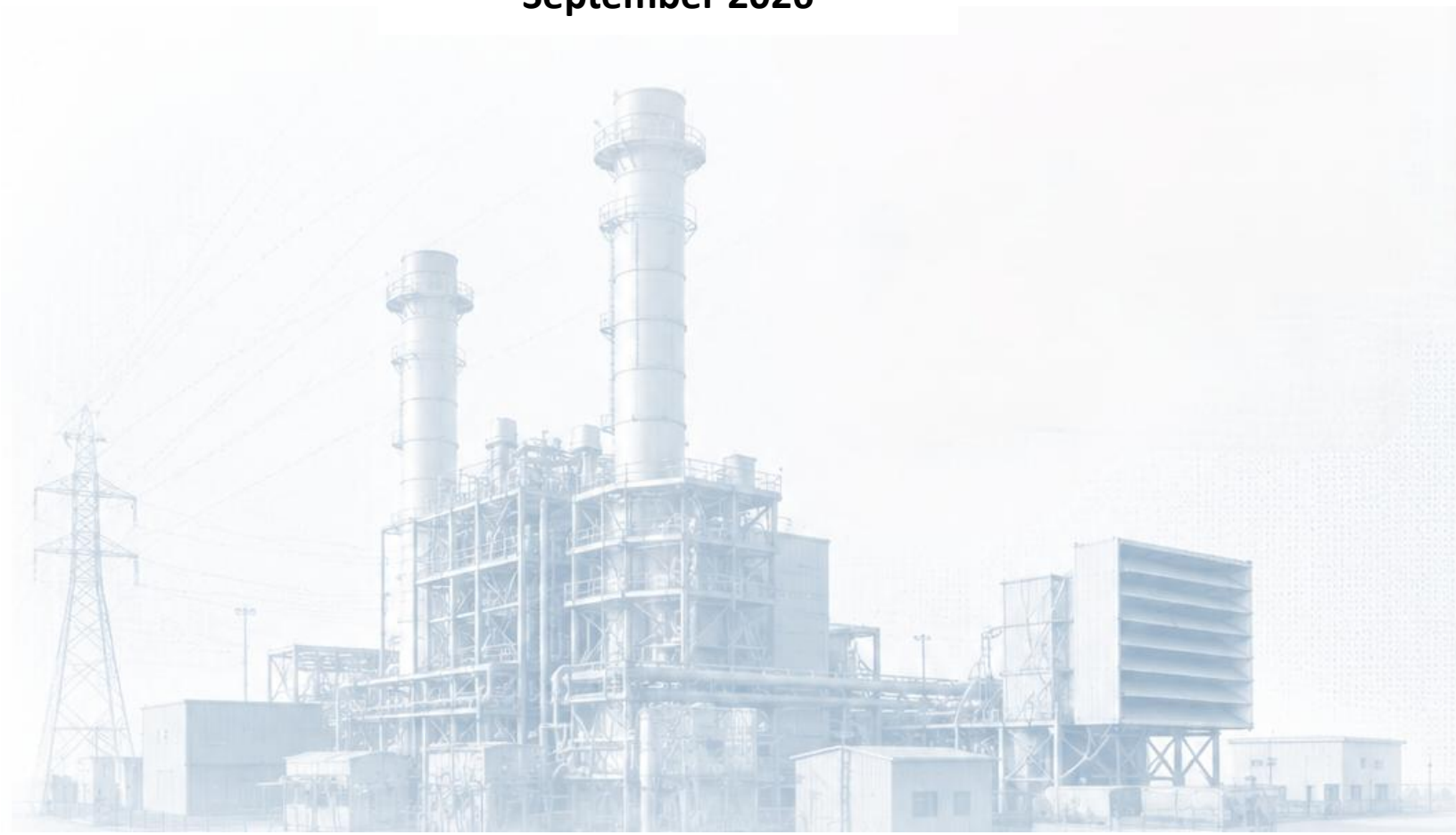
Environmental & Social Impact Assessment (ESIA)

