuries	Maximum of 3 minor injuries per Project related site at the end of each calendar year during construction and operation throughout the Project lifespan	End of each calendar year throughout the Project's contract duration
12.	Minimise near misses	Maximum of 4 near misses per Project related site at the end of each calendar year during construction and operation throughout the Project lifespan	End of each calendar year throughout the Project's contract duration

8.3. Institutional Arrangements

8.3.1. General Considerations

Abiding by environmental and social safeguards and implementation of mitigation measures and management provisions for the AAWDC- RE Component Project is the responsibility of the assigned BOT Contractor (for the RE Site) and NEPCO (for the OHTL) throughout the Project's contract duration. The Project Promoter has the overall responsibility of ensuring the Project is being implemented in line with this Project ESMP and the subsequent Construction and Operation ESMPs that will be developed.

Both parties shall acknowledge and ensure that the Project related activities during construction and subsequent operation comply with the Project agreements and covenants and the Project ESMP that incorporates the ESIA commitments, regulatory provisions, and legal obligations emanating from national laws as well as IFI's E&S policies and standards.

To this effect, the likely organisational structure for implementation of the AAWDC – RE Component Project ESMP and associated E&S mitigation/management and monitoring provisions is illustrated below showing the relationship between the BOT Contractor / NEPCO (Project Company), and the contractors for the RE Site and the OHTL.

8.3.2. Project Promoter

MWI under the Government of Jordan is the Promoter for the AAWDC Project including the RE Component. As such, MWI is responsible for the overall governance and contract administration and management of the AAWDC Project implementation and the management of the **BOT Contractor (Contractor & Operator) and NEPCO** through the contractual provisions and requirements, including those related to ESHS matters.

MWI will be responsible for enforcement of all contract provisions, including those related to ESHS conditions and requirements. MWI will also be responsible for necessary inter-ministerial coordination with the regulators (i.e., ASEZA), as well as with other competent national authorities concerned with the implementation of the AAWDC Project – RE Component as the case may be.

For ensuring effective integration and implementation of the Project ESMP and associated monitoring programs during the construction and operation phases, MWI shall designate an ESHS Officer, who, on behalf of MWI, will follow up on ESHS matters through the lifespan of the Project and ensure that the Project ESMP is being implemented through the developed Construction and Operation ESMPs by conducting regular audits and through regular communication with the BOT Contractor / NEPCO to this effect, on Project related ESHS aspects. MWI shall regularly report the findings of these audits to the IFIs.

8.3.3. Build-Operate-Transfer Developer

The BOT Contractor will be assigned by the Project Promoter and will be responsible for ensuring that all contract provisions are being achieved through their EPC Contractor. Construction of RE Site will be financed through the BOT Contractor, with co-financing from the Government of Jordan and potential loan financing from International Financing Institutions (IFIs). For the purpose of the AAWDC Project, the BOT Contractor will establish a Project Company for the Project.

The Project BOT Contractor shall ensure that the Project ESMP (for the RE Site) is effectively integrated into the Construction and Operation ESMPs to be developed by the EPC Contractor and subsequently strictly implemented to safeguard the environment and social welfare and abide by national legislations and international commitments.

Through his EPC Contractor, the BOT Contractor shall be responsible for incorporating this Project ESMP into the Construction ESMP (CESMP) that reflects the detailed design and methodology that will be used to deliver the Project associated works. The Construction ESMP (for the Re Site) will include all site specific and sub-plans as required. The EPC Contractor shall engage a full-time ESHS Manager, who will be responsible for reviewing, approving and reporting implementation of the CESMP developed by the various Project contractors.

The ESHS management responsibilities of the BOT Contractor through his EPC Contractor shall, in minimum, include:

- Recruiting a suitably qualified and full-time ESHS Manager.
- Coordinating with the Project Promoter and/or the CSC, if appointed, for updating the CESMP as/when required.
- Implementing the approved CESMP including addressing and resolving corrective action requests issued by the Project Promoter and/or the CSC, if appointed.
- Monitoring the implementation of the required monitoring plans comprised in the Construction ESMP and subsequent reporting to the Project Promoter and/or the CSC, if appointed, and the regulatory authorities as/when needed.
- Coordinating with the Project Promoter and/or the CSC, if appointed, regarding continued community consultation, implementation of the GRM, and Project information disclosure.
- Applying for permits/licenses as required for new materials sources and preparing and submitting respective extraction and management plans.
- Ensuring that all imported material and equipment is subject to quarantine clearance and receives appropriate phyto-sanitary certificates.
- Participating in joint inspections with the Project Promoter and/or the CSC, if appointed, as required.

- Maintaining a site diary and GRM register (including actions taken to resolve the issue and close-out dates).
- Providing status of CESMP (including issue and response to corrective action requests), consultation activities and GRM implementation in the monthly progress reports.

For ensuring effective integration and implementation of the Project ESMP and associated monitoring programs during the construction and operation phases, the BOT Contractor (through his EPC Contractor) shall designate an ESHS Manager, who will follow up on ESHS matters through the lifespan of the Project and ensure that the Project ESMP is being implemented through the developed undertake the review and approval of the Construction and Operation ESMPs to be developed by the BOT Contractor, supervise and inspect their implementation and communicate with the Contractors and Operator to this effect, and report on Project related ESHS aspects. The ESHS Manager shall demonstrate the following proposed qualifications:

- BSc in engineering degree, preferably with postgraduate degree in environmental science or engineering, proven track record in construction related environmental and health and safety aspects for public infrastructure projects, ability to manage multiple sites will be an advantage, excellent communication skills, excellent understanding of the Jordanian legislation and IFI policies and standards for environmental protection and health and safety requirements, very good command in English and Arabic.
- Minimum of 10 years total working experience in environmental, social health and safety assessment and/or management, preferred in construction and operation of water supply projects, at least 5 years of senior level specific experience in monitoring, control and reporting of construction and operation related environmental and health and safety aspects; experience in design, review and supervision/inspection of ESHS Management Plans.

The EPC Contractor will likely hire a Construction Supervision Consultant (CSC) whose mandate would be to ensure that high quality construction is achieved and that all works are carried out in full compliance with the detailed engineering design, the technical specifications, and all other relevant provisions of the Project contract documents. The CSC will be responsible for the day-to-day supervision of works and the approval of the materials and workmanship related to the works according to the provisions of the Project contract documents. Further, the CSC will have the mandate to check the on-site conditions and verify that the construction works, plant and materials, as well as the health and safety and environmental protection controls conform to the provisions of the Project contract documents and applicable laws and regulations in accordance with the Construction ESMP.

After the commissioning of the Project, the BOT Contractor will assign an Operator for the AAWDC Project – RE Component who will be responsible to develop and implement the Project's Operation Environmental and Social Management Plan (OESMP) for the RE Site. The BOT Contractor will be responsible to ensure proper operation and maintenance of the Project related facilities comprising the monitoring of operational condition and performance of Project facilities, as well as the monitoring of the implementation of the OESMP based on regular site audits.

8.3.4. National Electric Power Company

For the **OHTL component and its towers**, the implementation is under **NEPCO's responsibility**. As such, NEPCO is fully accountable for ensuring compliance with the ESMP framework and ensuring that all subcontractors also adhere to the same standards. To achieve this, NEPCO must prepare a **CESMP (for the OHTL)** before the commencement of construction activities, addressing all issues outlined in the ESMP framework:

- Develop site-specific management strategies, implementation plans, and monitoring plans to address identified environmental and social risks;
- Include the following sub-plans in the CESMP:
    - Spill Prevention and Management Plan
    - Waste Management Plan
    - Dust Suppression Measures
    - Emergency Preparedness and Response Plan

- Traffic and Transport Management Plan
- Site Security Management Plan
- Health and Safety Plan
- Code of Conduct
- Chance Finds Procedure

In addition to the CESMP, NEPCO must clearly define the roles and responsibilities of its personnel concerning environmental and social management. At a minimum, NEPCO must:

- Appoint a qualified **health, safety, and environmental officer** with relevant experience to work full-time at the site;
- Conduct induction training for all construction workers to ensure they understand and comply with the ESMP requirements;
- Coordinate closely with MWI and the Supervision Engineers to ensure alignment with Project environmental and social goals; and
- Report regularly on ESMP implementation progress, incidents, and corrective actions taken to address non-compliance.

NEPCO shall ensure that the training plan and CESMP are reviewed and approved by MWI, represented by the Supervision Engineer, before construction activities commence. NEPCO will also be responsible for ensuring the proper operation and maintenance of the project-related facilities, including monitoring the operational condition and performance of project infrastructure. NEPCO shall also be responsible for the implementation and continuous monitoring of the OESMP, conducting regular site audits to assess compliance with environmental, safety, and operational requirements.

8.3.5. International Financing Institutions

Should financing for the AAWDC Project be provided by IFIs (EIB, USAID, etc.), including the RE Component, this means that said institutions will seek to ensure the economic viability, efficiency, and sustainability of the investments financed under the Project. To fulfil this, the IFIs may undertake various intermediate steps in the Project implementation cycle comprising coordination of implementation, granting No-Objection at various Project execution milestones (e.g., procurement), and ex-ante and ex-post control evaluations. The IFIs, under their respective mandates, may also monitor the implementation of the CESMP and OESMP by the BOT Contractor through site inspections and subsequent reporting to their Boards.

8.3.6. Aqaba Special Economic Zone Authority

The role of ASEZA, into the implementation of the AAWDC Project – RE Component will be to review and approve the Project ESIA study and ESMP, to review and approve the Project related license/permit applications and to monitor/inspect the Project construction and operation activities for compliance against environment license/permit conditions.

8.4. Training and Awareness of the Project Promoter

Managed by MWI, a capacity building program tailored to the needs of its personnel in support of its role as Project Promoter. This capacity building program will be built on existing gaps in capabilities and will target to improve the technical qualifications of the MWI personnel involved in planning, environmental permitting, environmental and social aspects management, implementation, operation and maintenance procedures for water supply and desalination projects and, thus, enhance the scale, quality, effectiveness, and responsiveness of the respective procedures.

The key target groups of the capacity building support will be all key MWI departments comprising the Planning, Procurement, O&M, ESHS and PR sectors, which will be involved in the implementation of the AAWDC Project including the RE Component. It is considered that provided training will result in establishing a pool of trainers within MWI on these aspects.

The envisaged training methodologies and the number of staff to be trained will be decided by MWI. However, the applied approach to the capacity building will be mainstreamed on two key premises, as follows:

- **Focus on transfer of knowledge and not (only) information:** The intention of capacity building support is to make relevant knowledge accessible to the professionals responsible for making the decisions in an organized manner and to increase their competence to apply this knowledge. It is noted that knowledge is not the same as information. Information can be stored in manuals and/or to the Project dedicated website if one is established. When information is used effectively, it becomes knowledge. Hence, the process of associating information from one training module with information from another training module in such a manner that the association gives the full dimensions of a complicated situation is (building) knowledge. Knowledge in this way is the basis for decision making.
- **Good decisions are based on knowledge and the competence to take the best action in a given situation:** Professionals can be trained on how to source knowledge within and outside their working area. Knowledge is then the basis for taking this best action. Professionals acknowledge that there is a best action for a given setting irrespective of the contextual environment.

It is also considered that the tailored capacity building program for the AAWDC Project (including the RE Component) shall combine layers of information for the given seawater abstraction – desalination – water conveyance – RE Component project situation with information on available technologies and approaches. The MWI trainees shall perceive provided training as a source of aid to select the most suitable technology or approach. The training program will aid them in comparing and contrasting different solutions, including planning for construction, construction, operation and maintenance and management by also incorporating the geographical dimension, time scale, environmental and social, and health and safety impacts whenever applicable.

Subsequently, the envisaged work approach for the development of the tailored capacity building program for the AAWDC Project (including the RE Component) will be as follows:

a. Determination of the training objectives, which constitutes the most important element of the design of the training program since these objectives provide a clear guidance on how the training should be developed according to the identified needs.

b. Determination of the conditions under which the training will take place.

c. Selection of appropriate benchmarks against which the training performance will be measured.

d. Preparation of targeted training material in the light of the “Training of Trainers” approach.

Whereas in consideration of the AAWDC Project (including the RE Component) implementation needs, the curriculum of the tailored capacity building program will comprise the following key thematic areas:

1. Key operational practices within MWI
    - Investment strategy and planning
    - Operation and Maintenance
    - Service delivery
2. Key operational processes within MWI
    - Project management
    - Procurement and construction planning
    - Contract administration (monitoring of natural and financial progress of investments)
    - Improved operation of electrical supply for the RE Site
    - Communication and stakeholders’ management
    - Environmental and social safeguards management and monitoring related to the AAWDC Project (including the RE Component)

The execution of the tailored capacity building program in terms of timing, locations, participants, etc. is to be considered and defined by the MWI. To this effect, the work will comprise the organization of all necessary administration issues, such as renting of conference rooms and audio-visual equipment, provision of interpretation facilities, reproduction of training material for trainees, provision of catering facilities, etc. All these elements will be arranged and communicated prior to the anticipated start-up of any training session.

While the capacity building program will be a combination of introductory workshops, theory sessions, on-the-job training with hands-on instructions, and closing workshops on the training impact and results. A system for tracking the progress and performance of trainees will be also developed as part of the capacity building program. More specifically, to assess the quality, impact, and effectiveness of the training after implementation, interim surveys of the trainees will take place at the end of each part of the training. These surveys can be undertaken by means of evaluation questionnaires addressed to the trainees, which will be linked to pre-selected benchmarks assisting the quantitative assessment of performance. The selected performance indicators can be then graphically represented, while the qualitative assessment can be based on the analysis of observations on behalf of the trainers relating to the execution of the training program and reasoning provided by the trainees.

The following training approaches may be affected:

Training-of-Trainers (ToT)

A key training approach for the AAWDC Project (including the RE Component) may be to select a number of middle management staff at MWI, who will then receive highly targeted training on areas in their respective field of competence and responsibility. The selected staff will, in return, be expected to carry out training sessions to their colleagues, thereby facilitating the transfer of know-how throughout the MWI organization. An obvious advantage of the 'training-of-trainers' is that the know-how acquired from the training is swiftly transferred to other colleagues, thereby reducing the risk of institutional memory loss in case the trained staff decides to leave his/her position or the company altogether. Further, in a sense the 'training-of-trainers' approach is based on the well-known saying, "give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime", as the actual outcome of the training provided will become clear when the trained staff will be asked to take charge of their own training sessions.

To ensure that the trained staff will be in a position to efficiently transfer their acquired knowledge it is not sufficient to only provide specific training on technical issues, but the entity assigned with the provision/execution of the training will need to also provide them some insight on how to efficiently carry out a training session and also provide them with some suitable training tools/material. Under the AAWDC Project (including the RE Component), in close coordination with the MWI and in consultation with the trainees, it will be ensured that the needed training tools/material are prepared so that the various technical components of the Projects are effectively covered.

On-The-Job Training

This represents continuous Project-Driven Know-How Transfer. The second key approach to training and capacity building for the MWI staff shall be built into the individual Project implementation activities. This offers considerable benefits and opportunities to spread best-practice and know-how. Success very much depends on the manner in which interaction with MWI is handled at the level of Project implementation activities.

8.5. Regulatory ESHS Requirements and IFIs E&S Principles and Standards

ESHS legislation and other relevant regulatory requirements in Jordan comprising also the IFI's E&S principles and standards are detailed in Chapter 3. Applicable legislation and standards include national, EIB and USAID requirements.

To ensure legal compliance throughout the Project contract duration, the BOT Contractor shall undertake the following activities:

- Review these laws, regulations, and standards every [*Twelve (12) months*] along the Project contract duration to make sure that there are no changes (i.e., legal amendments, modifications, updates), which may affect this Project ESMP;
- Communicate the legal review results to the Project Promoter for advice; and
- Revise accordingly its Construction and Operation ESMPs.

8.6. Project ESMP Communication Requirements

8.6.1. Internal Communication

Internal communication related to the AAWDC Project (including the RE Component) shall include as a minimum:

- Monthly ESHS meetings between the BOT Contractor / NEPCO and the Project Promoter. These meetings can be dedicated to ESHS issues or ESHS issues can be one part of the agenda. Additional ESHS meetings will be organised when needed.
- Monthly ESHS aspects inspections undertaken by the Project Promoter. The results of said inspections shall be communicated to the BOT Contractor / NEPCO for necessary actions
- ESHS Semester Report. The ESHS Semester Report shall be part of the Semester Progress Report prepared by the BOT Contractor / NEPCO through his EPC Contractor / Supervision Consultant and communicated to the Project Promoter. The Semester Report shall be a collation of monthly inspections findings and associated corrective actions taken by during Construction. This report shall be also prepared by the Operator of the AAWDC Project (including the RE Component) during operation.
- Toolbox talks on ESHS aspects undertaken .

8.6.2. External Communication

Consultations with / Grievances by the Public

Queries and/or grievances on ESHS management from local communities, business community, local representatives, the press, and any other external parties shall be handled according to the Community Grievance Procedure included in the Project's Stakeholder Engagement Plan.

Consultations with / Grievances by the Workforce

As for worker grievances, they can be made and shall be addressed through the BOT Contractor / NEPCO's Employee Grievance Procedure.

8.7. Project ESMP Documentation, Monitoring and Auditing

8.7.1. Project E&S Records

Maintaining up-to-date documentation and records is critical for complying with specific regulatory requirements where required, but also for ensuring that the health and safety plan can be adequately understood, efficiently operated, effectively evaluated, and systematically improved.

Project related ESHS records, being part of the Project ESMP shall be maintained by the BOT Contractor and NEPCO's ESHS Manager to facilitate internal and external auditing and review by key Project stakeholders. These ESHS records shall consist of:

1. This Project ESMP and any review records.
2. Minutes of Meetings related to ESHS meetings held between the BOT Contractor / NEPCO and the Project Promoter.
3. Monthly/Semester ESHS site inspection reports.
4. Incidents and near miss investigation reports.
5. Incidents and near misses review and lessons learnt reports.
6. Emergency drill records undertaken.
7. Record of induction, training and toolbox talks.
8. Copies of any ESHS Project related correspondence including any nonconformities notification.
9. Internal and external ESHS audits records.

10. Consolidated annual ESHS report for all Project sites.

8.7.2. Accident and Incident Reporting and Investigation

All significant ESHS accidents or incidents and high potential near misses shall be recorded by the BOT Contractor (through his EPC Contractor) or NEPCO (through the supervision consultant) and reported to the Project Promoter. ESHS accidents or incidents and high potential near misses shall be thoroughly investigated by the BOT Contractor / NEPCO and action taken to prevent recurrence.

The Project Promoter shall be informed of any damage caused to people, or the property of individuals, other than the Contractor's personnel, within 8 hours of the event, regardless of the value of the damage.

8.7.3. Internal and External Audits

The AAWDC Project (Including the Re Component) related ESHS performance at site level shall be regularly monitored through the following means:

- Weekly site inspections undertaken by BOT Contractor (through his EPC Contractor) and NEPCO (through the supervision Consultant).
- Ad hoc site inspections by the Project Promoter.
- Internal reviews of the Project ESMP.
- External audit visits by local competent authorities or IFIs.

8.7.4. Nonconformity, Corrective and Preventive Actions

Non-conformities are defined as deviations from the requirements of the applicable regulations, the contract ESHS provisions, and the Construction/Operation ESMPs.