Mafraq 700 MW Combined-Cycle Gas Turbine (CCGT) Thermal Power Plant

REV-3

September 2026



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ABBREVIATIONS AND ACRONYMS

AAQS	Ambient Air Quality Standards
AAWDC	Aqaba-Amman Water Desalination and Conveyance
AAWDCP	Aqaba-Amman Water Desalination and Conveyance Project
ACC	Air-Cooled Condenser(s)
AIIB	Asian Infrastructure Investment Bank
AMR	Annual Monitoring Report
AoI	Area of Influence
AQM	Air Quality Monitoring
ATC	Automatic Traffic Count
BAT	Best Available Technology
BAU	Business-as-Usual
BOO	Build, Own and Operate
CARC	Jordanian Civil Aviation Regulatory Commission
CCGT	Combined-Cycle Gas Turbine
CCPP	Combined Cycle Power Plant
CCRA	Climate Change Risk Assessment
CCS	Carbon Capture and Storage
CEMS	Continuous Emission Monitoring System
CH4	Methane
CITES	Convention on International Trade in Endangered Species
CO	Carbon Monoxide
CO2	Carbon Dioxide
COD	Commercial Operation Date
CTG	Combustion Turbine Generator
CVRA	Climate Vulnerability Risk Assessment
DA	Degraded Airshed
DEM	Digital Elevation Model
DLS	Department of Lands and Survey
DoA	Department of Antiquities
DoS	Department of Statistics
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EDC	Etihad Development Company
EDI	Electro-DeIonization
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMRC	Energy and Minerals Regulatory Commission
EPC	Engineering, Procurement, and Construction
ESEL	Environmental and Social Exclusion List
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment

ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESP	Environmental and Social Policy
ESS	Environmental and Social Standard
EWE	Etihad Water and Electricity
FGD	Focus Group Discussion(s)
GBV	Gender-Based Violence
GBVH	Gender-Based Violence and Harassment
GHG	Greenhouse Gas
GHRRA	Gender and Human Rights Risk Assessment
GIP	Good International Industry Practice
GIS	Geographic Information System
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GoJ	Government of Jordan
GPN	Good Practice Note
GT	Gas Turbine
GTCC	Gas Turbine Combined Cycle
GTs	Gas Turbines
GWPs	Global Warming Potentials
HR	Human Resources
HRSG	Heat Recovery Steam Generator
HSES	Health, Safety, Environment, and Security
IA	Implementation Agreement
IBA	Important Bird Area
IBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
IFI	International Financing Institution(s)
ILO	International Labor Organization
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IPs	Indigenous Peoples
ISEP	Institute of Sustainability and Environmental Professionals
ISO	International Organization for Standardization
JS	Jordanian Standard
JSC	Joint Services Council
JSMO	Jordan Standards and Meteorology Organization
KBA	Key Biodiversity Area
KPI	Key Performance Indicators
LAF	Land Acquisition Framework
LC	Least Concern
LDU	Local Development Unit
LESA	Lender Environmental and Social Advisor
LHV	Lower Heating Value

LLA	Land Lease Agreement
LNTP	Limited Notice To Proceed
MCM	Million Cubic Meters
MEGA	Middle Eastern Geodatabase for Antiquities
MEMR	Ministry of Energy and Mineral Resources
MoA	Ministry of Agriculture
MoH	Ministry of Health
MoI	Ministry of Interior
MoL	Ministry of Labor
MoLA	Ministry of Local Administration
MoM	Minutes of Meeting
MoMA	Ministry of Municipal Affairs
MoPWH	Ministry of Public Works and Housing
MoT	Ministry of Transport
MPWH	Ministry of Public Works and Housing
MSW	Municipal Solid Waste
MTC	Turning Movement Count
MW	Megawatt / Mega Watt
MWI	Ministry of Water and Irrigation
NARC	National Agricultural Research Center
NDA	Non-Degraded Airshed
NDC	Nationally Determined Contributions
NEPCO	National Electric Power Company
NGO	Non-Governmental Organization
NOC	No Objection Certificate
NOx	Nitrogen Oxides
NPL	Noise Pressure Levels
NRW	Non-Revenue Water
NTS	Non-Technical Summary
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
OPGW	Optical Ground Wire(s)
PAC	Project Affected Community / Communities
PCU	Passenger Car Units
PEIA	Preliminary Environmental Impact Assessment
PM	Particulate Matter / Passage Migrant
POP	Persistent Organic Pollutants
PPA	Power Purchase Agreement
PPE	Personal Protective Equipment
PS	Performance Standard
PSD	Public Security Directorate
PtW	Permit to Work

RCP	Representative Concentration Pathway
REV	Revision
RJGC	Royal Jordanian Geographic Center
RO	Reverse Osmosis
ROW	Right-of-Way
RSCN	Royal Society for Conservation of Nature
RUSLE	Revised Universal Soil Loss Equation
SB	Breeding Summer Visitor
SDII	Simple Precipitation Intensity Index
SDU	Social Development Unit
SEAH	Sexual Exploitation, Abuse, and Harassment
SEP	Stakeholder Engagement Plan
SO2	Sulphur Dioxide
SSC	Social Security Corporation
ST	Steam Turbine
STG	Steam Turbine Generator
TBT	Toolbox Talks
TCFD	Taskforce on Climate-related Financial Disclosures
TMC	Turning Movement Counts
ToR	Terms of Reference
UN	United Nations
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNGPs	UN Guiding Principles on Business and Human Rights
UNSDGs	United Nations Sustainable Development Goals
UTM	Universal Transverse Mercator
VP	Vantage Point
VU	Vulnerable
WAJ	Water Authority of Jordan
WGS	World Geodetic System
WHO	World Health Organization
WHS	World Heritage Site(s)
WSA	Water Supply Agreement
WWTP	Wastewater Treatment Plant
YWC	Yarmouk Water Company
ZLD	Zero Liquid Discharge
ZTV	Zone of Theoretical Visibility

1. INTRODUCTION

1.1 Project Overview

This Environmental and Social Impact Assessment (ESIA) has been prepared to assess the Environmental and Social (E&S) impacts associated with the Mafraq 700 Megawatt (MW) Combined-Cycle Gas Turbine (CCGT) Thermal Power Plant Project (hereafter referred to as the "**Project**"). The Project comprises new power plant facilities to be constructed in the Mafraq Governorate around 55 km northeast of the capital city, Amman. (see Figure 1). Associated Facilities comprise a new substation and Overhead Transmission Line (OHTL) and short pipelines to tie-into nearby existing gas and water supplies.