Non-conformities detected during ESHS inspections or during internal and external audits shall be addressed by the BOT Contractor/NEPCO through appropriate measures adapted to the severity of the situation.

8.8. Project ESMP Review

Reviews shall take place on [*Annual basis*] along the AAWDC Project (including the RE Component) duration, or after any significant changes that might affect the ESHS performance, to ensure the ESMP's continued suitability and effectiveness in satisfying the Project's ESHS objectives and targets. The review shall consider the results of internal and external audits, lead and lag indicators, resources, changing circumstances along Project implementation and opportunities for continuous improvement.

Lead indicators, which shall be used to report against, are those that focus on positive efforts towards preventing injury and illness. Lead indicators under this ESMP shall include:

- Percentage of completed ESHS inductions and training executed.
- Number of inspections / audits performed in a given time frame.
- Number of "near miss" environmental incidents and hazards reported and addressed .
- Percentage of completed corrective actions.

Whereas lag indicators, which shall be used to report against, are those providing direct measures of harm. Lag indicators under this ESMP shall include:

- Environmental (and health and safety) incident reports.
- Community compensation claims as a result of an environmental incident reported and addressed.
- Lost time injuries reported and addressed.
- Worker compensation claims reported and addressed.

The review procedure shall involve the following steps:

1. At the end of each calendar year along the Project duration, the BOT Contractor / NEPCO shall undertake an internal review of the Project ESMP to verify that its provisions are incorporated into the Construction/Operation ESMPs and are properly implemented and maintained.
2. When changes are made to legislation, standards, codes of practice, agreements, and guidelines, these shall be appended to the Project ESMP.
3. The review shall include all ESHS Management provisions and procedures to ensure they remain relevant and current and that are appropriate to Project's ESHS risks and the legislative requirements.
4. Corrective actions identified from all audits (internal and external) shall be included in the review.
5. All changes made to provisions and procedures as a result of the review shall be documented in a Review and Revision record.

8.9. Environmental and Social Management Plan – Structure and Requirements

8.9.1. General Considerations for the Structure of Construction/Operation ESMPs

The ESMPs to be developed by the BOT Contractor (for the RE Site) and By NEPCO (for the OHTL) during the construction and operation phases of the AAWDC Project – RE Component shall integrate the environmental and social mitigation/management provisions, the provisions for Project monitoring plans.

The CESMP and OESMP for the Project shall be guided through the ISO 14001:2015 standard, developed under the Plan-Do-Check-Act approach and be structured as shown in Table 8-2.

Table 8-2: Structure and Content of BOT Contractor's CESMP and OESMP

No.	Thematic Area / Chapter	Content
1.	**Environmental policy**	➢ Declaration of ESHS policy signed by the Managing director of the BOT Contractor (for the RE Site) and NEPCO (for the OHTL) and defining the commitment of the Contractor/Operator in terms of (i) ESHS management for its construction/operation sites and (ii) compliance with the Project ESIA study, Project ESMP, and applicable national regulations and IFI's E&S standards.
2.	**CESMP/OESMP**	➢ Target and content of the CESMP/OESMP (including H&S) ➢ Preparation and updating schedule ➢ Quality assurance and validation
3.	**ESHS resources**	➢ Human resources: – ESHS manager – ESHS supervisors/officers – Person in charge of relations with stakeholders – Medical personnel ➢ Logistics & communications: – ESHS vehicles – IT stations – In situ noise, air, and water measuring equipment – Analysis laboratory used ➢ Reporting: – Weekly inspections – Monthly inspections – Accident/Incident inspections (environment and H&S)
4.	**ESHS regulations**	➢ Definition of standards for the applicable national ESHS regulations and the ESHS recommendations of EIB, USAID, International Labour Organization (ILO) and other IFIs, applicable to the execution of the Project works and the subsequent operation of the Project facilities: – Environment – Noise and Vibration

No.	Thematic Area / Chapter	Content
		– Soil Erosion – Air Quality – Solid Waste – Hazardous Materials – Wastewater Discharges – Contaminated Land – Occupational Health and Safety – Community Health and Safety – General Site Hazards – Disease Prevention – Traffic Safety – Discharge standards – Minimum wage – Day and/or night traffic restrictions – Other ➢ Definition of ESHS standards for the industry applied
5.	**ESHS operational inspection resources**	➢ Site tracking procedure: – Frequency – Personnel – Assessment criteria ➢ Nonconformity handling and detection procedure: – Distribution of information – Notification depending on the level of importance allocated to nonconformities – Tracking of the closing of the nonconformity ➢ Management of data on tracking and nonconformities: – Archiving – Use as a performance indicator
6.	**Project Areas**	➢ Description of Project Areas, where the term “Project Area” during construction means: (i) the land where Project works will be carried out; or (ii) the land necessary for the implantation of construction facilities (work camp, workshops, offices, storage areas, concrete production plants) and including special access roads; or (iii) quarries for aggregates, rock material and riprap; or (iv) borrow areas for sand and other selected material; or (v) stockpiling areas for backfill material or other demolition rubble; or (vi) any other location, specifically designated in the Contract as a Project Area, and (vii) The term “Project Area” encompasses any individual Project Area or all Project Areas, while the term “Project Area” during operation means all the sites where the Project water abstraction, treatment, and conveyance facilities are sited: – Number – Location on a topographical map – Activities – Opening & closing schedule – Access ➢ Reference to the Appendix: an ESMP for each Project Area
7.	**Health and safety plan**	➢ Identification and characterisation of health and safety risks during either of Project construction/operation phases, including the exposure of personnel to chemicals, biological hazards, and radiation. ➢ Description of working methods to minimise hazards and control risks. ➢ List of the types of work for which a work permit is required ➢ Personal protection equipment ➢ Presentation of the medical facilities at Project Areas: – Healthcare centre, medical equipment and allocation of medical staff – Medical treatments that can be carried out onsite

No.	Thematic Area / Chapter	Content
		– Ambulance, communications – Referring hospital ➢ Evacuation procedure for medical emergencies ➢ Description of the internal organisation and action to be taken in the event of an accident or incident
8.	**Training plan**	During both construction and operation phases: ➢ Basic training for nonqualified staff ➢ Health and Safety inductions ➢ Health & safety training
9.	**Labour Conditions**	➢ Description of Human Resource Policy for construction works/operation activities of direct and indirect workers
10.	**Local Recruitment**	➢ Local labour requirements (during both Project construction and operation phases): – Job descriptions and the levels of qualifications required – Recruitment procedure and deployment schedule – Initial training to be provided by the Contractor/Operator for each job description ➢ Location and management of the local recruitment office(s)
11.	**Project machinery and vehicle traffic**	➢ Description of the fleet of vehicles/machinery used for the execution of the Project works and emission levels and safety requirements ➢ Deployment (Project Area & schedule) and maintenance sites for each vehicle and machine ➢ Mapping of itineraries, travel times, and areas with speed limits ➢ Dust suppression: – Mapping or road sections where dust reduction initiatives apply – Water points identified or to be created for refuelling tanker trucks – Capacity of the tanker trucks used and calculation of the number of trucks required – Width of the track to determine if one watering run or equivalent is adequate (narrow track) or if two runs are required (wide track) – Number of watering or equivalent operations proposed per day depending on weather ➢ Similar arrangements as relevant and appropriate for the Project operation phase.
12.	**Dangerous substances**	➢ Inventory of dangerous substances per Project Area and per period (during both Project construction and operation phases) ➢ Transport and storage conditions and chemical incompatibility during both Project construction and operation phases
13.	**Effluents**	➢ Characterisation of effluents discharged to the receiving environment (during either of Project construction/operation phases) ➢ Facilities for the treatment or pre-treatment of effluents including sufficient run-off (during either of Project construction/operation phases) ➢ Measures for reducing the sediment content of rainwater runoff (during either of Project construction/operation phases) ➢ Measures for monitoring the efficiency and performance of facilities for reducing sediment content of rainwater runoff (during either of Project construction/operation phases) ➢ Resources and methods for monitoring effluent and rainwater runoff quality (during either of Project construction/operation phases)
14.	**Noise and vibrations**	➢ Estimation of the frequencies, duration, days of the week and noise levels per Project Area (during either of Project construction/operation phases)
15.	**Waste**	➢ Inventory of waste per Project Area and per period (during either of Project construction/operation phases) ➢ Collection, intermediate storage, handling, and treatment methods for ordinary or inert waste (during either of Project construction/operation phases) ➢ Storage and handling methods for dangerous waste (during either of Project construction/operation phases)

No.	Thematic Area / Chapter	Content
16.	**Clearing and revegetation**	➢ Methods & schedule for clearing vegetation and earthwork activities ➢ Methods, species and schedule for the revegetation of Project Areas disturbed by the works
17.	**Biodiversity**	➢ Schedule for adequate fauna and flora management (during both Project construction and operation phases) ➢ Measures for minimizing impact on fauna and flora species based on the Project ESIA study (during both Project construction and operation phases) ➢ Measures for monitoring the efficiency and performance of the plan in place ➢ Measures for limiting invasive alien species ➢ Measures for monitoring the efficiency and performance of the plan in place
18.	**Prevention of erosion**	➢ Location of zones suffering from erosion ➢ Methods and schedule for the implementation of anti-erosive actions, including topsoil storage
19.	**Documentation of site condition**	➢ List and cover of viewpoints ➢ Imaging method ➢ Archiving photographs
20.	**Rehabilitation**	➢ Method and schedule for Project Area rehabilitation
21.	**Appendices**	➢ Project Area-ESMP in number and location specified in Section 6 “Project Areas” above (during both Project construction and operation phases): – Marking out of the Project Area perimeter on a map – Definition of zones for vegetation clearing, zones for the storage of usable timber, zones for burning of green waste, etc. – Definition of on-site activities: construction, storage areas, accommodation areas, offices, workshops, concrete making units – Layout of activity areas on the Project Area: construction works, production/operation areas, rehabilitation and closure – Zones for the storage of topsoil, spoil from earthworks, materials – Access routes and checkpoints – Project Area occupancy schedule – Organisation of Project Area preparation – Liquid discharge outlet points – Proposed sampling points for monitoring water quality – Atmospheric emission outlet points – Location of the storage site for dangerous products – Location and mapping of waste treatment facilities when handled by an external service provider – Any other information relating to the environmental management of the Project Area ➢ Emergency Response Plan (during both Project construction and operation phases): – Description of facilities – Characterisation of hazards – Emergency situations – Organisation structure - roles and responsibilities – Emergency procedures – Human and material resources – Triggering of the plan – Reporting ➢ Pollution Prevention and Management Plan ➢ Traffic Management Plan ➢ Waste Management Plan ➢ Labour Management Plan ➢ Code of Conduct ➢ Environmental Monitoring Plans

8.9.1. Environmental and Social Mitigation/Management Provisions during Detailed Design – RE Site

The following sections present the overarching E&S mitigation/management requirements that the BOT Contractor shall necessarily consider and integrate into his detailed design during the Project pre-construction phase, i.e., during procurement. The responsibility to this effect lies under the BOT Contractor at no separate cost (i.e., included in detailed design costs as part of the tender preparation). It is noted that the following mitigation in design has taken into account environmental, construction, and operational constraints related to the AAWDC Project – RE Component.

8.9.1.1. Risk Reduction in Design: Flood and Earquake

The following mitigation measures shall be embedded into the BOT Contractor detailed design to prevent and/or minimise adverse impacts related to degradation of groundwater, and soils, disruption of livelihood conditions, public health issues, destruction of infrastructure, and reliability of water delivery as a result of a flood event or earthquake.

The detailed design of the RE Site shall comprise the following mitigation measures:

- Preserve flood management conditions of existing wadis drainage channels.
- Ensure all facilities and structures are designed taking into consideration earthquake risk in the area.
- Provide for additional site drainage measures or even flood retention walls around the RE Site.
- Provide for planting soils adjacent to key Project facilities to prevent erosion and sediments flows during flood events.
- Prevent any leakages of fuel or lubricant or other chemicals during flood events through appropriate protection against flooding of storage areas for all fuel or chemical storage facilities and provision of secondary containment of appropriate volume.

8.9.1.2. Social Engagement in Design for the RE Site and OHTL

The following mitigation measures shall be embedded into the BOT Contractor and NEPCO's detailed design to ensure effective and meaningful social engagement.

- The Project Promoter shall elaborate and implement Land Acquisition and/or Resettlement Action Plans pursuant to EIB/USAID E&S standards should the detailed design trigger such the need for such plans.
- Any land acquisition and lease issues shall be resolved, and agreements reached ahead of construction commencement. To facilitate work progress, the components can be divided into portions whereby works can commence once land acquisition within each portion has been resolved. Portions of the Project Site shall not be handed over to the BOT Contractor/NEPCO by the Project Promoter until the land acquisition is reached for the affected parcels within that portion.
- The BOT Contractor / NEPCO shall provide for land access and compensation mechanisms related to Project Affected Persons (PAPs) livelihood and damages to property and existing infrastructure.

8.9.1.3. Environmental and Social Compliance in Design and Procurement

The following considerations ensure environmental and social compliance in design and procurement and shall be taken on-board by the Project Promoter, the BOT Contractor (for the RE Site) and NEPCO (for OHTL) to ensure compliance of Project related environmental and social impacts related to degradation of environmental resources, degradation of terrestrial habitats, flora, and fauna, degradation of cultural resources, H&S workforce and community risks, disturbance of social welfare and amenities, and reliability of water delivery.

- Environmental and social performance requirements shall be embedded into contractors' tender and contract documents by the Project Promoter similar to operational, finance, institutional, and legal contractual requirements.
- The standards and mitigation provisions of the ESIA study and ESMP shall be considered and reflected in detailed design.

- As part of the detailed design for the Project, the BOT Contractor / NEPCO shall update the ESIA study and the ESMP to reflect changes to Project components as well as institutional set up and arrangements.
- All land needed for the OHTL will be prepared by NEPCO and shared with the Project Promoter for preparation of the Land Acquisition Plans or Resettlement Action Plans (where needed).

8.9.2. Environmental and Social Mitigation/Management Provisions during Planning and Pre-construction

Prior to commencement of Project related works, the alignments, boundaries, and limits of Project sites shall be staked out based on the detailed design plans. A working strip shall be established to restrict the area impacts to within the working corridor and limit personnel and vehicle movements to only within working areas.

A detailed Construction Methods Plan shall be developed for approval by the Project Promoter comprising, but not limited to the location of proposed borrow areas or areas to be excavated, the proposed backfill material stockpile locations or zones designated for the rubble from any demolition works, Project related maintenance facilities, storage areas, batch plants, and any side casting during the construction of linear infrastructure (roads, pipelines, transport routes).

8.9.3. Environmental and Social Management Plan during Construction

Table 9 1 presents the mitigation measures to be implemented by the BOT Contractor in order to eliminate or minimize potential environmental and social impacts associated with the construction activities of the Project. Several plans and procedures need to be developed by the BOT Contractor for that purpose and tailored to the work site. The ESMP framework for the construction phase should be included in the contractor's tender documents to ensure that all requirements have been taken into consideration by them and will be developed and implemented during the construction phase.

Table 8-3: Environmental and Social Management Plan - During Construction

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
Physical Environment					
Soil	• Soil erosion, compaction, and disturbance due to the excavation in the Project area and in borrow areas • Soil quality degradation due to the excavation in the Project area and in borrow areas • Soil Contamination: Borrow areas may contain natural deposits or historical anthropogenic contaminants. Excavation and transportation can potentially expose and spread these contaminants if not appropriately handled	Low	• Schedule construction activities to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle movement. • Preserve existing vegetation to the extent possible and ensure revegetation when possible. • Immediately remediate any localized erosion during excavation and drilling activities (if any). • Prepare and abide by a Pollution Prevention Management Plan and a Waste Management Plan. • Reinstate the project area to its original condition after completion of the works.	Negligible	BOT Contractor / NEPCO
Water Resources	• Surface water quality deterioration • Groundwater quality deterioration	Low	• Prepare and abide by a Spill Prevention and Management Plan • Abide by measures for proper disposal of wastewater. • Abide by Waste Management Plan • Schedule works during dry season if possible.	Negligible	BOT Contractor
	• Overconsumption of water resources	Low	• Reduce water wastage whenever possible • Whenever possible, use dry-cleaning instead wet cleaning • Regular site inspection to detect water leakages • Raise awareness among workers on water conservation measures	Negligible	BOT Contractor
Energy Resources	• Overconsumption of energy resources	Low	• Regularly maintain the generators, vehicles, and construction machinery • Shut down lighting at site offices during the night • Switch off machinery and equipment when not in use	Negligible	BOT Contractor / NEPCO

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
			• Raise awareness among site staff on energy conservation		
Air Quality	• Air quality degradation due to the excavation in the Project area and in borrow areas	Moderate	• Implement the dust suppression measures. • Regularly maintain all vehicles and construction machinery • Prepare and abide by Spill Prevention and Management Plan • Abide by measures for proper disposal of wastewater • Abide by Waste Management Plan	Low	BOT Contractor / NEPCO
Biological Environment					
Biological Environment	• Impacts on Flora, Fauna and Avifauna	Moderate	• Use existing roads and infrastructure where possible to avoid creating new access routes. • Conduct vegetation clearance in phases to reduce the area affected at any given time. • Rehabilitate disturbed areas not covered by permanent infrastructure with native vegetation. • Conduct pre-construction ecological surveys to identify sensitive species, nesting sites, and critical habitats. • Implement monitoring programs during construction to track wildlife activity and adapt practices accordingly. • Restrict noisy or vibration-inducing activities to periods when wildlife activity is minimal • Use low-noise machinery and install vibration dampening equipment to minimize disturbances. • Prepare and abide by Spill Prevention Plan • Conduct a follow-up survey during the hotter season to reassess the status of *Uromastyx aegyptia* burrows across the project area. • Conduct a survey for Sooty Falcons (*Falco concolor*) during the summer months	Low	BOT Contractor / NEPCO

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
	• Hunting and Active Taking of Wildlife	Moderate	• Avoid and strictly prohibit wildlife persecution, hunting, and all forms of animal and plant collection and active taking. • Strictly prohibit tree cutting by the project staff and workers and apply fines and charges on none-compliance by the staff.	Low	BOT Contractor / NEPCO
			• Design and implement an extensive terrestrial biodiversity monitoring program as part of project requirements to assess environmental conditions before, during, and after the completion of the construction works so that the 'new' baseline conditions before operation commences are determined.		BOT Contractor
Social Environment					
Economic Activities	• Potential job opportunities and increase local business	Moderate	The Contractor should implement the following: • Transparent recruitment procedure • Local hiring and skills development strategy to encourage local employment and manage expectations	Moderate	BOT Contractor / NEPCO
	• Disruption to surrounding local businesses	Moderate	• Inform local businesses owner about construction activities and schedule • Proper communication and coordination with affected owners	Low	BOT Contractor / NEPCO
Labour Influx and Social Tension	• Social tension between local and foreign workers	Moderate	• Implement and abide by Labour Conditions specified in the Project ESMP. • Draft a Code of Conduct for workers and ensure that workers sign and understand the Code of Conduct. • Develop and implement a Grievance Redress Mechanism and respond to culturally insensitive behaviours and incidents as a matter of priority. • Coordinate and implement public awareness campaigns for workers regarding dealing with the local population	Low	BOT Contractor / NEPCO