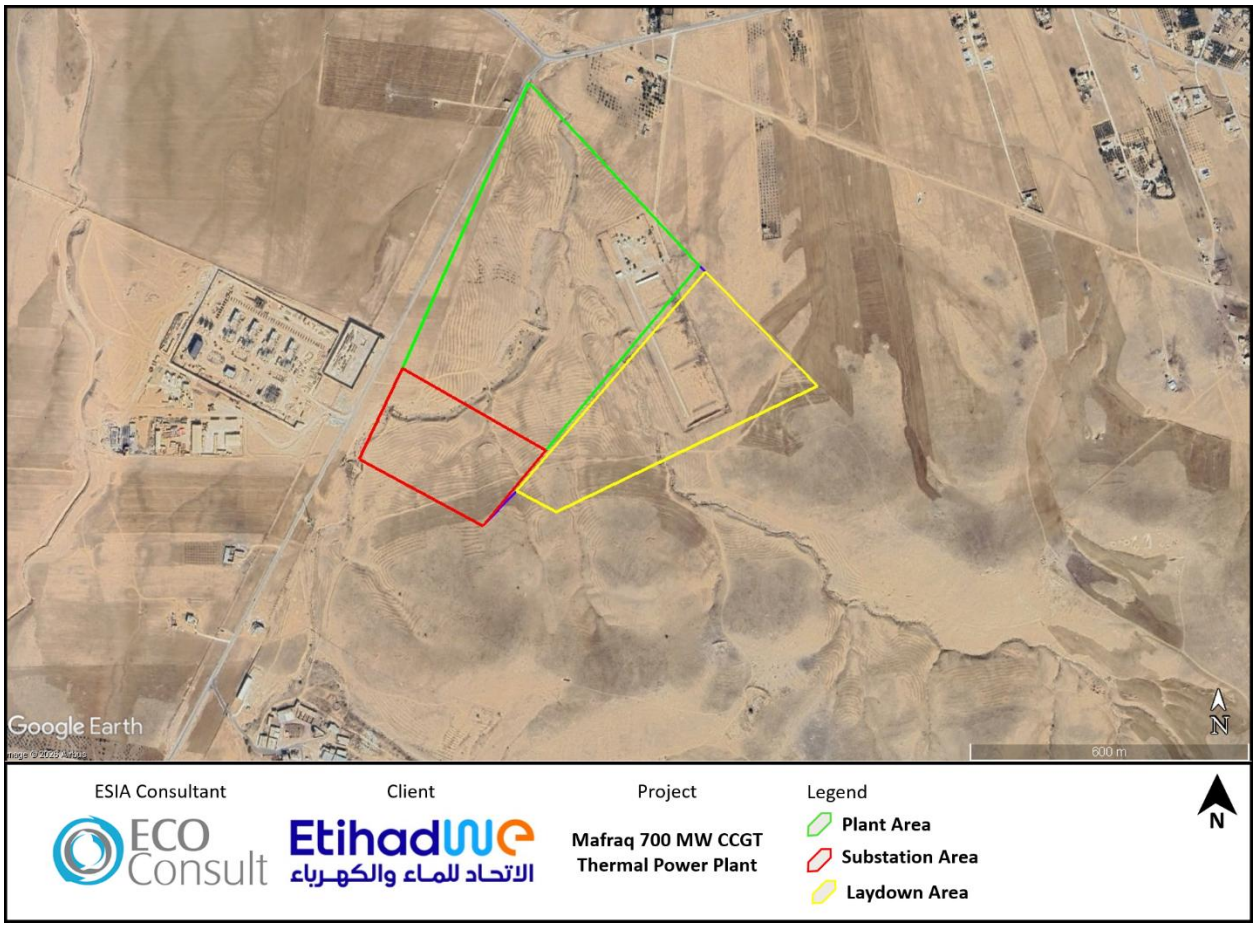


Figure 1: Project Site

Based on the current schedule, it is anticipated that the Project construction activities will commence at the end of Q3 2026, with operations planned to commence in September 2028 with the start of Phase 1 simple cycle operation followed by Phase 2 combined cycle operations in September 2029.

1.2 Background and Project Context

Jordan's energy sector is considered vital within the Hashemite Kingdom of Jordan, supporting economic growth and sustainable development. However, the sector continues to face key structural challenges, including limited local energy resources and a high reliance on imported energy, including that for electricity generation. Acknowledging this, Jordan adopted a policy direction focused on energy transition through diversifying sources, developing conventional and renewable energy

resources, improving energy efficiency, and encouraging private sector investment in energy infrastructure.

In the context of energy transition efforts, the Government of Jordan (GoJ) has announced a comprehensive portfolio of investments that includes more than 200 MW of renewable energy projects by 2029 and approximately 1,400 MW of new CCGT capacity by 2030..

These investments are incorporated within the "Jordan Economic Modernization Vision" as a key pillar for achieving sustainable development goals and emissions reduction targets, while meeting the accelerated demand growth and ensuring the electricity system's reliability and resilience standards. These projects are also part of National Electric Power Company's (NEPCO) "Master Plan 2024–2035" and Ministry of Energy and Mineral Resource's (MEMR) "Jordan Energy Strategy" as part of a balanced expansion portfolio.

Taking the above into account, CCGT forms an integral part of the expansion portfolio as required within the Energy Strategy and Master Plan. CCGT projects serve as units of an integrated system of generation and storage plants to maintain a secure and reliable electricity system while accommodating a rapidly increasing share of variable renewable generation.

In alignment with policy objectives set out above, the GoJ has approved the progression of a CCGT Power Plant Project within the framework of the Seventh Independent Power Producer Project (IPP7). MEMR progressed with the implementation of the framework of IPP7, through a 700 MW CCGT Power Plant Project, to be located in Mafraq District, Jordan (hereafter referred to as the "**Project**"). The Project will be developed under a Build, Own and Operate (BOO) model for a term of 25 years from Phase 1 COD (Simple Cycle), equating to approximately 24 years from the full Plant PCOD (Combined Cycle).