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
			to minimize friction caused by contacts between the construction workforce and communities.		
Working Conditions	• Forced labour and child labour may raise during construction • unequal pay, unfair treatment, and wage disparities between local and foreign workers	Moderate	• Prohibit child and forced labor in the project as defined by the ILO, Jordanian legislation. • Abide by ILO Standards. • Coordinate and implement public awareness campaigns for workers and the communities	Low	BOT Contractor / NEPCO
Land Use/Land Cover and Aesthetics	• Land acquisition impact on owners	Moderate	All lands in the project area of the Project components shall be acquired and compensated according to the Real Estate Ownership Law No. 13 of 2019 and its amendments and EIB Standard 6 for Involuntary Resettlement By following the Land Acquisition and Resettlement Policy Framework for the AAWDC project. However, a Resettlement Action Plan is needed to be developed for the RE Component after receiving the final design of the RE Site and its OHTL Furthermore, the following must be implemented to mitigate the impacts of visual intrusion due to the presence of construction activities on site, especially near residential areas: • Install adequate fencing around construction sites • Organize stock piling scheduling works to minimize the construction area • Coordination with the Department of Lands and Survey shall be made so that all related land use will be with the permission of the landowner and/or land user and compensation is provided at full replacement cost or as agreed through an open market transaction. • Monitoring procedures shall be put in place ensuring that negotiations occurred and the agreed compensation to private landowners will be provided in a timely manner for the purpose of securing that their	Low	WAJ/NEPCO
	• Change in Land Use				BOT Contractor / NEPCO
	• Negative aesthetics at active construction sites				

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
			living standard and income opportunities remain at their pre-Project levels. • A grievance mechanism shall be put in place that receive complaints on land acquisition matters. • The BOT Contractor will be responsible to cover any occupancy indemnities for the extraction or use of construction materials, and the cost of acquiring the necessary land to stockpile excess backfill material. • The BOT Contractor will be responsible to cover any damage suffered by the owners or users of the land as a result of a serious misconduct by his construction personnel. • Once the final affected land plots are identified, the BOT Contractor will be responsible for preparing and adhering to a comprehensive Resettlement Plan to ensure fair and transparent processes in line with the Land Acquisition and Resettlement Policy Framework for the overall project. • The BOT Contractor shall coordinate with both the Royal Film Commission and the Wadi Rum Film Centre prior to commencing any construction activities. This coordination aims to ensure that no filming is scheduled within the designated area during the construction period and that the planned activities will not interfere with or impact the integrity of the filming zone.		
Infrastructure and Public Services	• Disturbance of public infrastructure services • Use of public utilities	Moderate	• Develop and implement a Traffic Management Plan to minimize disruptions to local road networks. • Schedule excavation and construction activities during off-peak hours to reduce traffic congestion. • Provide clear signage and alternative routes for vehicles and pedestrians in affected areas.	Low	BOT Contractor / NEPCO

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
			• Coordinate with local authorities to ensure timely notification of road closures or diversions.		
Traffic	• Traffic congestion is caused by the transportation of bedding material, pipes, valves, concrete, and other items.	Moderate	• Develop and abide by a Traffic and Transport Management Plan	Low	BOT Contractor / NEPCO
Public Health and Safety	• Health risks from the generated dust and noise	Moderate	• Develop and abide by **Health and Safety plan** and **Site Security Management Plan** • Fence the construction area from all sides to prevent access to the site. • Prohibit unattended / unauthorized public access. • Install proper fences marked by red warning lights at night around excavations, material dumps or other obstructions at the construction sites • Install warning signs of excavation and construction activities at the external part of the site and at a distance of 100 meters. • Equip Project drivers with telephones for contacting the emergency services to enact the Emergency Preparedness and Response Plan (EPRP) if necessary, in case of emergency. • Manage the grievance mechanism through which community members can make complaints about Project activities. • Address potential increase in demand for local health facilities from in-Project migration arising from the construction workforce and support to health facilities located in the Project area (e.g. in terms of infrastructure, equipment, staff or financial/running costs).	Low	BOT Contractor / NEPCO
	• Traffic accidents, injuries and road closure				

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
Occupational Health and Safety	• Transportation accidents, falls, electric shock, mishandling of machinery • Working with high-voltage equipment, heavy machinery and at heights,	Moderate	• Develop and abide by Health and Safety Plan and Site Security Management Plan • Workers shall wear personal protective equipment (PPE) including hard hats, safety glasses, slip resistant boots, and masks; • First aid kit shall be available at each working site; • At least one onsite worker trained in basic first aid shall be present onsite. If number of workers in one site exceeds 50 and less than 500, appoint a full-time nurse and a part time doctor. • Chemicals stored onsite shall be labelled and handled properly; • All electrical tools and equipment shall be maintained and checked regularly for any defect; • The contractor shall conduct training and awareness meetings including safety toolbox talks, correct use of PPE, health and safety procedures, and handling hazardous material containers and related wastes.	Low	BOT Contractor / NEPCO
Solid Waste	• Demolition Waste generated from excavation works • Hazardous Waste generation	Moderate	• Waste segregation and labelling • Prepare and abide by a waste management plan • Prepare and abide by a spill prevention and response • Dispose the hazardous waste through licensed facilities	Low	BOT Contractor / NEPCO
Wastewater Generation	• Waste and wastewater generation causing pollution	Moderate	• Prepare and abide by a Waste Management Plan • Ensure that constructed septic tanks during the construction phase are well contained and impermeable to prevent leakage of wastewater into soil and groundwater; and ensure that septic tanks are emptied and collected by wastewater contractor at appropriate intervals to avoid overflowing	Low	BOT Contractor / NEPCO

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
			• Hire a private contractor for the collection of generated wastewater from the site to an authorized WWTP, such that the tankers must have a GPS system installed to track their movement • Prohibit illegal disposal of wastewater to land Maintain records and manifests that indicate volume of wastewater generated onsite, collected by contractor, and discharged into authorized WWTP. The numbers within the records are to be consistent to ensure no illegal discharge at the site or other areas		
Cultural Resources	• Damage to sites of historical importance	Low	• Ensure all chance finds of cultural heritage are reported immediately to DoA, excavation stopped, and contractor awaits instructions from DoA. • Ensure coordination between the Contractor and DoA. • Leave a 15-m buffer zone around each site. •	Negligible	BOT Contractor NEPCO

8.9.4. Environmental and Social Management Plan during Operation

Table 8-4 comprises the overarching environmental and social management provisions for the AAWDC Project – RE Component which shall be integrated into the BOT Contractor and NEPCO's OESMP related to the operation phase of the Project to ensure environmental and social welfare protection and legal compliance.

Table 8-4: Environmental and Social Management Plan - During Operation

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
Physical Environment					
Soil	• Soil erosion, compaction, and Contamination	Low	• Prepare and abide by a Pollution **Prevention Management Plan** and a **Waste Management Plan**. • Reinstate the project area to its original condition after completion of the works.	Negligible	BOT Contractor
Water Resources	• Overconsumption of water resources	Moderate	• Priority must be given to the use of dry-cleaning methods	Low	BOT Contractor
Biological Environment					
Biological Environment	• Impacts on Flora, Fauna and Avifauna	Moderate	• Limit human activity and vehicular movement to designated areas to minimize disturbances to wildlife. • Schedule maintenance activities during daylight hours to reduce disruption to nocturnal species. • Remove any abandoned construction waste, materials, or piles that could obstruct wildlife movement corridors. • Install bird diverters, reflectors, or other visual markers on OHTL wires to reduce collision risks for large bird species. • Avoid and strictly prohibit wildlife persecution, hunting, and all forms of animal and plant collection and active taking. • Design and implement an extensive terrestrial biodiversity monitoring program as part of project requirements to assess environmental conditions before, during, and after the completion of the construction works so that the 'new' baseline conditions before operation commences are determined	Low	BOT Contractor / MWI and NEPCO
Social Environment					

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
Social Tension	• Social tension between local and foreign workers	Moderate	• Draft and implement Code of Conduct for workers • Ensure that workers sign and area aware of Code of Conduct • Respond to culturally insensitive behaviour and incidents as a matter of priority	Low	BOT Contractor / MWI and NEPCO
Land Acquisition, Land Use and Aesthetics	• Reduce the value of lands nearby the OHTL	Moderate	• Engage with local tourism authorities and residents to identify ways to mitigate aesthetic concerns •	Low	BOT Contractor and NEPCO
Infrastructure and Public Services	• Traffic congestion • Use of public utilities	Low	• Develop and implement **a Traffic Management Plan** to minimize disruptions to local road networks. • Scheduled maintenance of the OHTL infrastructure • Provide clear signage and alternative routes for vehicles and pedestrians in affected areas. • Coordinate with local authorities to ensure timely notification of road closures or diversions.	Negligible	BOT Contractor / MWI and NEPCO
Public Health and Safety	• Phenomenon of corona discharge from OHTL • The risk of electrical hazards, such as electrocution or fires	Moderate	• Conduct routine monitoring of electromagnetic fields to ensure compliance with safety standards and address any community concerns. • Prepare and abide by Health and Safety plan • Place clear and visible signage warning of potential electrical hazards and restricting access to operational areas. • Develop and implement Emergency Response Plans to handle incidents such as fires, electrocution, or spills promptly and effectively.	Low	BOT Contractor / MWI and NEPCO

Environmental / Social Component	Potential Impact	Significance	Mitigation Measures	Residual Impacts	Institutional Responsibility
Occupational Health and Safety	• Working with high-voltage equipment, heavy machinery, and at heights • Exposure to electromagnetic fields and corona discharge effects • Working from Height	Moderate	• Workers shall wear personal protective equipment (PPE) including hard hats, safety glasses, slip resistant boots, and masks; • First aid kit shall be available at each working site; • At least one onsite worker trained in basic first aid shall be present onsite. If number of workers in one site exceeds 50 and less than 500, appoint a full-time nurse and a part time doctor. • The contractor shall conduct training and awareness meetings including safety toolbox talks, correct use of PPE, health and safety procedures, and handling hazardous material containers and related wastes. • Require **two-person teams** for all high-altitude maintenance tasks to ensure safety and emergency support. • Restrict work at heights **during adverse weather conditions** • Use **engineered climbing systems** such as fixed ladders with safety cages, vertical lifelines, or ladder fall arrest systems on transmission towers.	Low	BOT Contractor / MWI and NEPCO
Solid and Hazardous Waste Management	• Improper solid waste and PV panels disposal and inappropriate discharge of wastewater	Moderate	• Prepare and abide by a Waste Management Plan • Prohibit illegal disposal of broken or damaged solar panels onto the land. • The damaged panels will be stored at the Al-Swaqa Landfill, managed by the Ministry of Environment, until they can be reused or properly disposed of alongside other similar waste. It is worth noting that this is currently the only available method for managing the damaged PV panels in Jordan.	Low	BOT Contractor / MWI

8.10. Supplementary Plans and Conditions for the ESMP

Supplementary to Sections 8.9.3 and 8.9.4above related to the Project ESMP E&S mitigation provisions, which the BOT Contractor / NEPCO shall incorporate in the CESMP and OESMP on the basis of the AAWDC Project – RE Component's detailed design, the following sections aim at providing overarching principles for the supplementary plans that shall be developed and form integral part of these ESMPs.

8.10.1. Construction Plans, Mechanisms and Procedures

8.10.1.1. Pollution Prevention Management Plan

The BOT Contractor / NEPCO shall develop a PPMP as part of the CESMP and will be applicable to all Project construction sites. The following sections describe the various topics and conditions that shall be included in the PPMP.

8.10.1.1.1. Effluent Management

The PPMP shall include measures for the management of effluents, defined as liquid discharges transporting a pollutant (dissolved, colloidal or particles), including infiltration, that are generated at Project Areas. A pollutant is a given chemical compound at a concentration greater than the limit value established for that compound according to national regulations and/or international recognised standards including those of EIB and USAID.

If no recognized threshold exists for a chemical compound, the BOT Contractor/NEPCO shall provide proof that the concentrations of the chemical in effluents released (discharged) to the environment are harmless to it and to humans.

No effluent generated during construction shall be discharged into water courses or bodies including the marine environment nor to ground surface or infiltrated into subsoils, without prior treatment and without monitoring quality of the treatment's performance to guarantee the absence of pollution in the effluent. Effluent discharge and flow rates into natural water bodies will be managed to control erosion and sediment load

All sources of effluents and outlets to the natural environment shall be listed, located, characterised (flow, expected quality, discharge frequency) and reported.

An Effluent Quality Monitoring Report shall be submitted on a monthly basis during construction, including documentation for each effluent discharge point comprising the following: (a) average flow rates of discharged effluents, (b) discharge frequencies and durations over the month, and (c) the physical and chemical quality of the effluent discharged, for the conformity with set parameters and limit values.

Wastewater

Appropriate measures shall be taken to ensure that discharges of any process wastewater, sanitary wastewater, wastewater from utility operations or stormwater to surface water or seawater does not result in contaminant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality.

Adequate sanitation facilities shall be set up for the workforce. Domestic wastewater shall either be discharged to the sewage network (if any). The condition of the septic tanks shall be checked regularly and accumulated sludge pumped out and disposed to an appropriate regulated facility off-site as per the national regulations. Discharge of untreated wastewater or sludge to the sea, streams or wadi beds shall not be permitted.

All excess construction water shall be discharged downstream of construction works. Domestic wastewater and other effluent discharges shall only be permitted where the discharge quality and location conform to the national regulations.

Rainwater and Run-off

Run-off consists of rainwater flow on the surface or the soil and other technical surfaces at Project Areas. Provisions for drainage through all Project worksites and accommodation camps shall be included in the PPMP. These will include measures to ensure that surface water run-off is contained and managed appropriately. Such provisions shall prevent flooding of the sites and the resulting contamination of the surrounding environment.

The natural flow of unpolluted rain and spring water along all rivers, streams, wadis, wadi openings and alluvial fans shall be maintained throughout the construction period.

In case of pollution suspicion (e.g., through to contact with chemicals or waste storage areas), all runoffs shall be treated before discharge.

Suspended solids in rainwater shall be removed using sediment traps or settling ponds. Whereas rainwater from vehicle parking areas, machinery areas, workshops shall be subject to treatment with oil interceptors.

Any rainwater pre-treatment units shall be sized, cleaned, maintained and accessible to ensure compliance with the effluent quality criteria set out in national regulations and to allow for monitoring of performance.

8.10.1.1.2. Spill Prevention and Management

The BOT Contractor / NEPCO shall identify all potential spill source areas, such as loading and unloading, storage, and processing areas, places where dust or particulate matter is generated, and areas designated for waste disposal. The BOT Contractor / NEPCO shall also evaluate the spill potential for any Project stationary facilities, including manufacturing areas, warehouses, service stations, parking lots, and access roads. The PPMP shall define material and waste handling procedures and storage requirements and outline actions necessary to reduce spill potential and impacts on surface water or groundwater quality.

All platforms where generators, hydrocarbon storage tanks and refuelling stations are installed shall have impervious and chemical resistant surfaces, are drained separately and are equipped with an oil removal treatment (oil-water separator) to prevent pollution. For concrete batching plants, run-off shall be drained to a settling basin, where the pH is buffered.

Vehicle/machinery and equipment operations, maintenance and refuelling shall be carried out to avoid spillage of fuels and lubricants and ground contamination. An “oil interceptor” shall be provided for wash-down and refuelling areas. Fuel storage shall be located in proper bunded areas.

Fuel and hazardous chemicals/materials shall be stored in designated areas, except for quantities generated or required for the daily construction activities. Fuel, oil, or hazardous materials required to be temporarily stored onsite will be stored within secondary containments located at least beyond 100m from any watercourse or the sea.

Fuel and hazardous chemical storage areas shall not be allowed within 50 m of a minor watercourse, within 100 m of a major watercourse, within a floodplain or where there is the potential for spilled fuel and chemicals to enter groundwater through soil percolation.

All fuel and hazardous chemical storage facilities shall be located on flat or gently sloping ground and should be contained within a bund designed to contain at least 110% of the total capacity of the storage containers plus 10% of the aggregate tank volume within the containment area or 20% by volume of the chemical waste stored or as otherwise specified by national regulatory requirements. The bund walls and floor shall be constructed of concrete with appropriate coating protection for corrosion or other suitably impermeable material. The filling connection must be within the bund. No drain valves or other connections through the bund walls should be permitted. Tanks shall be fitted with a gauge to allow the fill level to be monitored during refilling and preferably with a high-level alarm.

Oily water discharges shall not be permitted. Provisions shall be made so that that oil, chemicals, and other contaminants stored on Project worksites and accommodation camps are properly stored, isolated and bunded, with secondary containment of adequate volume where appropriate, to prevent leakage or spillage to the soil, wadis, and groundwater.

All hydraulic equipment shall be laid on percolation preventive surfaces.

A regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors shall be implemented at all Project worksites.

8.10.1.1.3. Air Emission Control

Air emissions refer to any discharge into the air of solid substances, aerosols, gases, radiation, or energy, whether point sources (e.g., stacks) or diffuse (e.g., fugitive dust emissions from road use by trucks).

Equipment and vehicles shall be used and maintained so that generated atmospheric emissions are not in excess of the threshold emission values set out in national regulations or international recognised standards including those of the EIB and USAID.

The fleet of vehicles or equipment emitting combustion gases shall be maintained at the intervals and according to the methods specified by the manufacturer.

The maintenance records for the fleet of vehicles, machinery, and equipment shall be recorded.

The PPMP shall describe the road sections designated for the application of dust suppression agents and the methods and frequencies programmed. Where it is deemed that dust is impacting or may have an impact on human, plant, or animal receptors or where dust may cause sedimentation of watercourses/water bodies or unacceptable levels of soil loss, water shall be applied to the area creating the dust and consideration shall be given in implementing other dust control measures such as using windbreaks, netting screens or semi-permeable fences; controlling vehicle speeds to reduce traffic-induced dust dispersion and resuspension by setting and enforcing speed limits. This shall include posting speed limit signs in sensitive areas; ensuring trucks hauling sand, dirt or other loose materials are covered (sheeting trucks); suspending topsoil stripping and replacement during strong winds; using a dust collection system for bulk materials unloading; wet suppression (as needed, depending on the soil type) in the dry season, where unpaved roads and/or the working strip is located < 200 m from settlements taking appropriate abatement measures.

When storage, transport and handling of bulk materials is made in the open air and exposed to the wind, the necessary dust abatement measures shall be implemented.

8.10.1.1.4. Documentation, Procedures and Training

Detailed description of practices and procedures that will be used to prevent spills and other emergencies from occurring shall be included in the PPMP. These procedures shall provide for employee training, inventory monitoring, inspection, secondary containment, etc. and shall include:

- Worksite site characterization comprising the following information:
  - Site data description inclusive of location, and nearby businesses or residences, site plan showing location of storage areas for hazardous materials/waste, location of storm drains, yard drainage, wadis, etc.
  - Products/Materials Lists comprising the types and amounts of hazardous materials stored at the particular worksite/facility site (wastes and products).
  - Emergency Contacts List of individuals who should be contacted in the event of a spill or other emergency. This list should include all relevant management and site personnel, police, fire, health department personnel, clean-up contractors, chemical treatment/disposal companies, and other local agencies and authorities, as necessary.
- Response actions comprising the following information:
  - Denomination of person(s) who will be responsible for responding to spills and notification of emergency response teams.
  - Description of equipment and material located on-site to be used in spills' response as well as marking of the location of said response equipment and material.
  - Description of plans for evacuation of employees and third parties.
  - Detailed description of procedures that will be followed in responding to emergency situations.
- Audit and Review Procedures
- Communications and Reporting Procedures
- Personnel Training Requirements/Procedures

Moreover, the PPMP shall clearly document the locations of spill response equipment and procedures to be used and ensure that procedures are clear and concise. The plan shall include step-by-step instructions for the response to spills and also identify individuals responsible for implementing the plan, define safety measures to be taken with each kind of hazardous material/waste, specify how to notify appropriate authorities, such as police and fire departments, hospitals, or municipal sewage treatment facilities for assistance, set out procedures for containing, diverting, isolating, and cleaning up the spill, and describe the spill response equipment to be used, including safety and clean-up equipment.

An outline but concise PPMP shall be posted at appropriate points at all Project worksites. In addition, the PPMP shall be evaluated and updated on semester basis by the BOT Contractor / NEPCO along the duration of construction.

Training is necessary to ensure that all worksite personnel/operations personnel are knowledgeable enough to follow the procedures outlined in the PPMP. The BOT Contractor / NEPCO will be responsible for making equipment and materials for clean-up readily accessible, and for marking them clearly so that site personnel/operations personnel can follow procedures quickly and effectively.

8.10.1.2. Waste Management Plan

The BOT Contractor / NEPCO shall develop a Waste Management Plan (WMP) as part of CESMP, detailing the amount and type of waste that will be produced at Project sites and how this waste will be reduced, reused, recycled, or disposed of. The WMP shall be updated during the construction phase at semester basis to record how waste is being managed and to demonstrate that any materials which cannot be reused or recycled are disposed of at a legitimate site and in a manner pursuant to the Jordanian regulations and international best practice, as well as EIB and USAID E&S standards.

The WMP shall take into consideration the following measures:

- Avoid unnecessary and/or prolonged solid waste accumulation especially at the tidal zone, the beach front, and other sensitive areas.
- Whenever waste accumulation, prolonged storage or use of area close to the water (tidal zone) is unavoidable, reduce disposal of waste, leakage of leachate and blocking of water courses.
- Restore areas used as temporary storage grounds immediately after the completion of the construction activities.

Waste shall be categorised according to the following definitions:

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

8.10.1.2.1. Spoils and Excavation Materials

Spoils and excavation materials shall be managed in line with the Construction Methods Plan Whenever cut materials are not suitable to be used for filling, the BOT Contractor shall identify a final destination site that is neither ecologically sensitive nor important. Conducting an ecological assessment of this site is a prerequisite and shall be approved by the relevant authorities.

The workspace in the coastal environment shall be reduced to the minimal operational area and time required.

On the coastal part, the workspace and the access thereto shall not use concrete, asphalt, or any other permanent sealing material.

No dumping of spoil or any other type of waste in the surrounding environment or at any location other than to sites approved by the competent national authorities will be allowed and after actions have been taken to assess and minimize the effect on the environment and public health.

On completion of construction works, efforts shall be made to restore the situation to its original state including the dismantling of all temporary roads and installations.

All dust generating materials transported to and from the construction worksites shall be covered by sheeting.

The wheels of vehicles leaving the worksites shall be cleaned so that dirt and mud is not spread on surrounding roads.

The following shall be implemented to the extent possible/practicable:

- Minimize storage time of spoils stockpiles.
- Align stockpiles to prevailing wind to minimise surface area exposed to wind erosion.
- Minimize stockpiles height and use gentle slopes and compact stockpile surfaces.
- Store materials away from the site boundary and downwind of sensitive receptors.
- Minimize height and fall of excavation materials during handling.

- Minimize cutting and grinding on site.
- Equipment and techniques shall be used such as dust extraction to minimise dust. A wet cutting saw or the use of vacuum extraction shall be considered.

In the event that excavation spoil materials are encountered with detectable levels (above natural background) of radiation from concentrations of naturally occurring radioactive ores (such as Uranium Oxide, deposits of which have been found in other parts of Jordan), the Radiation Protection Directorate within the Jordan Nuclear Regulatory Commission shall be notified, and suitable spoil handling, storage and disposal measures shall be developed and applied accordingly.

8.10.1.2.2. Non-hazardous and Domestic Waste

Specific measures that have to be implemented to achieve waste reduction and to maximise reuse and recycling of waste materials shall include segregation and storage of different types of waste in different containers or stockpiles and provision of separate labelled bins for collection of aluminium cans, plastics and waste paper. Wood, steel and other metals shall be separated from construction and demolition waste, to enable its re-use and/or recycling.

Proper storage and site practices shall be employed to reduce the potential for damage or contamination of construction materials; and ordering and stocking of construction material shall be carefully planned to avoid unnecessary generation of waste.

General waste shall be transported directly to the nearest local and approved landfill for final disposal. If no landfill area exists nearby and providing a suitable location can be found to avoid transporting the waste over long distances, consideration may be given in coordination with the Project Promoter to establish a Project associated landfill site. In this event, the landfill design and operation shall meet international standards (e.g., EU Landfill Directive) and be undertaken pursuant to the national planning and permitting requirements, and in close liaison with the competent regulatory/permitting agencies.

Local recycling companies shall be contacted to arrange for the recycling of as many waste types as possible.

The following materials may be collected separately for recycling from each Project worksite and accommodation camps: ferrous metal (construction sites only), non-ferrous metals (construction sites only), wood (construction sites only), plastic bottles (all sites), waste oils (all sites where vehicles are based), and paper/cardboard (all sites).

8.10.1.2.3. Hazardous Waste

The WMP shall ensure prevention of the generation of significant amounts of hazardous waste through good management and control actions. Waste reduction shall be achieved by careful planning and design, as well as by ensuring the implementation of good site practices.

The WMP shall comprise detailed procedures for working with chemical products and hazardous materials and handling hazardous waste.

Hazardous materials are those that pose a potential risk to human health or the environment and include cleaning chemicals, solvents, fuels and PV Panels.

Any hazardous waste generated at any of the Project worksites and camps shall be temporarily stored safely and securely for later disposal. Hazardous wastes shall be handled to avoid potentially dangerous incidents due to escape of the waste or mixing of incompatible waste. No hazardous waste shall enter the non-hazardous waste stream.

Storage areas for hazardous waste shall be clearly labelled and used solely for the storage of hazardous wastes; have adequate ventilation; be covered to prevent rainfall entering (water collected within the bund), and be arranged so that incompatible materials are appropriately separated.

Should the hazardous waste management be conducted by third parties, they must be reputable and accredited in Jordan for this activity, such that the waste shall be disposed at the MoEnv operated Hazardous Waste Facility at Swaqa, should the type of hazardous waste indeed be accepted at this facility. The capability and track record of waste collectors shall be assessed and confirmed in coordination with the competent regulatory authorities prior to the appointment of any such sub-contractors.

Containers used for the storage of hazardous wastes shall be suitable for the substance they are holding, resistant to corrosion; maintained in a good condition, and securely closed; display a label in Arabic and English

to state clearly the nature of the waste, any hazards which it may pose, contact numbers of persons that can provide additional information in the case of an emergency, and display any international hazard warning sign as appropriate.

Hydrocarbons, lubricants, paints, solvents, and batteries shall be transported in drums to suitable waste management facilities.

Any contaminated land encountered during construction works shall be dealt with in compliance with the relevant regulations and in agreement with the competent regulatory authorities. All contaminated land, whether existing, or as a result of spills or leakage during construction, must be treated/disposed in a manner approved by the competent national regulatory authorities.

Vehicles carrying hazardous waste to be labelled appropriately. If hazardous waste is mixed with non-hazardous waste, the entire mix will be considered and handled as hazardous.

All transportation vehicles shall be equipped with suitable materials or equipment to contain, handle, and remove accidental spillages.

8.10.1.2.4. Other Provisions

No organic waste shall be used for backfilling. Original material shall be used as far as possible, supplemented by approved inert material where necessary.

The open burning of any waste, hazardous and non-hazardous, at construction sites, permanent Project sites or workers' accommodation camps shall be prohibited.

Hazardous and non-hazardous waste shall be securely transported from the point of arising to storage facilities and from there to treatment or disposal facilities to avoid spillages, windblown litter, and other potential environmental issues. The following precautions should be observed:

The type, material, and integrity of transport packaging and containers shall be appropriate to the type and class of waste being transported.

Transportation vehicles shall be appropriate for the type, class and quantity of waste being transported in terms of its composition, load capacity, need for covering, etc.

Strict loading and unloading procedures shall be followed to avoid any waste loss.

Each worksite shall have one or more staff with responsibility for implementing the waste management procedures detailed in the WMP.

The WMP shall be disseminated to all Project worksites and camps and to all subcontractors working on the Project Areas.

All personnel shall be trained in proper waste management procedures as appropriate to their level of responsibility and duties. This includes training in concepts of site cleanliness and good housekeeping, and on appropriate waste management procedures, including waste reduction, reuse, and recycling under the waste management hierarchy.

A waste register shall be established since the mobilisation of the construction works and maintained throughout construction duration. This register shall record all waste management operations from production through to collection, transport, treatment, and final disposal. The following aspects should be documented in this register: Type of waste; Waste quantities; Name and address of the third-party waste management facilities receiving waste or parties taking possession of the substances no longer considered as waste; Name and address of waste transport Contractors; Planned waste treatment; Final disposal locations.

The WMP shall be structured to include at minimum the following contents:

1. Introduction
   - *Project Description*
   - *Purpose of the WMP*
   - *Scope of Application of the WMP*
   - *Terms and Definitions*
2. Involved Parties, Roles and Responsibilities
   - *Client*
   - *Principal Contractor*
   - *Principal Designer*

- *Sub-contractors*
- *Materials Suppliers*
- *Waste management contractors*

3. Regulatory Framework
   - *Waste Management Principles*
   - *Jordanian Legislation*
   - *International Standards (EIB, USAID)*
4. Implementation Schedule of the WMP
5. Determination of Types of Waste
   - *Construction and demolition waste*
   - *Excavated materials*
   - *Hazardous waste*
   - *Non-hazardous waste*
6. Estimation of Waste Generation
7. Waste Management Procedures
   - *Waste Prevention and Minimisation*
   - *Preparation for Reuse*
   - *Recycling*
   - *Other recovery*
   - *Disposal*
   - *On-site waste management*
   - *Off-site waste management*
8. Monitoring, Reporting, and Control Procedures
   - *Waste Register*
   - *Documentation for Waste Transportation*
   - *Reporting*
   - *Audit and Control*
   - *Quality Monitoring*
9. Review and Updating Procedures
10. Personnel Training Requirements/Procedures

8.10.1.3. Health and Safety Management Plan

Based on a risk assessment to be conducted, the BOT Contractor / NEPCO shall develop a HSMP as part the CESMP, which shall identify and specify the following:

- All health and safety risks relating to the execution of the Project works, including gender-specific risks;
- Prevention and protection measures to control risks related to the execution of the works/operations, by differentiating, where necessary, measures concerning the protection of women and men;
- Human and material resources required;
- Works requiring a permit (e.g., blasting, working at height, working in confined spaces, etc.); and
- Emergency plans to be implemented in the case of an incident or accident.
- Training of staff.

The BOT Contractor / NEPCO shall ensure efficient and effective H&S communication and consultation with all personnel involved in the Project Areas construction activities. This includes but is not limited to toolbox meetings prior to the start of the works, worksite H&S meetings on a regular basis with all parties involved (including subcontractors, the Construction Supervision Consultant if appointed and third parties).

The BOT Contractor / NEPCO shall ensure that supervision, directly in charge of construction activities, fully brief and discuss with personnel at H&S Toolbox Talks at the start of each work day and prior to commencing new activities. These talks should be conducted in Arabic. A checklist shall be utilised for this purpose. At a minimum it shall include the following: Nature of the job; Associated hazards; Safe working methods to be adopted; Requirements of the Permit to Work.

Adequate training shall be provided to all employees working on Project worksites who may be exposed to harmful substances and situations. Employees shall be trained to prepare for the work to be done, including knowing what the hazards are at the site, learning how to use the PPE needed to perform tasks safely, understanding the work practices that will reduce risks, using safe engineering controls and equipment, and recognizing the signs that may indicate overexposure to a hazard.

8.10.1.3.1. Safety and Security

The BOT Contractor / NEPCO shall evaluate the security strategy and arrangements required for all worksites including transport. This evaluation shall be performed by qualified security experts and should form the basis for the Worksite Security Strategy and Plan which shall be submitted as part of the HSMP. The Security Strategy and Plan shall describe:

- Security risks and the identified mitigation / management measures
- Roles and responsibilities including details of the EPC Contractor and Subcontractors
- Detection, monitoring and management procedures
- Escalation plans including resources

The facilities and equipment used by the BOT Contractor shall be installed, maintained, revised, inspected, and tested pursuant to the manufacturer's recommendations. The recommendations shall be available in an appropriate language.

To safeguard local community members and the public, A Community Health and Safety Plan shall be developed as part of the HSMP and include the following:

- Fence the construction area from all sides to prevent access to the site
- Prohibit unattended/unauthorized public access
- Install proper fence marked by red warning lights at night around excavations, material dumps or other obstructions at the construction sites (especially along the proposed roads where the conveyance pipeline will be installed)
- Install warning signs for drilling and construction at the external part of the site and at a distance of 100 meters
- Equip Project drivers with telephones for contacting the emergency services to enact the EPRP if necessary, in case of emergency.
- Keep Project stakeholders informed of the Project (in particular its schedule) and monitor stakeholder engagement
- Manage the grievance mechanism through which community members can make complaints about Project activities
- Address potential increase demands on local health facilities from in-Project migration arising from the construction workforce and support to health facilities located in the Project area (e.g. in terms of infrastructure, equipment, staff or financial/running costs)
- Conduct influx management forums throughout the construction phase with the local communities to identify their experiences and concerns of impacts
- Information dissemination and education programmes regarding safety awareness around construction sites and traffic as well as sanitation and hygiene, particularly in schools in the area of the Project

The Community Health and Safety Plan shall cross reference with other relevant management plans such as the TMP and EPRP. Local health care and emergency services should be consulted in the development of the plan.

8.10.1.3.2. Excavations

Construction sites workers and associated inspection staff are frequently required to work in or around excavations. Hazards related to excavation operations include entrapment, suffocation, gas explosion, electrocution, and striking by heavy equipment.

A H&S Officer shall be assigned and trained to identify all existing and predictable hazards associated with the excavation, including identification of soil types, and be authorized to take corrective action to eliminate hazards.

A written instruction on excavation safety shall be developed to ensure compliance with existing safety standards. Components of said instruction shall include the following:

- Notification of the Project Promoter and competent authorities when locating underground utilities according to the national legislation.

- Determination of location of any underground utilities.
- Consideration of confined-space atmosphere potential.
- Selection of proper soil protective systems and personal protective equipment and clothing.
- Determination of soil composition and classification.
- Assessment of surface and subsurface water problems.
- Determination of depth of excavation and duration of work.
- Training and supervision of all relevant workers.

The H&S Officer shall be onsite and ensure the safety instruction is followed by the dedicated worker(s) and in close cooperation with the supervisor of the excavation related tasks. Daily and periodic inspections of the excavation site(s) shall be conducted and documented. Such inspections should be conducted before every shift, after a rain event, or any other event that increases hazards.

Soil testing shall be undertaken on freshly excavated samples from the worksite. This testing determines the soil type and points to the type of soil protective system that should be used. It is noted that most fatal cave-ins occur on small jobs of short duration, such as service connections and excavations for drains and wells. Often the public perception is that these jobs are not hazardous enough to require safeguards against collapse.

Procedures and basic operating principles for safely carrying out excavation works shall be as described in the following paragraphs.

All excavation activities on Project worksites shall be controlled by a work permit. Key safety issues relating to the inherent risk involved in excavation shall be identified in the work permit and appropriate controls and protection measures put in place before excavation works are carried out.

Ongoing review and inspection of supports shall be undertaken to ensure that any unauthorized removal and alterations of supports and braces are identified and rectified. Careful excavator operation shall be done in and around supports to prevent striking damage.

All overhead hazards (e.g., utility lines) shall be supported or removed as appropriate.

Excavated spoil/stockpile heaps shall be located well back from the edge of the excavation works. A general rule is to keep the spoil as back from the edge of the excavation at least the distance that the excavation is deep. The storage of materials close to the edge of excavated areas shall not be permitted.

Excavated areas require edge protection to prevent falls. Secured ladders shall be used for excavation access and climbing on excavation supports shall not be permitted.

When vehicles are operating in the vicinity of an excavation, e.g., trucks tipping for backfilling, the use of stop blocks or the establishment of berms/curbing to prevent vehicles driving into excavations shall be sought. Signs and barricades shall also be erected to protect workers from vehicular traffic.

Excavations shall be checked daily before entering for any change in condition which may make the excavation unsafe, e.g., after a heavy rainfall, changes in support and shoring, etc.

When working in and around excavations, workers shall always wear the appropriate personal protective equipment (PPE), never jump across excavations, and never throw tools or materials down to someone into an excavated area. A means of egress from the excavation with a ladder, ramp, or stairs should be provided and appropriate lateral travel distance and anchorage at the top shall be ensured.

Testing for a hazardous atmosphere shall be carried out daily if potential for such a hazard exists.

Excavation machinery shall be checked regularly before use. Items to be considered include:

- Coupler assembly, free of debris and material; check for any damaged or cracked components.
- General check for any missing parts or components, oil leaks, distressed welds, etc.
- Check of safety, lynch and mounting pins, locks and nuts; ensure they are in good condition, not bent or worn, and functioning correctly.
- Check of blocking arm and bar components and operation.
- Check of all the hydraulic hoses, couplings, fittings.
- Check of all grease points; ensure maintenance scheduling is carried out

- Check of lights, flasher beacons, mirrors, etc.

In operating excavation machinery, the following precautions shall be considered:

- Never carry passengers.
- Keep watch for potential hazards, overhead cables, people and machines.
- If outriggers and supports are available, they should be used.
- Ensure safety pins are always fitted with quick hitch buckets.
- Always ground bucket before leaving the machine.
- Do not leave the machine unattended unless switched off, parked, and fully locked.

Storing of spoil piles shall be practiced in appropriate distance from the side of an excavation (at least 1.5 to 2 meters from the edge).

Rescue teams shall be alerted to the location of the excavation.

8.10.1.3.3. Working at Height

Construction work often exposes people to hazards from working at height. Such works involve for instance:

- Steel workers erecting the steel framework of a building.
- Scaffolders erecting or striking (taking down) a scaffold.
- Roofers cladding the roof of a steel-framed building.
- Demolition workers dismantling machinery on the roof of a building.
- Welders working at the side of a deep excavation.
- Pipe fitters fixing pipework to the ceiling in a factory workshop.
- Painters painting a lamp-post or a steel-span footbridge.

Many of these tasks will involve the use of some form of access equipment (e.g., scaffolding or ladders) and those using this equipment are usually familiar with and used to such work, which can lead to complacency. Other workers may not be so used to these tasks at height, and lack competence.

The main risks associated with work at height are (a) the worker falling from height and (b) an object falling from height onto someone below.

All work at height shall be assessed.

Any work carried out at height shall be controlled by work permit. All personnel working at height are required to be specifically trained in such working positions.

Good design shall be adopted, not only of the existing structures or materials to be worked on, but design and strength/stability of the access equipment used, and the design of the task itself.

Work at height shall be planned in advance, with careful consideration given to the selection and use of work equipment. A pre-work permit is required.

If adverse weather such as icy, rainy, or windy conditions greatly increases the risk of working at height (e.g., carrying a wide roof sheet in high wind), the work shall be postponed until conditions are satisfactory.