The implementation framework entailed obtaining proposals from various international developers. Etihad Development Company (EDC) (hereafter referred to as the "**Developer**"), which is the development arm of Etihad Water and Electricity (EWE), submitted a direct proposal on 21 July 2025, and on 5 November 2025 the Council of Ministers Resolution No. 5574 was issued approving the direct proposal submitted by EDC. Pursuant to the resolution, EDC was invited to participate in a direct negotiation for the development of the Project with NEPCO (hereafter referred to as the "**Off-Taker**") and the GoJ represented by MEMR. EDC has signed the Power Purchase Agreement (PPA), Implementation Agreement (IA), Land Lease Agreement (LLA), and Water Supply Agreement (WSA), (collectively the "**Project Agreements**") on 6 May 2026.

The Project Agreements were signed with the following parties:

- PPA – signed with NEPCO
- IA – signed with MEMR
- LLA – signed with the Department of Lands and Survey (DLS)
- WSA – signed with the Water Authority of Jordan (WAJ) and Yarmouk Water Company (YWC)

1.3 ESIA Report

Under the local environmental clearance process in Jordan (see "Chapter 2.1" below), the environmental clearance for the Project is subject to the Ministry of Environment's (MoEnv) requirements, governed by the "Environmental Protection Law No. (6) of 2017".

In accordance with the relevant legislation, the MoEnv has officially requested that the Project undertake a comprehensive Environmental and Social Impact Assessment[1] (ESIA) study in order to obtain the environmental permit for the Project. The first step within the ESIA process comprises the "Scoping Phase" which includes undertaking a formal scoping session and preparing a Scoping Report for MoEnv review and approval. The Scoping Report identifies the proposed scope of the ESIA, including the key E&S issues to be assessed, the baseline studies to be undertaken, and the methodology to be adopted during the assessment (i.e. the Terms of Reference (ToR) for the ESIA study).

The "Assessment Phase", which follows scoping, includes conducting the required E&S baseline studies, identifying and assessing potential E&S impacts associated with the Project, and developing the Environmental and Social Management Plan (ESMP), including the mitigation, monitoring and management measures required during the different phases of the Project. The "Assessment Phase" concludes with the production and subsequent approval of the ESIA report and supporting studies.

The Project will be seeking financing from International Financing Institutions (IFIs) and therefore, the Developer wishes to design and manage the Project in accordance with the relevant international E&S standards and requirements. At the time of writing the IFIs providing financing comprise International Finance Corporation (IFC) and Asian Infrastructure Investment Bank (AIIB). For the purpose of the ESIA, the relevant international E&S requirements are based on:

- IFC's Requirements. This includes the IFC Policy on E&S Sustainability (2012), IFC Performance Standards (2012), and relevant IFC Environmental, Health and Safety (EHS) Guidelines – General EHS Guidelines (2007), EHS Guidelines for Thermal Power Plants (2008), and EHS Guidelines for Electric Power Transmission and Distribution (2007).
- AIIB Requirements. This includes the Environmental and Social Framework (ESF) (2024).

This ESIA Report has been prepared in accordance with "Environmental Protection Law No. (6) of 2017" of Jordan and IFIs requirements.

1.4 Purpose of the ESIA

The purpose of this ESIA is to:

- Provide an assessment of the E&S baseline conditions within the Project's defined Area of Influence (AoI);
- Evaluate the significance of potential positive and negative environmental, social, health, and safety impacts during all phases (construction, operation, and decommissioning) of the Project;
- Demonstrate compliance with relevant national E&S regulations, applicable international standards and IFI requirements;
- Provide an overview of the stakeholder consultation undertaken and key feedback and how it has been considered within the ESIA; and
- Develop management plans, specifically an Environmental and Social Management Plan (ESMP) that outlines mitigation measures, monitoring frameworks, and institutional responsibilities to eliminate, minimize, or offset adverse impacts and enhance beneficial ones.

[1] Within the local context, the study is known as an Environmental Impact Assessment (EIA)

1.5 ESIA Structure

The following table provides an overview of the chapters within this ESIA document. In addition, the ESIA includes a standalone Non-Technical Summary (NTS), Stakeholder Engagement Plan (SEP) and a Land Acquisition Framework (LAF).