Emergency procedures shall be in place to cover reasonably foreseeable circumstances, e.g., deployed fall arrest, in order that people can be rescued. The selected rescue method shall be proportionate to the risks in place.

Workers shall receive adequate training and instruction to appreciate the inherent dangers of working at height as well as the service and correct use of preventive and protective equipment. The following information shall be provided to the workers and implemented during work at heights:

- Where possible, avoid work at height and carry out work from an existing spot of work.
- Ensure safe access and egress to work face.
- Provide a safe working platform with guardrails, fences, toe boards, etc., that are strong enough to prevent a fall. Where this is not possible, provide properly installed personnel equipment such as rope access or boatswain’s chairs. If this is not possible and a worker can approach an unprotected edge, provide equipment which will restrain or arrest falls, e.g. safety harnesses or safety nets.

- Provide isolation and barricading in areas where required.
- Ensure safe ladders use by:
- Prohibit extended use of ladders in lieu of working platforms.
- Check equipment before use (no splits or cracks in stiles and rungs, none be missing or be loose).
- Remove defective ladders from site.
- Do not position ladders in the place where it can be struck by passing vehicle or where it can be knocked by a door or window.
- Only use ladders when other platforms have been explored but not able to be used.
- Only work on ladders in short durations.
- Set ladders on a firm base and leaning at the correct angle. One (out) to Four (up) ratio is acceptable.
- Tie ladders at the top and extend a safe distance (1 m or 3 rungs) above the landing height.
- Stake the base of the ladder to prevent slipping.
- Clean footwear from excessive mud/soil before climbing the ladder.
- Always face the ladder when climbing; always have three points of contact on the ladder at all times.
- Do not overreach from the ladder; always move the ladder to the new work face.
- Ensure safe use of harnesses by:
- Harnesses shall only be considered as a last option after platforms, mobile towers, scaffolding, and where no other fall restraint is available.
- Harness equipment must be fully inspected before use. Include wedding, leather, checking for cuts, cracks, tears, tears, abrasions, and damage. Check hooks and karabiners and all stitching.
- Wet equipment and harnesses shall be hung to dry naturally.
- Confirm a firm and secure anchorage points and lines (best above head height). All anchorages shall be installed by a competent person and checked by the Health and Safety Officer.
- Do not tie, loop, or place the harness lanyard near small or sharp items during use, this could mean the lanyard fails in the event of a fall situation.

Users shall be trained in harness use by the Health and Safety Officer.

Established rescue/emergency procedures shall be in place.

Ensure proper use of mechanical elevated work platforms (scissor hoists, cherry pickers, crane baskets) by:

- Checking the machine is the correct type for the task intended.
- Ensuring trained operators are in place for the machinery in use.
- Not using the machine as a crane or have it overloaded.
- Providing regular inspection and testing, check before use of the machine.
- Ensuring the machine is set up on firm ground with all support legs fully extended where applicable.
- Operating well away from overhead services.
- Ensuring that workers on platforms are wearing harnesses.
- Ensuring the lanyard is just long enough to provide free movement within the confines of the platform.
- Not allowing material waste and rubbish to build up on platform.
- Ensuring tools are secured to the working platform.
- To prevent falling materials/objects:
- Not stacking materials near edges, and particularly unprotected edges.
- Close boarding of working platforms to minimise the gaps between scaffold boards or placing sheeting over the boards so that material cannot fall through.
- Avoiding carrying materials up or down ladders, etc., by using hoists and chutes to move materials.
- Preventing materials from falling by using physical safeguards such as toe boards and brick guards.
- Where a risk remains, use physical safeguards to prevent falling objects hitting people below, e.g., debris netting, fans (wooden shielding angled to catch debris) and covered walkways (tunnels).

Scaffolds

Falls from scaffolding may result in severe injuries and/or fatalities. Therefore, personnel involved in the design, installation, and inspection of the scaffolding systems for the Project shall be competent in the type and complexity of the scaffold system to be used.

Any scaffold system shall be formally inspected at least once a week to ensure it remains in safe condition. Each scaffolding and ladder shall be marked with the appropriate tag, indicating inspection dates and whether scaffolding/ladder is safe for use. Scaffolds that are not completed or not safe to be used shall have a red tag with a clear 'No Entry' sign.

Procedures and basic operating principles for safe design, installation and ongoing use of scaffolds shall be, but not limited to, as follows:

General

- Scaffolders shall install guard rails, decking and ties as soon as possible when erecting.
- Appropriate PPE must be worn by scaffolders.
- Screening may be required to protect the surrounding areas.
- Screening material shall be suitable for the conditions and fixed correctly to withstand windy conditions.
- Scaffold shall be adequately protected against vehicle collision.
- Scaffolding shall not be overloaded. Material loads shall be distributed around the support standard bearing members.
- Walking space shall be allowed on platform where materials are also stacked.

Foundations/Base

- Scaffolding shall be on suitable foundations and stable against subsidence (level, compacted, cable of all loads).
- Each supporting standard shall be supported by a base plate and then a sole board (indicative guide on sizing, base plate 15 x 15 x 0.6 cm, sole boards 50 x 200 x 3.8 cm).
- Each supporting standard shall be centered on the base plate and sole board.

Geometry

- All standards shall be vertical.
- All ledgers and guardrails shall be horizontal.
- All transoms shall be horizontal.
- All standards, ledgers and guardrails shall be staggered.

Bracing

- Braces shall start from ground and extend to top platform at 45 degrees.
- All platforms shall have an appropriate width (70 cm minimal).
- All platforms shall be secured against uplift or horizontal movement.
- Platforms shall have toe/kick boards, at a minimum height of 15 cm, fixed to the scaffold
- All lap planks shall be tied/cleated.
- Gaps in the platforms shall not be more than 5 cm.
- The platforms shall be no more than 30cm away from the work face. If so, an internal guardrail is required.
- Access to Platforms
- Appropriate access shall be provided to every working platform.
- Ladders shall be secured top and bottom.
- Ladders shall be positioned at a 4 to 1 ratio.
- Ladders above the second lift shall be located within the scaffold frame.

Ties

- Ties shall be placed every 4 to 5 m horizontal and vertically.
- Ties shall be staggered every second-floor lift.

Guardrails

- Guardrails shall be installed on all platforms.
- Height of guard rails shall be between 90 – 110 cm.
- Platforms shall have a mid-rail.
- Internal guard rail shall be installed if platform is further than 30 cm away from work face.

Raking Members

- Raking members shall be connected to the standards.
- Raking members shall have a horizontal tube connected back to the scaffolding.

8.10.1.3.4. Hot Works

Hot works is one the main causes of site and/or facility fires. Hot work is a temporary operation involving open flames or producing heat and/or sparks. The sparks, welding slag, open flames, and hot surfaces can ignite nearby combustibles, starting what could become an uncontrollable fire. A fire in a hidden area can often go unnoticed until it is well established, spreading and causing needless destruction to nearby equipment and materials as well as neighbouring private properties.

A formal permit to authorize hot work shall be in place related to all operations such as cutting, welding, brazing, grinding, soldering, or any other activity that produces an ignition source.

The permit shall require that trained fire watchers maintain constant fire watch of the work area during the hot work and for at least one hour after work is completed.

The permit shall be only valid for the single job and should expire at the end of the shift or on completion of the fire watch.

To the extent possible, all potential fire hazards from hot work areas shall be removed.

Guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.

Welders and other hot work personnel shall wear PPE, including eye protection, helmets and/or hand shields, and other protective clothing.

Appropriately rated fire extinguishing equipment shall be kept in the area, in a state of readiness for instant use.

All hollow spaces, cavities, or containers shall be vented to allow air or gases to escape before preheating, cutting, or welding.

Welding cable and other equipment shall be placed so that it is clear of passageways, ladders, and stairways.

Hot work shall be never conducted in the presence of explosive atmospheres (mixtures of flammable gases, vapours, liquids, or dusts with air), or on a metal partition, wall, ceiling, or roof with a combustible cover.

Cutters or welders and their supervisors shall be suitably trained in the safe operation of their equipment, the safe use of the process, and the use of appropriate PPE.

8.10.1.3.5. Materials Handling

Construction sites workers have to undertake tasks including various materials-handling activities. These activities include manual lifting and the operation of cranes, hoists and powered industrial trucks. Workers can be at risk of collisions with moving parts and equipment, strain or injury from exertion or improper techniques, and other injuries.

Any work carried out that requires manual or mechanical lifting shall be controlled by work permit.

Workers shall be properly trained to operate various types of materials-handling equipment. When cranes or hoists are used, a trained operator shall be at the controls and all aspects of equipment inspection, maintenance, and operation procedures shall be followed to ensure safety. Proper rigging for lifting shall be ensured to prevent the load from shifting during the lift. When planning the lift, the operator shall be trained to understand the characteristics of the load, including weight, dimensions, center of gravity, and the hazardous/toxic nature of material in the load.

Operators shall also review the rigging to ensure slings and other devices are sufficient to support the load and attach it to the hook. During the lift, safe clearances shall be maintained and workers shall stay clear of the loads.

Periodic inspections of all operating mechanisms, hydraulic lines, hooks, ropes, chains, and related electrical apparatus shall be documented. Any damaged or defective equipment shall be immediately tagged and removed from service. All repairs and adjustments to this equipment shall be performed by well-trained and certified workers.

Procedures and basic operating principles related to lifting shall be, but not limited to, as follows:

Tower Crane

All tower crane erection, commissioning and maintenance shall be carried out by registered/licensed (in accordance with national authorities and laws) and experienced professional industry practitioners. Documented evidence shall be obtained confirming the suitability, experience, and expertise of the proposed company.

All erection, commissioning and dismantle operations shall be thoroughly pre-planned with written submissions detailing all personnel involved with relevant experience and role descriptions, design and loading calculations regarding crane base and fixing supports, erection/dismantle process including lifting methods, transport, unloading etc. The submission shall also outline all testing and certification processes for the crane commissioning including a comprehensive list of operating tolerances and items/equipment and operations for testing.

Key personnel including crane supervisor, driver, banksmen and slingers shall be nominated and trained, competent, experienced and, where required, certified to carry out the required tasks.

An operational and equipment testing program shall be established and executed as part of the tower crane maintenance program. Daily, weekly and six-monthly inspection schedules are typical and records of such inspections and checklists shall be kept.

A suitable radio communication system shall be provided to allow for safe communication between the crane drive and banksman.

An evacuation/rescue procedure shall be developed to access personnel working in the crane cab or on the crane jib in the case of an emergency.

Mobile Cranes

Mobile crane operation shall be undertaken under the following conditions:

- Operate only by trained and or certified operators.
- Ensure the planned regular inspections have been carried out.
- Ensure outriggers are used and are on suitable load bearing ground.
- Confirm signals between driver and slinger/dogman.
- Check minimum of 600mm slewing clearance.
- Check for overhead cables, services, and structures.
- Ensure load is correctly fixed, balanced, and secure.
- Never exceed the safe working load.
- Slew the load gently to minimise load swing.
- Ensure the vehicle driver is out of the cab before lifting.
- Ensure fully planned tandem lifting with a full briefing prior to any operation.
- Never leave a load suspended.
- Confirm operation design and ability of machine prior to any operation to carry (Very few cranes can lift and travel with loads).

Excavator, Forklifts and Hiabs

A machine operator shall be responsible for controlling each lift. If something cannot be lifted safely, then it shall not be lifted at all.

Only machines that are designed for lifting and have the proper lifting attachment fitted for securing and lifting the load shall be used.

Safe Working Load capacity of the equipment shall be never exceeded. It shall be marked in the cab or on the boom. It shall also be found in the instruction handbook that is supplied with the machine in the form of lifting or load charts or tables. The lifting chart gives information about the lifting capacity of the machine at different distances from the cab (the lifting radius), different height or depths and whether the lift is parallel to the tracks or across the tracks.

Machines that are permitted to lift shall be clearly marked.

Load shall be correctly fixed, balanced, and secure.

Lifts shall only be undertaken following communication with the slinger/signaller and on his signal.

The weight of the load shall be established/estimated prior to lifting.

Lifting shall be only carried out in area clear of people.

Only properly checked lifting equipment (such as chains, strops and shackles) shall be used for lifting.

Good lifting practice is to position the machine to carry out the lift most effectively. Where possible, the load shall be kept between the tracks; or reasonably close to the machine (not at full stretch); or low to the ground.

Lifting shall be kept to level ground avoiding side slopes. If lifting takes place on a slope, the tracks shall be positioned up (or down) the slope (and not sideways).

If lifting includes travel with a load, the load shall be positioned between the tracks, reasonably close to the cab and not too high off the ground. Travel shall be slowly and carefully, ensuring the route is clear of obstructions and personnel at all times.

The lifting operation shall be stopped at any time if events dictate (such as if someone is walking towards or into the lifting area).

Manual Lifting

Personnel engaged in manual lifting shall adhere to the following:

- Wear back braces if required to lift and carry heavy loads.
- Avoid twisting and turning movements.
- Use legs to position and move the torso.
- Avoid leaning or bending over for extended periods.
- Stretch and exercise the back before starting work each day.
- Inspect the work area for slip, trip, and fall hazards.
- Inspect steps and stairs before climbing; use a handrail whenever possible.
- Lift with the legs; position the body so the load is centered and supported by the body before lifting and carrying.
- Avoid sudden jerks and pulls on a load, which could cause muscle sprain or injure discs.

8.10.1.3.6. Traffic and Driving Hazards

Transportation incidents/accidents and workers and or public struck by vehicles or mobile equipment account for the highest number of permanent and/or fatal work injuries. In a worksite zone, workers, and the public in the vicinity of a worksite, are susceptible to the careless driving of in/out-coming traffic as well as to the activities of worksite vehicles and equipment. To avoid/minimize traffic and driving hazards, a TTMP shall be developed and implemented (refer to Section 8.10.1.4).

8.10.1.3.7. Noise Hazards

Construction sites workers are frequently exposed to noise levels that can be harmful to hearing. Noise sources include heavy construction equipment and vehicles, alarms, generators, compressors, and ventilation equipment. Excessive noise exposure can cause temporary or permanent hearing loss, stress, and other physical problems. In general, noise levels above the 85-decibel level (dBA), expressed as an 8-hour time-weighted average, trigger the requirement for noise abatement and hearing protection measures.

In addition to implementing the NVMP, noise assessments of workplace shall be carried out by a professional. Workers exposed to noise shall be provided with appropriate PPE such as earplugs and earmuffs that reduce noise exposure levels by 15–20 decibels and inspect their usage.

8.10.1.3.8. Electrical Hazards

Construction workers are frequently exposed to many electrical hazards that can cause burns, arc blasts, fires, explosions, shocks, and electrocution (fatality). Overhead wires at various voltages are frequently present on worksites. The presence of water in the workplace compounds the hazard from electricity because water is a good electrical conductor.

Measures to eliminate/minimize electrical hazards shall include, but are not limited to:

- Maintaining all electrical equipment according to prescribed practices and manufacturers' instructions.
- Inspecting all electrical equipment on regular basis and making repairs only if authorized to do so. Reporting all electrical failures and repair needs to appropriate power suppliers.
- Ensuring all safety features are used as designed.
- Protecting electrical cables and cords from damage.
- Using extension cords only, when necessary, but never as a substitute for permanent fixed wiring.
- Avoiding wearing metal objects (rings, watches, etc.) when working with electrical systems.
- Using mats, gloves, shields, flame resistant clothing, and any other protective equipment required to protect workers from electric shock and burn (e.g., electric-shock-resistant footwear, hard hat, safety glasses with side shields, under and outer clothing that has flame resistance properties, earmuffs as applicable).
- Tools, devices, and equipment, including PP, to be used for live work must be designed, tested, maintained, and used so as to provide adequate protection for workers.
- Placing enough warning devices in the area of the hazard so that at least one is always visible to worker.
- Maintaining minimum clearance, according to H&S national regulations, from overhead wires that contain 50 kilovolts or higher voltages.
- Informing operators of large equipment where overhead and buried powerlines are and where overhead powerlines may be lower than expected.
- Informing workers not to let a ladder, scaffold, or elevated work platform lean or drift toward overhead powerlines. Always maintain minimum allowable clearances.
- When working in damp locations, inspecting electrical cords and equipment carefully to avoid shocks, and always making use of the ground-fault circuit interrupter.
- Avoiding use of electrical tools and lighting in wet and/or explosive environments, and using explosion-proof equipment and wiring instead in such conditions.
- Ensuring that all electrical power tools are properly grounded or double insulated for protection from shock hazards.
- Keeping doors on electrical panels in place and closed, correctly labelling circuits breakers and switches and plugging empty breaker slots.
- Using voltage-rated rubber gloves or jumpers when repairing or removing electrical equipment within an excavation.
- Properly installing and maintaining electrical protective devices, including fuses, circuit breakers, and ground-fault circuit interrupters.

8.10.1.3.9. Hazardous Chemicals

Construction workers are often required to work with highly hazardous chemicals and compressed gases. Numerous potential physical and health hazards are associated with compressed gases such as propane, oxygen, nitrogen, argon, chlorine, ammonia, and compressed air. Compressed gases are hazardous because they are contained in high-pressure containers and can be released accidentally from a broken or leaking valve or safety device. When unsecured, uncapped cylinders can be knocked over, breaking the valve and releasing the high-pressure gas, turning the damaged cylinders into uncontrolled rockets or pinwheels and potentially

causing severe injury and damage. Compressed gas in chemical reaction systems can cause vessels to burst if they are improperly released, create leaks in hoses, or produce runaway reactions.

Proper in-house storage and handling shall be provided to reduce or eliminate risks associated with hazardous chemicals.

Chemicals shall be properly labelled and stored according to information specified on the Material Safety Data Sheet.

Emergency equipment shall be provided when storing or handling chemicals. This equipment shall include, but is not limited to, first aid supplies, emergency phone numbers, eyewash and shower facilities, fire extinguishers, spill clean-up supplies and PPE, all of which should be readily available on-site any Project worksite.

Basic training and written materials for applied hazardous chemicals in construction activities shall be available to workers.

All workers handling or using cylinders of compressed gases shall have basic training in the use of gas cylinders, emergency shutoffs, proper equipment design, leak-testing procedures, and the use of appropriate respiratory protection in the event of a release of a compressed gas.

When in storage, compressed gas cylinders shall be restrained using straps, chains, or other suitable stand to prevent them from falling.

Full cylinders shall be segregated from empty cylinders and be legibly marked with the chemical or trade name of the gas.

Storage areas shall be well ventilated to prevent accumulation of explosive concentrations of gas. No ignition sources shall be permitted in these areas.

Hand trucks shall be used for the transfer of cylinders from storage area to shop or working area.

Valve protection covers shall be in place during the transport of cylinders.

Cylinders that cannot be identified positively shall not be used.

Compressed gases or air to blow away dust or dirt shall not be used.

When cylinders are not in use, the cylinder valves shall be closed.

On valves without hand wheels, the wrench recommended by the gas supplier shall be used. The wrench shall remain on the valve while the container is in use.

On valves with hand wheels, wrenches or hammer a hand wheel to open or close a valve shall never be used.

8.10.1.3.10. Hazardous Waste

Sudden injuries or illnesses, which may also be life threatening, can occur when workers are exposed to safety or health hazards related to hazardous waste management operations. Activities where hazardous conditions may exist in construction include clean-up operations, treatment, storage, disposal operations, corrective actions, and emergency response. For instance, as a result of an uncontrolled spill of e.g., spent solvents, workers may be exposed, through skin contact or inhalation to harmful constituents and hence, can suffer significant damage to their health, some of it may even be permanent or life threatening.