Table 1: Overall ESIA Structure

Chapter	Description of Content
Chapter 1 – Introduction	Provides an overview of the Project, its background and development context, applicable regulatory and financing requirements, the ESIA process, and the objectives and scope of the assessment.
Chapter 2 – Policy, Legislation and Standards	Provides a summary of applicable Jordanian regulations, international conventions and relevant lender policy requirements.
Chapter 3 – ESIA Approach and Methodology	Presents the approach used to identify and assess impacts and assign impact significance ratings. The approach will consider the sensitivity of what is being impacted (the receptor) and the magnitude of the event causing the impact.
Chapter 4 – Project Alternatives	Investigates several alternatives to the Project development and the reasons for the preferred choice. This includes alternatives in relation to the Project site, selected technology, Project design, and finally investigates the 'no action alternative' – which assumes that the Project development does not take place.
Chapter 5 – Project Description	Provides a detailed description of the Project in relation to its location, the key project components and an overview of the proposed activities that are to take place during the various Project phases.
Chapter 6 – Environmental and Socio-economic Baseline	This chapter presents the baseline conditions within the Project site and its area of influence, describing existing physical, biological, social, economic, and cultural conditions and identifying key receptors and sensitivities. This chapter provides the essential context against which potential project impacts are identified, assessed, and managed, ensuring that impact significance, mitigation, and monitoring measures are evidence-based and proportionate.
Chapter 7 – Stakeholder Consultations and Engagement	Discusses in detail the stakeholder consultation and engagement plan which were undertaken as part of the ESIA process for the Project and provides an overview of the findings. In addition, this chapter also discusses the future stakeholder engagement and consultation plans which are to take place at a later stage of the Project development.
Chapter 8 – Environmental and Social Impact Assessment, Mitigation and Monitoring	This chapter identifies, evaluates, and characterizes the Project's potential environmental and social impacts, including cumulative and transboundary effects. Impact significance is assessed based on receptor sensitivity and impact magnitude. It defines the mitigation hierarchy measures and monitoring requirements needed to avoid, minimize, mitigate, and manage residual impacts throughout construction and operation.
Chapter 9 – Climate Risk Assessment	This chapter identifies and evaluates the Project's exposure and sensitivity to climate-related hazards during construction, operation, and decommissioning. The assessment presented will consider both physical climate risks (acute and chronic) and, where relevant, transition risks (policy, regulatory, and market-related changes).
Chapter 10 – Environmental and Social Management Plan (ESMP)	Synthesizes the key findings of the ESIA, summarizing the Project's significant environmental and social impacts, residual impacts after mitigation, and the overall acceptability of the Project when implemented in accordance with IFC and AIIB requirements. It will present an overview of the environmental and social management system for construction and operations.

1.6 Project Setup and Responsibilities

Different entities are involved in the planning and implementation of the Project. Responsibilities of each entity are listed in the text below along with a general description of their roles.

- *Etihad Development Company*: The owner and developer of the Project (hereafter referred to as 'the Developer'). EDC will be responsible for the development of the Project under the BOO model;
- *Ministry of Energy and Mineral Resources (MEMR)*: the governmental entity representing the GoJ in relation to the Project. MEMR is involved in the overall governmental approval process and selection process of the Developer;
- *National Electric Power Company (NEPCO)*: the Off-Taker for the Project and the entity that signed the PPA for the Project. In addition, NEPCO will be responsible for constructing the required connection infrastructure to the national grid, including the OHTL;
- *Ministry of Environment (MoEnv)*: the official governmental entity responsible for protection of the environment in Jordan. The Ministry is responsible for approval of the ESIA, ensuring compliance with local environmental legislation, and granting the environmental clearance for the Project;
- *International Financing Institutions (IFIs)*: which includes: (i) IFC, and (ii) AIIB. The IFIs are providing financing for the development of the Project and will ensure that it is implemented in accordance with applicable international E&S standards and requirements;
- *Engineering, Procurement, and Construction (EPC) Contractor*: will be responsible for preparing the detailed design and layout of the Project; supply of the material and equipment; construction of the Project and its various components (e.g. building infrastructure). The EPC Contractor has not been assigned at this stage;
- *Project Operator*: responsible for Operation and Maintenance (O&M) of the Project. The Project Operator has not been assigned at this stage;
- *Yarmouk Water Company*: will be responsible for supplying the Project with water requirements, in accordance with the WSA;
- *Fajr Company for Natural Gas Transmission and Supply*: will be involved in the natural gas supply arrangements for the Project, including the establishment of the gas supply point and related gas connection infrastructure in coordination with NEPCO; and
- *E&S Team (ECO Consult, Energies Group and WKC Group)*: is the ESIA Practitioner and the consultant commissioned by EDC to prepare the ESIA for the Project in accordance with local requirements as well as international E&S standards and requirements.