Proper waste and hazardous waste management shall be provided in line with the Project WMP.

A written health and safety program shall be developed to identify, evaluate, and control the health and safety hazards for workers assigned tasks related to hazardous waste operations and emergency response.

8.10.1.3.11. Personal Protective Equipment

PPE, such as hard hats, ear protection, safety glasses, and work boots must be provided and used to prevent injuries on all Project worksites.

All PPE clothing and equipment shall be of safe design and construction, and should be maintained in a clean and reliable fashion. The EPC Contractor shall take the fit and comfort of PPE into con-sideration when selecting appropriate items for his personnel.

All PPE must meet the Jordanian safety standards or international standards (e.g., ANSI standards).

- Personnel who must use PPE shall be trained to know at least the following:
- When PPE is necessary
- What PPE is necessary
- How to properly put on, take off, adjust and wear the PPE.
- The limitations of the PPE.
- Proper care, maintenance, useful life and disposal of PPE.

Training of each employee required to wear or use PPE shall be documented by preparing a certification containing the name of each employee trained, the date of training and a clear identification of the subject of the certification.

Appropriate PPE shall be selected for specific on-site hazards such as approved buoyancy equipment (e.g. life jackets, vests, floating lines, ring buoys) when workers are over, or adjacent to, water where there is a drowning hazard.

The provision of mandatory PPE signs in various areas at the Project worksites are an important visual reminder of the H&S policies and procedures. Though appropriate signage, personnel, guests, and subcontractors shall become more aware of certain workplace risks, taking protective measures as required.

8.10.1.3.12. Incident Reporting

All accidents, dangerous occurrences and investigations shall be documented in a structured system (e.g., a Site Accident record sheet), which shall be available at all times for inspection by the Project Promoter or competent national authorities.

Any incident shall be investigated, recorded, and systematic follow-up of relevant findings and recommendations should be reported.

A monthly H&S progress report shall be developed. This report shall contain the following data, as related to the works:

- Progress against implementation of the HSMP
- A list, including a brief description, of all incidents and dangerous occurrences
- Number of fatalities
- Number of serious incident frequency
- Total recordable injury frequency
- Number and type of accidents with and without lost time
- Serious illness
- Total number of ‘near miss events
- Number of theft incidents
- Number of security and number and type of other incidents

The Project Promoter shall be informed within one hour day/night of any accident involving serious bodily injury to a member of personnel, a visitor or any other third party, caused by the execution of the works or the behaviour of the personnel of the Contractor.

The Project Promoter shall be informed as soon as possible of any near-accident (near misses) relating to the execution of the works which, in slightly different conditions, could have led to bodily injury to people, or damage to private property or the environment.

The BOT Contractor / NEPCO shall prepare a report on each accident or dangerous occurrence and a copy of the report, together with witness statements and any other relevant information, shall be submitted to the Project Promoter as soon as possible.

A reportable accident shall include any accident to any person on site requiring medical attention or resulting in the loss of working hours or any incident that resulted, or could have resulted in injury, damage or a danger to the works, persons, property, or the environment. The Contractor will also notify and report of incidents of subcontractors and suppliers (in particular those for major supply items).

Any H&S accident, related to Project activities or personnel, shall be reported to national or local authorities as required by relevant legislation. A copy of all such reports shall be provided to the Project Promoter.

The BOT Contractor / NEPCO shall not notify or give any information to the media or other units or people without the Project Promoter's consent.

The BOT Contractor / NEPCO shall immediately rectify any situation or condition that could result in injury or a danger to the works, person, property, or the environment. If the situation or condition cannot be corrected immediately, temporary barriers and appropriate warning signs and devices shall be set up and/or other appropriate action necessary for the protection of persons, property, and the environment taken.

Given the above considerations, the HSMP shall be structured to include at minimum the following contents:

1. Stated H&S policy, leadership, and commitment that meets MWI E&S policy
2. H&S Management System definitions
3. Scope, objectives, and targets of the H&S Management System
4. Organizational roles, responsibilities, and authorities
5. Planning procedures
   - *Hazard identification, risk assessment and determination of controls*
   - *Identification of legal and other requirements and their incorporation into the development, implementation and maintenance of the system*
   - *Setting and maintaining objectives, targets and plans*
6. Implementation and operation procedures
   - *Resources, roles, responsibility, accountability and authority*
   - *Competence, training and awareness*
   - *Communication, participation and consultation*
   - *Operational controls (PPE, first aid, fire safety, electricity safety, work in heights and confined areas, manual handling, labelling of hazardous materials, etc.)*
   - *Documentation procedures*
   - *Development and updating of documentation*
   - *Control of documentation and records*
7. Emergency preparedness and response procedures
   - *Performance evaluation procedures*
   - *Monitoring and measurement*
   - *Evaluation of compliance*
   - *Incident investigation*
   - *Nonconformity, corrective, and preventive actions*
   - *Internal (and external) audits*
8. Management review and improvement procedures

8.10.1.4. Traffic and Transport Management Plan

Based on a Traffic Impact Assessment to be conducted at the hotspot areas, the BOT Contractor / NEPCO shall develop a TTMP as part of the CESMP, which shall:

- Define the characteristics of the fleet of vehicles and site machinery with the aim to prevent construction site vehicle incidents by the effective management of transport operations throughout the Project construction phase.
- Define the itineraries used on a map for each route between the Project worksites and for each stage of the construction works.
- Describe the expected traffic created by the construction fleet of vehicles (frequency of trips between Project worksites, working hours, convoys, etc.).
- Describe the number and positioning of flagmen.
- Include actions to limit and check the speed of all vehicles and machinery used to execute the works at an appropriate level.

The TTMP shall define itineraries to be used on a map for each route between the different Project Areas and for each phase of the construction works. In coordination with the Project Promoter, the required authorisations shall be obtained from the competent administrative authorities if public roads are to be used, specifically from ASEZA in Aqaba Region.

The TTMP shall be continuously updated, taking into account the exact location of the worksites, campsites, access roads, materials, and waste disposal sites, etc. The TTMP shall take account of the relevant noise standards and the receptors in the area (residential settlements, habitats, etc.). The key means of mitigation of impacts from traffic is to ensure that any unmade transportation/access roads for heavy goods vehicles be constructed so that they are as far away as feasible from residences, cultivated areas or natural habitats. In addition, any new roads shall be routed away from sensitive communities and other receptors and to be surfaced and maintained so as to minimise dust generation.

The characteristics of the fleet of vehicles and site machinery shall be defined in the TMP, which shall aim to prevent construction site vehicle incidents and accidents through effective management of transport operations throughout the construction duration.

The TTMP shall also describe the expected traffic created by the construction fleet of vehicles (frequency of trips between Project Areas, working hours, convoys, etc.). The number and positions of flagmen shall also be described in the Plan.

The CESMP shall comprise a consultation and notification process to give any local residents and businesses advance warning of potential delays on the road network as a result of increased traffic and any abnormal loads associated with construction activities in any Project Areas.

Within one month of the physical start of works, the administrative authorities shall be informed for the areas crossed by the construction vehicles, and for the itinerary and characteristics (frequency of passing, size and weight of trucks, materials carried) of the construction fleet of vehicles.

In the case of public roads and/or bridges are used, a bailiff shall be mandated to develop a sworn report regarding the state of the road/bridge prior to its use by the construction vehicles.

Only selected routes to the Project worksites shall be used during construction activities. Appropriately sized vehicles suitable to the class of road shall be selected and used, and transported loads shall be restricted to prevent damage to roads and bridges to be used for transportation purposes. The BOT Contractor / NEPCO will be held responsible for any damage caused to the roads and bridges due to the transportation of excessive loads, and will be required to repair such damage to the approval of the competent national authorities.

Construction area warning signs shall always be visible when work is being performed and removed or covered promptly when the work is completed.

Traffic movement shall be coordinated with the relevant authorities in Aqaba especially in restricted areas.

Strict adherence to international standard best practice measures related to navigation and safety shall be ensured. This is meant to include management of vessels movement via automatic identification system.

The trailers and skips used to carry materials, which could be dispersed (sand, crushed material, aggregates, selected materials), shall be covered with a tarpaulin for the entire itinerary between two Project Areas.

All abnormal loads shall be suitably marked to warn other road users.

The use of any vehicles, either on or off road generating excessive, exhaust or noise emissions shall be avoided. In any built-up areas, noise mufflers shall be installed and maintained in good condition on all motorized equipment.

Considering the water scarcity facing Jordan, water dampening of roads with freshwater for dust dispersion prevention is not considered a sustainable option. However, treated domestic wastewater is understood to be used for side-road irrigation purposes in Jordan and this option may be used for dust control in certain areas of works especially where construction activities are executed within urban settings (e.g., Amman).

For any construction taking place in the urban areas, good site management practices shall be observed comprising measures such as the use of hoarding to shelter and screening of construction areas.

Access roads to Project worksites and camps shall not be made wider than that required for efficiency and safety reasons and, where possible, shall use existing tracks.

To confine traffic as much as possible, the use of one two-way access road is preferable to two separate one-way access roads. To confine vehicles to the approved paths as per the TTMP and eliminate unnecessary straying off-path, access roads shall be clearly delineated.

Truck trips on the highway during peak traffic flows shall be avoided.

Construction personnel shall be provided with organised bus commuting to and from Project worksites as a measure to prevent additional traffic by individual vehicular travel.

To prevent and/or to reduce traffic related accidents, the following actions shall be taken:

- Pedestrians and vehicles to be kept apart (e.g., through providing separate entrances, walkways, signals).
- Vehicle movements to be minimized to the absolutely needed for construction activities.
- Drivers to be adequately trained and have the appropriate permits for driving vehicles.
- Turning circles for turning vehicles to be installed.
- The night movements of heavy vehicles shall be prevented between 22:00 and 06:00 hrs within residential areas.
- Actions shall be taken for the control and check of speed limits for all construction vehicles and machinery to appropriate levels complying to the lowest limits as set out in national regulations or the following limits:
    - 20 km/h within the Project Areas.
    - 30 km/h in villages or hamlets, in towns, from 100m before the first house.
    - 80 km/h on unpaved roads outside of towns, villages, hamlets, and camps.

It shall be strictly prohibited to transport people, equipment, or products other than those required for the Project works and the management of Project Areas, on board any of the construction vehicles.

It shall be strictly prohibited to transport live animals and meat obtained from hunting, fishing, or poaching.

Given the above considerations, the TTMP shall be structured to include at minimum the following contents:

1. Introduction
    - *Purpose of the TTMP*
    - *Scope of Application of the TTMP*
2. Roles and Responsibilities
3. Regulatory Framework and Standards
4 Implementation Schedule of the TTMP
5. Project Transportation Activities and Related Hazards
    - *Transportation Activities*
    - *Hazards to H&S*
    - *Hazards to the Environment*
    - *Hazards Control Procedures*
6. Communication and Reporting Procedures
7. Audit and Review Procedures
8. Personnel Training Requirements/Procedures

8.10.1.5. Chance Finds Management Plan

"Chance Finds" are defined as potential cultural heritage objects which are located outside the designated areas of cultural heritance protection and preservation by competent national authorities and which may be discovered unexpectedly during the implementation of the Project.

The BOT Contractor / NEPCO shall develop a Chance Finds Management Plan (CFMP) as part of the CESMP, which shall detail the necessary mitigation measures to ensure the prevention of negative effects on cultural heritage, focusing on chance finds, as a result of the Project related activities during construction at all Project worksites. Where prevention is not technically feasible, the plan shall include procedures to minimise the negative effects on cultural heritance as far as reasonably practicable. The objectives of the CFMP shall be to ensure that the undertaking of the cultural heritage management related to the Project construction activities complies with applicable Jordanian laws and regulations, international best practices and all relevant EIB's and USAID's environmental and social standards and performance requirements.

Given the above considerations, the BOT Contractor's Construction CFMP shall be structured to include at minimum the following contents:

1. Introduction
   - *Project Description*
   - *Purpose of the CFMP*
   - *Scope of Application of the CFMP*
   - *Terms and Definitions*
2. Involved Parties, Roles and Responsibilities
3. Regulatory Framework and Standards
   - *Jordanian Legislation*
   - *International Standards (EIB, USAID)*
4. Implementation Schedule of the CFMP
5. Chance Finds Mitigation and Management Procedures
6. Monitoring, Audit and Control Procedures
7. Reporting Procedures
8. Review and Updating Procedures
9. Personnel Training Requirements

8.10.1.6. Emergency Preparedness and Response Plan

An Emergency Preparedness and Response Plan (EPRP) will be developed so that the Project Promoter and relevant third parties (local authorities and emergency services) are prepared to respond to accidental and emergency situations in a manner that prevents and mitigates harm to people and the environment. The EPRP needs to be discussed and disclosed to service providers and local affected communities prior to construction. The EPRP will identify:

- Accidents and emergency situations and the communities and individuals that may potentially be impacted
- Response procedures, provision of equipment and resources, designation of responsibilities, communication systems and channels and periodic response training

The Project will need to implement EPRP training and drills at all the construction sites. In addition, the Project will also need to liaise with the district and municipal departments in charge for emergency response for the project, in order to ensure they have trained for project-specific emergency procedures.

8.10.1.7. Code of Conduct

The BOT Contractor / NEPCO should develop and commit to a Code of Conduct for the Project related worksites and facilities, which should address the following: safety rules, zero tolerance for substance abuse, environmental sensitivity of areas around the Project worksites and facilities, the dangers of sexual transmitted diseases (STDs) and HIV/AIDS, gender issues (and in particular sexual harassment) and respect for the beliefs and customs of the populations and community relations in general.

The key rules set out in the Code of Conduct shall be clearly displayed at the different Project worksites and posted in the Contractor's vehicles and machinery driving cabs.

Any new Contractor's personnel and existing Contractor's personnel should be made aware and acknowledge their understanding of subject rules of procedure and the associated provisions. This acknowledgement should be manifested through provided signing on the Code of Conduct by the BOT Contractor and NEPCO's personnel prior to the start of any physical work at any Project worksite.

The Code of Conduct shall include a list of acts which as considered as serious misconduct and which must result in dismissal from any Project worksite, or by the Construction Supervision Consultant if the Contractor is not acting in due course, should a BOT Contractor and NEPCO's personnel repeatedly commit an offence of serious misconduct despite awareness of the rules of procedure, and this is without prejudice to any legal action by any public authority for non-compliance with applicable regulations relative to:

- Drunkenness during working hours, leading to risks for the safety of local inhabitants, customers, users, and personnel;
- Punishable statements or attitudes, and sexual harassment in particular;
- Violent behaviour;
- Intentional damage to the assets and interests of others, or the environment;

- Repeated negligence or imprudence leading to damage or prejudice to the environment, the population or properties, particularly breaching provisions intended to prevent the spreading of STD and AIDS;
- Drug use;
- Possession and/or consumption of meat or any other part of an endangered animal or plant as defined in the Washington convention (CITES) and national regulations.
- Entering property of neighbouring people without permission of the landowners or those cultivating/renting the land.

The BOT Contractor and NEPCO should establish a record for each case of serious misconduct, and a copy will be provided to the Contractor's personnel in question, indicating all action taken to terminate the misconduct by the BOT Contractor and NEPCO's personnel in question and to bring the attention of other BOT Contractor and NEPCO's personnel to the type of incident detected. This record will be provided to the Construction Supervision Consultant of the Promoter as an attachment to the BOT Contractor and NEPCO's Environmental and Social and Health and Safety (ESHS) progress report. In case of serious misconduct, the Project Contractor should without delay inform the Construction Supervision Consultant who should immediately inform the Project Promoter.

8.10.2. Operation Plans, Mechanisms and Procedures

8.10.2.1. Pollution Prevention Management Plan

All necessary measures shall be taken to ensure that pollution to air, water or land is either prevented or, where this is not possible, reduced and mitigated as far as reasonably practicable through developing and implementing a PPMP as part of the OESMP. The PPMP outline shall be posted at appropriate points in all Project facility sites. In addition, the PPMP shall be evaluated and updated annually after operation start-up.

To this effect, training is necessary to ensure that all operations personnel are knowledgeable enough to follow the procedures outlined in the PPMP.

The BOT Contractor / NEPCO shall be responsible for making equipment and materials for clean-up readily accessible, and for marking them clearly so that site personnel/operations personnel can follow procedures quickly and effectively.

Environmental and/or occupational health and safety regulators will be notified and informed as required by applicable laws in Jordan about any environmental pollution. It shall be ensured that all appropriate environmental protection measures are adopted during the clean-up process and that clean-up activities are appropriately documented pursuant to the OESMP and available upon request by the competent authorities.

The PPMP shall ensure:

- Immediate rectification measures in case of non-compliance, reporting and review procedures of the timely response and effectiveness of rectification.
- Strict adherence to the set monitoring plans in terms of execution frequency, parameters to be monitored, and reporting requirements pursuant to the Project ESIA study, Project permits, and national legal provisions.
- Effective regular maintenance of plant and equipment pursuant to manufacturer's specifications.
- Strict adherence to effective maintenance practices for all Project plant and equipment (preventive and corrective) pursuant to manufacturer's specifications.

8.10.2.1.1. Spill Prevention and Management

Vehicle/machinery and equipment operations, maintenance and refuelling shall be carried out to avoid spillage of fuels and lubricants and ground contamination. An "oil interceptor" shall be provided for wash-down and refuelling areas. Fuel storage shall be located in proper bunded areas.

All spills and collected petroleum products shall be disposed of in accordance with standard environmental procedures/guidelines or as directed by the competent national regulatory authorities.

Oil, chemicals, and other contaminants stored on the Project sites for operational purposes shall be properly stored, isolated and bunded, with secondary containment of adequate volume where appropriate, to prevent leakage or spillage to the soil, wadis, and groundwater.

The PPMP shall include provisions for:

- Regular visual inspections of the structural integrity of the surfaces on which hydraulic equipment with immediate rehabilitation of any evident cracks.
- Regular visual inspections of the structural integrity of the surfaces and secondary containment related to hazardous chemicals/waste storage areas.

A regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors shall be included in the PPMP and implemented at all Project sites and reported as part of the OESMP.

8.10.2.1.2. Documentation and Reporting

Detailed description of practices and procedures that will be used to prevent spills and other emergencies from occurring shall be included in the PPMP. These procedures shall provide for employee training, inventory monitoring, inspection, secondary containment, etc. and shall include:

- Facility site characterization comprising the following information:
  - Site data description inclusive of location, and nearby businesses or residences, site plan showing location of storage areas for hazardous materials/waste, location of storm drains, yard drainage, wadis, etc.
  - Products/Materials Lists comprising the types and amounts of hazardous materials stored at the particular facility site (wastes and products).
  - Emergency Contacts List of individuals who should be contacted in the event of a spill or other emergency. This list should include all relevant management and site personnel, police, fire, health department personnel, clean-up contractors, chemical treatment/disposal companies, and other local agencies and authorities, as necessary.
- Response actions comprising the following information:
  - Denomination of person(s) that will be responsible for responding to spills and notification of emergency response teams.
  - Description of equipment and material located on-site to be used in spills' response as well as marking of the location of said response equipment and material.
  - Description of plans for evacuation of employees and third parties.
  - Detailed description of procedures that will be followed in responding to emergency situations.
- Audit and Review Procedures
- Communications and Reporting Procedures
- Personnel Training Requirements/Procedures

8.10.2.2. Waste Management Plan

The BOT Contractor shall develop a WMP as part of the OESMP, which will detail the amount and type of waste that will be produced at Project facilities and how this waste will be reduced, reused, recycled, or disposed of. The WMP shall be updated annually after operation commencement to record how waste is being managed and to demonstrate that any materials which cannot be reused or recycled are disposed of at a legitimate site and in a manner pursuant to the Jordanian regulations and international best practice, as well as EIB and USAID E&S standards.