2. POLICY, LEGISLATION AND STANDARDS

This chapter presents the environmental clearance process in Jordan, the key E&S legislation that is applicable for the Project, and the relevant international E&S standards and requirements.

2.1 Environmental Clearance Process in Jordan

The environmental permitting process in Jordan is governed by the MoEnv, in accordance with the "Environmental Protection Law No. (6) of 2017" and the "Regulation for Environmental Classification and Licensing No. (69) of 2020".

In general, the environmental permitting process includes two (2) main steps. The first step includes obtaining the site/location approval and undertaking the screening process to determine the environmental classification of the Project and identify whether an environmental assessment study is required. This step has already been completed for the Project, whereby the MoEnv approved the Project site and determined that a comprehensive ESIA is required.

The second step includes undertaking the comprehensive ESIA study in accordance with the requirements of the "Regulation for Environmental Classification and Licensing No. (69) of 2020". This includes the preparation and submission of the relevant ESIA documentation to the MoEnv for review and approval prior to granting the environmental clearance for the Project.

Both steps are discussed in further detail in the chapters below.

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

As discussed above, the first step of the environmental permitting process includes obtaining the location/site approval permit and undertaking the environmental screening process, in accordance with the requirements of the MoEnv.

- Location/Site Approval Permit Application: The Project Owner/Developer submits an application to the Central Licensing Committee at the MoEnv. The application generally includes the required site maps, Project description, implementation schedule and other supporting information required by the MoEnv.
- Location/Site Approval Permit Decision: Upon receipt of the application, the Central Licensing Committee reviews the submitted information and undertakes a site visit to assess the suitability of the proposed site for the Project. Based on the outcome of the site visit and the review of the submitted documents, the Committee either approves the site for the proposed development or rejects it.

  This is guided by the requirements of the "Regulation for Environmental Classification and Licensing No. (69) of 2020". Annex 5 of the Regulation identifies requirements for siting of Project depending on activity. Point 52 (C) identifies the following for natural gas thermal power plants:

  - Must be located at least 500 m from the nearest house in a populated area and sensitive facilities. As noted within "Chapter 5.2" later, the closest house and/or sensitive facility in a populated area is AlFaa' which is 760 m from the Project site.
  - 100 m from the main highway. As noted within "Chapter 6.9.9" later, the closest highway is around 3.5 km from the Project site.
- Screening Decision / Environmental Assessment Requirement: As part of the same process, the Central Licensing Committee undertakes the environmental screening of the Project to determine whether it is subject to a formal environmental assessment procedure. "Regulation No. (69) of

2020" identifies the types of projects that require either a comprehensive Environmental Impact Assessment (EIA) or a Preliminary Environmental Impact Assessment (PEIA). Projects that may result in significant environmental impacts are classified as Category 1 projects and require the preparation of a comprehensive EIA prior to obtaining the required approval to begin construction or operation.

For this Project, MoEnv has completed the site approval and screening process and issued its official decision confirming the approval of the Project site and requiring the preparation of a comprehensive ESIA for the Project.

Step 2: ESIA Study and Environmental Permit

Following the completion of the site approval and screening process, the second step includes the preparation of the comprehensive ESIA study and obtaining the environmental clearance for the Project.