The Operation WMP shall be disseminated to all Project sites.

Personnel at an appropriate level of seniority shall be nominated to be responsible for implementation of the WMP at the various Project facilities.

The WMP shall include the following provisions:

- Waste generated from PV facility maintenance **be minimized** through **efficient stock control, responsible procurement of replacement parts, and proper inventory management** to reduce unnecessary waste generation.
- Overall, the amount of waste produced shall be minimized by efficient ordering of materials, and careful stock control. Waste generated shall be properly contained to prevent uncontrolled release into the environment, and segregated into different waste types to ensure the maximum potential for reuse

and recycling. Local markets for recyclables (e.g., metals, cardboard, plastics, batteries, etc) shall be investigated and effectively used to this respect.

- All waste that cannot be reused or recycled shall be treated or disposed of in the most technically feasible and environmentally sound manner and pursuant to national legal provisions and EIB/USAID E&S standards.

Waste shall be categorised according to the following definitions:

- Non-hazardous solid waste
  - General packaging waste from replacement parts.
  - Recyclable materials such as metals, plastics, and electronic components.
- Hazardous solid waste
  - Damaged PV panels
  - Used **oil filters, lubricants, and oily rags** from maintenance activities.

8.10.2.2.1. Non-hazardous and Domestic Waste

The waste expected to be generated during operation and maintenance activities is minimal and primarily includes waste from maintenance activities and domestic waste produced by workers at the RE site.

The WMP shall include specific measures to minimize waste generation and maximize **reuse and recycling** of materials. These measures shall include:

- Segregation and proper storage of different types of waste in different containers to enhance reuse or recycling of material and their proper disposal;
- Responsible procurement and stock control to prevent excess material waste during operation and maintenance activities.

Local recycling companies shall be contacted to arrange for the collection and recycling of as many waste types as possible. The following materials maybe collected separately for recycling from each Project site ferrous and non-ferrous metal (e.g., wiring, cables, panel frames), plastic components and bottles from packaging materials, waste oils (all sites where vehicles are based), and paper/cardboard from packaging and administrative materials.

General waste shall be transported directly to the nearest local and approved landfill for final disposal, ensuring compliance with Jordanian regulations and international best practices.

8.10.2.2.2. Hazardous Waste

The WMP shall comprise dedicated procedures for handling chemical products, hazardous materials and handling of hazardous waste during operation and maintenance activities of the PV facility and Overhead Transmission Line. These procedures will ensure safe handling, storage, and disposal to prevent environmental contamination and worker exposure.

Hazardous Waste Prevention and Management:

- The generation of significant amounts of hazardous, non-hazardous, and household waste will be prevented though good management, housekeeping, and control actions at Project facilities.
- Any hazardous waste generated from PV components, such as damaged solar panels, electronic components, inverters, and wiring, shall be temporarily stored safely before disposal in compliance with project permits.
- Hazardous wastes shall be stored and handled separately to avoid potentially dangerous incidents due to escape of the waste or mixing of incompatible waste. No hazardous waste shall enter the non-hazardous waste stream to avoid contamination.

Storage and Handling of Hazardous Materials

- All fuel and hazardous chemicals/materials shall be stored in designated areas, except for limited quantities required for the daily operation activities.
- Fuel, oil, or hazardous materials required to be temporarily stored onsite at any Project site will be stored within secondary containments.
- Storage areas for hazardous waste shall be clearly labelled and used solely for the storage of hazardous wastes whereas the provided ventilation system shall be regularly checked.

- The structural integrity of surfaces and secondary containments provided for hazardous materials/waste storage areas shall be regularly checked and any identified cracks will be timely rectified to avoid percolation of pollutants to soils and groundwater.

Disposal and Third-Party Hazardous Waste Management

- Should hazardous waste management be conducted by third parties, they must be reputable and accredited in Jordan for this activity such that the waste shall be disposed at the MoEnv operated Hazardous Waste Facility at Swaqa, should the type of hazardous waste indeed be accepted at this facility.
- The capability and track record of waste collectors shall be assessed and confirmed in coordination with the competent regulatory authorities prior to the appointment of any such sub-contractors.

Labelling and Transportation

- Containers used for the storage of hazardous waste shall be suitable for the substance they are holding, resistant to corrosion; maintained in a good condition, and securely closed; display a label in Arabic and English to state clearly the nature of the waste, any hazards which it may pose, contact numbers of persons that can provide additional information in the case of an emergency, and display any international hazard warning sign as appropriate.
- Hydrocarbons, lubricants, paints, solvents, and batteries shall be transported in drums to suitable waste management facilities where available.

8.10.2.2.3. Other Provisions

The open burning of any waste, hazardous and non-hazardous, at the Project sites shall be prohibited.

Hazardous and non-hazardous waste shall be securely transported from the point of arising to storage facilities and from there to treatment or disposal facilities so as to avoid spillages, windblown litter, and other potential environmental issues. The following precautions shall be observed:

The type, material, and integrity of transport packaging and containers shall be appropriate to the type and class of waste being transported.

Transportation vehicles shall be appropriate for the type, class and quantity of waste being transported in terms of its composition, load capacity, need for covering, etc.

Strict loading and unloading procedures shall be followed to avoid any waste loss.

Workforce shall be trained in the correct procedure to address accidents and emergencies related to transportation and waste handling.

All transportation vehicles shall be equipped with suitable materials or equipment to contain, handle, and remove accidental spillages.

Vehicles carrying hazardous waste to be labelled appropriately. If hazardous waste is mixed with non-hazardous waste, the entire mix will be considered and handled as hazardous.

A waste transfer note system shall be employed to provide evidence that all loads of waste have been taken to an approved treatment or disposal site pursuant to the WMP. A waste register shall be established since the commencement of Project operation. This register will record all waste management operations from production through to collection, transport, treatment, and final disposal. The following aspects shall be documented in this register: Type of waste; Waste quantities; Name and address of the third-party waste management facilities receiving waste or parties taking possession of the substances no longer considered as waste; Name and address of waste transport Contractors; Planned waste treatment; Final disposal locations.

All personnel shall be trained in proper waste management procedures as appropriate to their level of responsibility and duties. This will include training in concepts of site cleanliness and good housekeeping, and on appropriate waste management procedures, including waste reduction, reuse, and recycling under the waste management hierarchy.

Given the above considerations, the WMP shall be structured to include at minimum the following contents:

1. Introduction
   - *Project Description*
   - *Purpose of the SWMP*

- *Scope of Application of the SWMP*
- *Terms and Definitions*

2. Involved Parties, Roles and Responsibilities
   - *Client*
   - *Principal Operator*
   - *Principal Designer*
   - *Sub-contractors*
   - *Materials Suppliers*
   - *Waste management contractors*
3. Regulatory Framework
   - *Waste Management Principles*
   - *Jordanian Legislation*
   - *International Standards (EIB, USAID)*
4. Implementation Schedule of the WMP
5. Determination of Types of Waste
   - *Construction and demolition waste*
   - *Excavated materials*
   - *Hazardous waste*
   - *Non-hazardous waste*
6. Estimation of Waste Generation
7. Waste Management Procedures
   - *Waste Prevention and Minimisation*
   - *Preparation for Reuse*
   - *Recycling*
   - *Other recovery*
   - *Disposal*
   - *On-site waste management*
   - *Off-site waste management*
8. Monitoring, Reporting, and Control Procedures
   - *Waste Register*
   - *Documentation for Waste Transportation*
   - *Reporting*
   - *Audit and Control*
   - *Quality Monitoring*
9. Review and Updating Procedures
10. Personnel Training Requirements/Procedures

8.10.2.3. Health and Safety Management Plan

Based on a risk assessment to be conducted, the BOT Contractor / NEPCO shall develop a HSMP as part the OESMP, which shall identify and specify the following:

- All health and safety risks relating to the execution of the Project works, including gender-specific risks;
- Prevention and protection measures to control risks related to the execution of the works/operations, by differentiating, where necessary, measures concerning the protection of women and men;
- Human and material resources required;
- Works requiring a permit (e.g., blasting, working at height, working in confined spaces, etc.); and
- Emergency plans to be implemented in the case of an incident or accident.
- Training of staff.

The HSMP shall identify and specify the following:

- Understanding and managing of all health and safety risks relating to Project operations at all Project sites, including gender-specific risks based on Hazard Identification Risk Assessment (HIRA).
- Prevention and protection measures to control risks related to the Project operations at all Project sites, by differentiating, where necessary, measures concerning the protection of women and men.
- Human and material resources involved in the Project operation phase.
- Operation activities requiring a permit (e.g., confined spaces, hot works, working at height, etc.).
- Emergency plans to be implemented in the case of any fatal or serious accident, flood, major spillage, seismic events, etc.
- Prevention, protection, and monitoring measures shall be implemented as described in the Operation HSMP.

H&S Officers shall be assigned as responsible for implementation and oversight of the HSMP.

The BOT Contractor / NEPCO shall immediately rectify any situation or condition that could result in injury or a danger to the Project sites, person, property, or the environment. If the situation or condition cannot be corrected immediately, temporary barriers and appropriate warning signs and devices shall be provided and/or other appropriate action necessary shall be taken for the protection of persons, property, and the environment.

The BOT Contractor / NEPCO shall ensure efficient and effective H&S communication and consultation with all personnel involved in the Project operations at all Project sites. This includes but is not limited to toolbox meetings prior to the start of any Project operations, H&S meetings at Project sites on a regular basis with all parties involved (including subcontractors, the Project Promoter, and third parties as the case maybe).

The BOT Contractor / NEPCO shall ensure that supervision, directly in charge of operation activities, fully brief and discuss with operations personnel at H&S Toolbox Talks at the start of operations and prior to commencing any new activities. These talks shall be conducted in the language of communication defined in the contract. A checklist shall be utilised for this purpose. At a minimum the checklist shall include the following: Nature of the job; Associated hazards; Safe working methods to be adopted; Requirements of the Permit to Work.

8.10.2.3.1. Safety and Security

The BOT Contractor / NEPCO shall evaluate the security strategy and arrangements required for all Project sites including transport. This evaluation shall be performed by qualified security experts and shall be submitted as part of the OESMP. The Security Strategy and Plan shall describe:

- Security risks and the identified mitigation / management measures
- Roles and responsibilities including details of the Operator and its subcontractors
- Detection, monitoring and management procedures
- Escalation plans including resources allocation

The BOT Contractor / NEPCO shall be responsible for the provision and inspection of integrity related to site fences equipped with lockable gates, lockable manholes for underground water valves, and displaying visible signs indicating danger and restricted areas for the public at all Project facilities.

Access to all Project facilities will be prohibited to unauthorized persons/third parties. The BOT Contractor / NEPCO shall be responsible for the security and access control of all Project sites in close coordination with the national security authorities.

The BOT Contractor / NEPCO shall be responsible for any damage to people and property caused by Project operation activities and associated compensation thereof.

8.10.2.3.2. Personal Protective Equipment

PPE, such as hard hats, ear protection, safety glasses, and work boots must be provided by the Operator and used by operation personnel to prevent injuries on all Project sites.

All PPE clothing and equipment shall be of safe design and construction, and shall be maintained in a clean and reliable fashion. PPE shall be selected based on fitness, comfort and appropriateness for specific hazards.

All PPE shall meet the Jordanian safety standards or international standards (e.g., ANSI standards).

Project personnel who must use PPE shall be trained to know at least the following:

- When PPE is necessary;
- What PPE is necessary;
- How to properly put on, take off, adjust, and wear the PPE;
- The limitations of the PPE,
- Proper care, maintenance, useful life and disposal of PPE.

Training of employees required to wear or use PPE shall be documented by preparing a certification containing the name of each employee trained, the date of training and a clear identification of the subject of the certification.

The provision of mandatory PPE signs in various areas at the Project sites are an important visual reminder of the H&S policies and procedures in place.

Careful selection of materials and work practices shall be implemented to eliminate respiratory hazards. Appropriate PPE shall be made available to all operations staff involved in operations with inherent respiratory hazards.

Regular inspection of ventilation systems shall be undertaken to all Project sites related to enclosed storage areas for chemicals/waste as well as confined spaces.

Appropriate PPE shall be made available to all operations staff that work near highly noise emissions sources in Project sites based on noise assessments and pursuant to the national H&S regulations.

8.10.2.3.3. Hazardous Chemicals

The BOT Contractor / NEPCO shall ensure and maintain proper in-house storage and handling of hazardous chemicals/waste to reduce or eliminate risks associated with their handling.

Chemicals shall be properly labelled and stored according to information specified on the Material Safety Data Sheet (MSDS).

Emergency equipment must be provided by the Operator when storing or handling chemicals. This equipment shall include, but not limited to, first aid supplies, emergency phone numbers, eyewash and shower facilities, fire extinguishers, spill clean-up supplies and PPE, all of which shall be readily available on-site at any Project site.

Basic training and written materials for applied hazardous chemicals in Project operation activities shall be available to operation staff.

8.10.2.3.4. Hazardous Waste

The BOT Contractor / NEPCO shall develop and implement a written health and safety program to identify, evaluate, and control the health and safety hazards for his operations staff assigned to tasks related to hazardous waste operations and emergency response on all Project sites.

Adequate training shall be provided to all employees working on Project sites who may be exposed to harmful substances and situations. Employees shall be trained to prepare for the work to be done, including knowing what the hazards are at the site, learning how to use the PPE needed to perform tasks safely, understanding the work practices that will reduce risks, using safe engineering controls and equipment, and recognizing the signs that may indicate overexposure to a hazard.

Barricade and fence off active work sites to prevent unauthorized entry and public access. Posting warning and directional signs and safety instructions at active work sites and on roads will also alleviate the risk to the public and avoid traffic accidents caused by ongoing maintenance activities

Severe degradation of environmental resources, workforce and community H&S risks

8.10.2.3.5. Incident Reporting

All accidents, dangerous occurrences and investigations shall be documented in a structured system (e.g., a dedicated Project Site Accident record sheet) which shall be available at all times for inspection by the Project Promoter and/or competent national authorities.

Any incident shall be investigated, recorded, and systematic follow-up of relevant findings and recommendations shall be reported.

A monthly H&S progress report shall be developed. This report shall contain the following data, as related to the Project operations at all Project sites:

- Progress against implementation of the Operator's HSMP
- A list, including a brief description, of all incidents and dangerous occurrences
- Number of fatalities if any
- Number of serious incident frequency
- Total Recordable injury frequency
- Number and type of accidents with and without lost time
- Serious illness
- Total number of 'near miss events
- Number of theft incidents
- Number of security and number and type of other incidents

The Project Promoter shall be informed within one hour day/night of any accident involving serious bodily injury to a member of personnel, a visitor or any other third party, caused by the execution of the works or the behaviour of the personnel.

The Project Promoter shall be informed as soon as possible of any near-accident (near misses) relating to the Project operations at all Project sites which, in slightly different conditions, could have led to bodily injury to people, or damage to private property or the environment.

A report shall be prepared on each accident or dangerous occurrence and a copy of the report, together with witness statements and any other relevant information, shall be submitted to the Project Promoter as soon as possible.

A reportable accident shall include any accident to any person on site requiring medical attention or resulting in the loss of working hours or any incident that resulted, or could have resulted in injury, damage or a danger to the Project sites, persons, property, or the environment. A report of incidents of subcontractors and suppliers (in particular those for major supply items) shall also be prepared.

Reporting shall be done on any H&S accident, related to operation activities or personnel, to national or local authorities as required by relevant legislation. A copy of all such reports shall be provided to the Project Promoter.

The BOT Contractor / NEPCO shall not notify or give any information to the media or other units or people without the Project Promoter's consent.

Given the above considerations, the HSMP shall be structured to include at minimum the following contents:

1. Stated H&S policy, leadership, and commitment that meets MWI E&S policy
2. H&S Management System definitions
3. Scope, objectives, and targets of the H&S Management System
4. Organizational roles, responsibilities, and authorities
5. Planning procedures
    - *Hazard identification, risk assessment and determination of controls*
    - *Identification of legal and other requirements and their incorporation into the development, implementation and maintenance of the system*
    - *Setting and maintaining objectives, targets and plans*
6. Implementation and operation procedures
    - *Resources, roles, responsibility, accountability and authority*
    - *Competence, training and awareness*
    - *Communication, participation and consultation*
    - *Operational controls (PPE, first aid, fire safety, electricity safety, work in heights and confined areas, manual handling, labelling of hazardous materials, etc.)*
    - *Documentation procedures*
    - *Development and updating of documentation*
    - *Control of documentation and records*
7. Emergency preparedness and response procedures
    - *Performance evaluation procedures*
    - *Monitoring and measurement*
    - *Evaluation of compliance*
    - *Incident investigation*
    - *Nonconformity, corrective, and preventive actions*
    - *Internal (and external) audits*
    - Management review and improvement procedures

8.10.2.4. Traffic and Transport Management Plan

The BOT Contractor / NEPCO shall develop a TTMP as part of the OESMP, which shall:

- Define the characteristics of the fleet of vehicles and site machinery with the aim to prevent facility site vehicle incidents by the effective management of transport operations throughout the Project construction/operation phases.

- Define the itineraries used on a map for each route between the different Project facility sites
- Describe the expected traffic created by the Project fleet of vehicles (frequency of trips between Project facility sites, working hours, convoys, etc.).
- Describe the number and positioning of flagmen.
- Include actions to limit and check the speed of all vehicles and machinery used to execute the works/operations at an appropriate level.

The TTMP shall include the following:

- Regular maintenance activities carefully planned and persons/communities who may be affected informed in advance.
- Proper warning signs installed on the road where maintenance activities are undertaken to warn the passing cars and ensure the traffic is not blocked.
- Clearly mark alternative roads if blocking a road is necessary
- Ensure that any material transported by trucks is well covered along transportation

Given the above considerations, the TTMP shall be structured to include at minimum the following contents:

1. Introduction
   - *Purpose of the TTMP*
   - *Scope of Application of the TTMP*
2. Roles and Responsibilities
3. Regulatory Framework and Standards
4 Implementation Schedule of the TTMP
5. Project Transportation Activities and Related Hazards
   - *Transportation Activities*
   - *Hazards to H&S*
   - *Hazards to the Environment*
   - *Hazards Control Procedures*
6. Communication and Reporting Procedures
7. Audit and Review Procedures
8. Personnel Training Requirements/Procedures

8.10.2.5. Emergency Preparedness and Response Plan

Suitable and sufficient steps shall be taken by the BOT Contractor / NEPCO, to prevent, as far as reasonably practicable, the risk of major environmental incidents and the injury to any person during the execution of the Project related construction activities and operation.

To this effect, based on a risk assessment approved by ASEZA, suitable and sufficient arrangements shall be developed for dealing with any foreseeable emergency and shall include necessary evacuation measures. At all Project worksites, a suitable number of emergency routes and exits shall be provided to enable any person to reach a place of safety quickly in the event of danger, and, where appropriate, this route shall be suitably signed to assist quick evacuation.

The BOT Contractor / NEPCO shall therefore develop an EPRP for the Project during both the construction and operation phases, which shall comprise specific procedures in the case of fire, earthquakes, major accidents, major spillages, oil pollution, etc., before any works commence. This EPRP shall be submitted to ASEZA for approval. The EPRP shall be kept up to date and shall be appropriate for the changing worksite conditions. The EPRPs shall be clear and unambiguous. Especially in the case of fire, travel distances to reach safety positions shall be considered because of the effects of smoke and heat, which can spread quickly, it is particularly important not to overestimate how far people can travel before they are adversely affected by fire.

As a minimum, the EPRP and their associated procedures shall include:

- Emergency contact numbers available on notice and information boards in each Project worksite areas/ Project site offices.
- Emergency procedures incorporated in the site inductions briefing.

- Emergency drills, which shall be properly recorded through developed template forms.

The emergency procedures shall be periodically reviewed by the BOT Contractor / NEPCO on semester basis throughout the duration of the construction and annually during operation to ensure continued relevance. Moreover, the emergency and evacuation procedures shall be tested by the BOT Contractor / NEPCO through appropriate drills that will be held every [4 months] along Project construction duration and on semester basis during operation, and, where possible, may involve all parties with interest in the Project.

For fixed locations, fire points, assembly points, spill kit, secondary containments, and means of warning shall be detailed on a site layout plan, which shall be displayed on each site office notice board. The requirements of the emergency plan at all Project worksites shall be made known to all employees as part of their site induction training.

The EPRP shall comprise procedures covering the following emergency situations as a minimum:

- Chemical spills
- Fire
- Flooding
- Extreme weather conditions
- Explosions
- Extended power loss
- Major structural failures
- Electrocution
- Toxic gas releases and respiratory/poisoning threats
- Medical injuries
- Force majeure

Procedures for first-aid, rescue, and evacuation shall be also developed and appropriate training shall be provided and documented for all Project personnel.

Fit-for-purpose Emergency Response Capability in terms of human resources and means shall be made available at the Project worksites/facilities and shall be clearly documented.

It shall be ensured that all Project personnel are informed and aware of how to react in an emergency situation, and responsibilities are defined. Information and awareness training shall be documented and available at all Project Areas.

Emergency simulation exercises (i.e., emergency drills) shall be organised, executed, and documented within 3 months of the physical start of the works, and subsequently twice per year up to construction completion. These exercises shall be organised, executed, and documented within 3 months of the operation commencement, and subsequently once per year.

Based on fire safety risk assessment, it shall be ensured that adequate and appropriate fire safety measures are in place to minimise the risk of injury or loss of life in the event of a fire. To this effect, appropriate actions shall include keeping sources of ignition and flammable substances apart, avoiding accidental fires, ensuring good housekeeping at all times, e.g., avoiding build-up of rubbish that could burn, installing fire warning systems, having in place correct and readily available fire-fighting equipment, keeping fire exits and escape routes clearly marked and unobstructed at all times, ensuring workers receive appropriate training on procedures they need to follow, including fire drills. In any case, the selected measures shall comply to the provisions of national regulations and official instructions by the competent national authorities.

All necessary communications and arrangements shall be made with the local fire-brigades for emergencies.

Contingency arrangements shall also be in place for medical injuries, which at minimum shall comprise calling for a doctor and transporting injured staff or people to the nearest hospital. The telephone numbers of the emergency services and the name, address and telephone number of the doctor and the nearest hospital shall be prominently displayed in the worksite offices.

All Project sites shall be clearly mapped and known by all construction and operation personnel. This will help in clearly defining the emergency evacuation routes. The map shall include the location of fire extinguishers, medical first aid kits, alarm system, and assembly points that the employees working at the construction site and project facilities should use. The worksite employees shall be familiar with at least two emergency evacuation routes.

Chemical spills shall be immediately contained. The designated emergency coordinator shall be notified. The site shall be secured. The spill shall be cleaned only by trained personnel. Proper equipment shall always be used for the cleaning process. If trained personnel are not available, a professional chemical spill clean-up company shall be used.

Clear guidance shall be in place about what should be done in case of a medical emergency. The paramedics shall be given vital information about the nature of the emergency and the exact location of the response. Worksite employees shall be given first aid and CPR training. This is of utmost importance when a hospital or a clinic is not near the worksite.

Rescue plans shall always be implemented by trained personnel. If works take place in confined spaces, an emergency action plan shall be in place that includes rescue procedures in the confined spaces.

A written emergency medical procedure shall be provided to all employees before their work begins. This will help avoid confusion in the event of an accident.

Given the above considerations, the EPRP shall be structured to include at minimum the following contents:

1. Scope and Purpose of the EPRP
2. Categorisation of Incidents and Emergencies
   - *Personnel injury incidents and accidents*
   - *Facilities damage incidents and accidents*
   - *Pollution incidents and accidents*
3. EPRP Organisation and Application Procedures
   - *Mobilisation of the Plan*
   - *Control Point (Location, roles and responsibilities, control supervisor)*
   - *Coordination Point (Location, roles and responsibilities, coordination manager)*
   - *Management procedures of minor incidents*
   - *Management procedures for major injuries (poisoning by inhalation of chemicals, major injuries by malfunctioning equipment, medical care, and transportation to hospital)*
   - *Management procedures for fatalities*
   - *Management procedures for damage in facilities (activation of emergency procedures, control and H&S measures)*
   - *Firefighting Management Procedures*
   - *Earthquake Management Procedures*
   - *Spill Management Procedures*
   - *Fugitive gases Management Procedures*
   - *Evacuation Procedures*
4. Organisation of Human Resources
5. Organisation of Equipment
6. Accountability
7. Communication Procedures
8. Personnel Training Requirements and Drill Procedures

8.10.2.6. Labour Conditions

The BOT Contractor / NEPCO shall develop and adhere to labour conditions as part of CESMP and OESMP. The purpose of these conditions are to ensure that the construction and operation of the AAWDC Project provides:

- fair treatment for all workers;
- non-discrimination and equal opportunities of workers;
- a sound worker-top management relationship;
- compliance with national labour laws;
- protection and promotion of the safety and health of workers;
- prevention of the use of forced labour and child labour (as defined by the ILO and Jordanian legislation).

The implementation of labour conditions is essential to maximize the opportunity for local employment and ensuring access to jobs to all affected communities. This will assist in promoting a positive relationship between the Project and the local community.

Decent labour conditions shall be ensured for workers in compliance with applicable national laws and regulations, the EIB / USAID E&S standards, and the fundamental conventions of the ILO. This will include workers' rights related to wages, working hours, rest and leave, overtime, minimum age, regular payment, compensation and benefits, equal opportunities, a non-discriminatory workplace, best practice on human resource management and occupational health and safety. Wages, benefits, and conditions of work will be comparable to employers operating in the water sector in Jordan.

The workers' right to be organised in unions shall be respected and facilitated.

A system shall be developed and implemented for Project employees (including those of main sub-contractors) to monitor hours worked on the Project, which will also identify and remedy any practices that lead to long working hours in excess of national legislation.

The CESMP and OESMP shall comprise policies and procedures related to the following aspects:

- Workforce accommodation (including sanitary facilities), meals, and transport.
- Workforce health screening and access to health care and medical services.
- Workforce health and hygiene awareness on waterborne diseases, transmissible diseases (e.g., STD), etc.
- Workforce awareness on first aid.
- Workforce awareness of the Code of Conduct and interactions with local communities.
- Workforce awareness on occupational safety, and environmental, biodiversity, and cultural resources.

The following overarching principles shall be abided by the BOT Contractor throughout the Project duration.

8.10.2.6.1. Non-Discrimination and Equal Opportunity

The BOT Contractor / NEPCO shall:

- Not make employment decisions on the basis of personal characteristics such as gender, race, nationality, ethnic origin, religion or belief, disability, age, or sexual orientation, unrelated to inherent job requirements.
- Base the employment relationship on the principle of equal opportunity and fair treatment, and will not discriminate with respect to all aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employment or retirement, and discipline.
- Establish mechanisms to ensure non-discrimination of women in accessing recruitment procedures. To this effect, an incentive mechanism to increase the share of women recruited for the Project may be established.

8.10.2.6.2. Local Recruitment

Local recruitment shall be promoted as much as possible and in-line with the signed Power Agreement. Local recruitment is defined as the number of positions actually allocated to people residing in the region of the Project activities (i.e. less than two hours by land transport to Project Areas/Facilities) for more than one year and citizen of Jordan.

The BOT Contractor / NEPCO shall coordinate and implement public awareness campaigns for workers regarding dealing with the local population to minimize friction caused by contacts between the Project workforce and communities

Local labour needs shall be estimated prior to the commencement of works and shall be described in the CESMP and OESMP with the following information:

- Identification of positions that could be filled by local staff and the level of qualification required.
- Definition of the planned procedure for the effective recruitment of these members of staff. This may also include the establishment of a recruitment office at a location that covers effectively the Project Areas/Facilities.
- Deployment schedule for these positions.
- Initial training to be provided for each job description.

Considering that the Project Areas/Facilities are located near several different communities, a fair distribution of local recruitment between the different communities shall be ensured through the establishment of mechanisms to ensure equal opportunities. To this effect, recruitment campaigns may be undertaken in the

different local communities ensuring that said recruitment campaigns have been spread to women and that the latter have not been discriminated in recruitments.

8.10.2.6.3. Preventing Discrimination at the Workplace

The BOT Contractor / NEPCO shall ensure that employees responsible for recruitment decisions are applying the criteria developed by the organization for the position equally to all applicants or candidates. For example, if the Project Contractor/Operator requires some of its applicants to have a certain amount of experience, that requirement shall be applied equally to all groups of applicants.

Additionally, the BOT Contractor / NEPCO shall review their compensation policies to make sure employees are not subject to wage discrimination. They should also examine employee access to opportunities affecting compensation, such as: work assignments, training, preferred or higher paid shift work, access to overtime hours, pay increases, and incentive compensation.

Women shall receive equal pay for work of equal value. This means that rates of remuneration (including the basic wage and any additional cash or non-cash benefits) must be established without any discrimination based on sex.

Measures shall be taken to enable workers with disabilities to retain their jobs and make accommodations required by national law for physically disabled persons.

Providing a formal anti-harassment training for all employees shall also be ensured to prevent discrimination in the workplace.

Practices that may lead to discriminatory recruitment that the BOT Contractor shall avoid include:

- Failing to prevent sexual harassment directed at female employees, and then failing to take adequate corrective action;
- Failing to prevent racial or ethnic harassment, including the use of racial and ethnic language, and then failing to take adequate corrective action;
- Terminating employees for complaining about a hostile work environment;
- Denying women regular and overtime work hours comparable to those of their male counterparts;
- Failing to provide adequate restroom facilities for female employees, for example by not allowing restroom breaks or failing to furnish sanitary facilities to female workers;
- Assigning certain employees (such as women or non-nationals) to the most difficult, dirty, and least desirable jobs; and
- Systematically excluding certain employees (such as women or non-nationals) from promotion opportunities.

In addition, subjective hiring practices that may result in discriminatory practices and shall be avoided by the BOT Contractor / NEPCO as much as possible include:

- Word-of-mouth recruitment or referrals where the workforce predominantly consists of one race, sex, or ethnicity;
- Job announcements, application forms or interviews that refer to an applicant’s gender, marital status, age, race, disability, or other personal characteristic that is irrelevant to the job;
- Use of an "eyeball test," where an employer looks at an applicant to determine whether that person appears to be strong;
- Requesting job applicants or workers to undertake health or pregnancy tests (except as strictly required by health and safety laws); and
- Not posting or giving notice of hiring or promotional opportunities, vacancies and/or selection criteria, and relying too heavily on friends of supervisors or of current employees to fill positions.

8.10.2.6.4. Best Recruitment Practices

The BOT Contractor / NEPCO shall adopt best recruitment practices including:

- Regularly reviewing their outreach and hiring practices to learn whether certain groups are being excluded, not just from being hired, but from even entering the applicant pool.
- Considering whether practices such as word-of-mouth recruiting, hiring only previous workers when new positions or opportunities for work arise, or picking up day labourers in particular locations are having an adverse impact on hiring.

- Working with local apprenticeship programs and community-based organizations to seek a diverse pipeline of qualified workers. Worker referral programs located within the same geographic area as the project can also help contractors draw from the available workers in the recruitment area.

8.10.2.6.5. Forced Labour

The BOT Contractor shall ensure that:

- Employees are paid their wages in full and on time.
- Employees are not charged recruitment, processing, or placement fees to obtain employment which entail a significant debt that can only be repaid by continued employment with the same employer.
- Only reputable recruitment and employment agencies are used, and there are procedures in place to check their practices and policies.
- Employees are provided with an employment contract which will include, at minimum, the following:
  - Expected working hours
  - Overtime requirements
  - Annual leave entitlements
  - Total salary and payment frequency
  - Notice period and conditions of termination by each party
  - Disciplinary procedures
  - Confirmation that the employer will cover the worker's medical insurance
- Employees retain control and possession of their passports and other personal documents.
- Employees are free to leave the worksite and their accommodation when they are not working.
- Employees are free to leave their employment without penalty on giving reasonable notice (in accordance with national law).
- Employees are not forced to work overtime above national limits.

8.10.2.6.6. Child Work

The BOT Contractor / NEPCO shall at minimum:

- Comply with minimum age requirements set out in the national legislation (whichever offers the greatest protection to young people under the age of 18) and keep records of the dates of birth of all employees verified by official documentation.
- Check the activities carried out by young workers and ensure that under-18s are not employed in hazardous work as defined in national legislation.
- Assess the safety risks relating to any work by under-18s and carry out regular monitoring of their health, working conditions and hours of work.

8.10.2.6.7. Employee Grievance Mechanism

The BOT Contractor / NEPCO shall develop and implement an employee/worker grievance mechanism that will allow employees to address workplace disputes or concerns in a fair, easily accessible, and transparent manner annexed to the ESIA. A standardised procedure to this effect is as follows:

- When a concern or an action has occurred the employee/worker must file a written grievance to his or her supervisor.
- The supervisor must respond back. If the employee/worker was not satisfied with the supervisor's response, he/she can direct the grievance to the HR Department of the BOT Contractor/ NEPCO.
- The HR must respond back. If the employee/worker was not satisfied with the response and wishes to appeal, he/she can direct the grievance to the higher level of management.
- If the employee was not satisfied with the response of top management, then he/she can approach the workers organization (that he/she belongs to) where applicable for further advice and assistance.
- The employee can approach the client / client representative for an amicable resolution.
- If an employee is not satisfied with the final determination of the internal grievance procedure, the employee can still hire a lawyer and resolve the issue at court.

The grievance mechanism shall be available to all workers, including the workers of subcontractors. All workers shall receive an induction on their rights and on the Worker Grievance Mechanism whereas the contact details

of the Worker Grievance Mechanism shall be displayed at well visible places in all worksites and accommodation camps

8.10.2.6.8. Code of Conduct

The BOT Contractor shall develop and commit to a Code of Conduct for the Project related worksites/facilities, which should address safety rules, zero tolerance for substance abuse, environmental sensitivity of areas around the Project worksites and facilities, the dangers of STDs and HIV/AIDS, gender issues (and in particular sexual harassment) and respect for the beliefs and customs of the populations and community relations in general.

The emanating rules of procedure shall be clearly displayed at the different Project Areas/Facilities and posted in the Project vehicles and machinery driving cabs.

Any existing or new personnel shall be made aware and acknowledge their understanding of the rules of procedure. To this effect, the document comprising the rules of procedure shall be initialled by all Project personnel prior to the start of any work.

The rules of procedure will include a list of acts that are considered as serious misconduct and which must result in dismissal from any Project Area/Facility., should a Contractor's Personnel repeatedly commit an offence of serious misconduct despite awareness of the rules of procedure, and this is without prejudice to any legal action by any public authority for non-compliance with applicable regulations and more specifically:

- Drunkenness during working hours, leading to risks for the safety of local inhabitants, and personnel.
- Punishable statements or attitudes, and sexual harassment in particular.
- Violent behaviour.
- Intentional damage to the assets and interests of others, or the environment.
- Repeated negligence or imprudence leading to damage or prejudice to the environment, the population or properties, particularly breaching provisions intended to prevent the spreading of STD and AIDS.
- Drug use.
- Possession and/or consumption of meat or any other part of an endangered animal or plant as defined in the national regulations and the Washington convention (CITES).
- Entering property of neighbouring people without permission of the landowners or of those cultivating/renting the land.

Serious misconduct, such as organization of sex trade, committing sex offenses, physical aggression, drug trafficking, deliberate and severe pollution, trading and/or trafficking in all or part of protected species, shall lead to immediate dismissal as of the first report of misconduct is detected, in application of the rules of procedure and labour laws.

A record for each case of serious misconduct shall be established, and a copy will be provided to the personnel in question, indicating all action taken to terminate the misconduct personnel in question and to bring the attention of other personnel to the type of incident detected. This record will be provided to the Project Promoter.

The Project Promoter shall be informed without delay in case of any serious misconduct.

8.11. Environmental and Social Monitoring Plans

The following Sections aim at providing the requirements related to the E&S Monitoring Plans that shall be developed by the BOT Contractor / NEPCO as part of the CESMP and OESMP for the monitoring of the Project related E&S impacts as identified in the Project ESIA study.

8.11.1. Terrestrial Biodiversity during Construction

The frequency of monitoring for terrestrial biodiversity is mostly Periodical (every three months) combined with follow up on daily basis and Annual Auditing. The following are the biological environment monitoring indicators and responsibilities:

- Maintained pre-project land utilization and access

- Maintained natural conditions of the habitat and geomorphology, and occurrence of habitat deterioration
- Monitor of key herpeto-faunal, avifaunal and mammalian species, with emphasis on threatened species and identified flagship species.
- Monitor incidents of hunting and accidental kills of wildlife
- Monitor worker bites by venomous snakes and scorpions, parasitic infections and other epidemiological accidents

The following components shall be monitored on a regular basis to conserve the agricultural and pastoral resources.

- Availability of safe passageways dedicated for the use of Herders.
- Removal from the construction corridor and/or cutting of Acacia, Tamarix and other natural trees or parts of trees for wood collection.
- Removal of trees within farms along the route and from forested areas.
- Number of direct or indirect killing of pastoral animals by the project activities, workers or machinery

8.11.2. Air Quality and Noise Monitoring during Construction

Where applicable, visual inspections of atmospheric emissions shall be conducted, especially dust and emissions from vehicles and machinery. The inspections shall identify areas where the implementation of dust reduction measures is required.

Noise monitoring shall be undertaken daily when works are located near sensitive receptors including residential areas and natural habitats.

8.11.3. Electromagnetic Fields during Operation

Electromagnetic fields are generated by the operation of the OHTL. While exposure to low-frequency Electromagnetic fields is generally considered safe at regulated levels, prolonged or high-intensity exposure can pose potential health risks to workers and nearby communities. Therefore, **continuous monitoring** and compliance with international exposure limits are essential to ensuring safety.

By implementing regular monitoring, worker safety protocols, and public awareness measures, the project can ensure that electromagnetic fields exposure remains within safe limits, protecting both operational staff and nearby communities.

9. Annexes

Annex 1: ASEZA's Screening Letter

Annex 2: ASEZA's Approval on the ToR

Annex 3: Scoping Session Details

Annex 4: Disclosure Session Details