- Submission of Terms of Reference Report (ToR): A ToR report has been prepared and submitted to MoEnv for review and obtained approval. The ToR defines the proposed scope of the ESIA study, including the applicable legal framework, baseline conditions to be studied, key environmental and social issues to be assessed, and the methodology to be adopted during the ESIA.
- Preparation and Submission of the ESIA Study: Following approval of the ToR, the ESIA study is undertaken. This includes conducting the required environmental and social baseline studies, identifying and assessing potential impacts associated with the Project, and developing the ESMP for the construction, operation and decommissioning phases of the Project.
- Approval of the ESIA and Environmental Clearance: Upon submission of the ESIA study, the EIA Technical Committee at the MoEnv reviews the report and either approves the study and grants the environmental clearance for the Project, or rejects the Project if the study indicates that the Project would result in significant adverse environmental impacts that cannot be adequately avoided, reduced or managed. Environmental clearance from the MoEnv is required prior to issuance of the environmental permit for the Project.

The ToR has been approved by the MoEnv on 21 June 2026. The ESIA has subsequently been submitted to the MoEnv and is currently pending approval and issuance of environmental permit.

2.2 Jordan E&S Regulatory Context

The chapter below outlines the national institutions, national strategies, and overall legislative framework that is applicable for the Project.

2.2.1 Relevant National Institutions

Table 2 below summarizes the main responsibilities of the relevant governmental ministries and entities that are considered applicable for the Project.

Table 2: Key National Institutions Relevant to the Project

Responsibilities	Relevance to the Project
Ministry of Environment (MoEnv)	
▪ Maintain and improve the quality of the Jordanian Environment by sustaining and conserving Jordan's	▪ Regulate the environmental clearance process; which mainly consists of:

Responsibilities	Relevance to the Project
environmental resources and contributing to sustainable development. ▪ Set environmental protection legislation (protection of environmental resources including air quality, noise, soil protection, ecology protection, liquid effluents, etc.). ▪ The MoEnv is the governmental entity in charge of issuing environmental permits for different projects and developments. The MoEnv is responsible for the approval of the ESIA studies and ensuring their compliance with the "Environmental Classification & License Regulation and its Amendments No. 69/2020" and is also responsible for granting the environmental permit for the Project. ▪ Monitor and enforce compliance. ▪ Conserving the environment and its ecosystems through developing legal, strategic and policy frameworks in addition to spreading environmental culture and enhancing environmental monitoring and law enforcement and transition to a green economy within a participatory approach and a supporting institutional structure to contribute to achieving sustainable development.	- Approves the Project location and screening of environmental assessment requirements; - Requires undertaking an ESIA for the proposed Project. - Upon submission of the ESIA study, reviews and approves the study; and - Issues the environmental permit. ▪ Responsible for overall management of hazardous waste landfills. ▪ Responsible for overall management of areas of critical environmental concern.
Ministry of Energy and Mineral Resources (MEMR)	
▪ MEMR is the responsible authority of energy supply and services, as well as for the overall energy resources planning and monitoring, directly or through public companies that it owns. ▪ Development of national energy and electricity strategies, master plans, and sector policies. ▪ MEMR ensures that efficient management of power generation resources, grid integration, and the implementation of environmental protection and emissions control standards at energy developments. ▪ MEMR is also responsible, for long-term energy infrastructure planning, fuel supply security, and national grid monitoring. ▪ Provision of centralized energy-related data, standardization and consolidation of data. ▪ MEMR also carries out performance control through the Utilities Performance Monitoring Unit in order to secure work progress and implementation in accordance with the plans and agreements.	▪ Owner of the Project. ▪ Responsible for issuing and managing the detailed designs and tender and contracting of the awarded/selected Contractor.
Ministry of Water and Irrigation (MWI)/Water Authority Jordan (WAJ)	
▪ WAJ is the responsible authority of water supply and services, as well as for the overall water resources planning and monitoring, directly or through public companies that it owns. ▪ Development of national water strategies and policies. ▪ WAJ provides service recipients with drinking water, managing available water resources efficiently and protecting them from pollution, and for management of water developments. ▪ WAJ is also responsible, together with MWI, for	▪ Responsible for managing and securing water supply infrastructure to the Project. ▪ Responsible for setting strict standards for discharged water (if any) from the plant, and conducting regular water quality inspections.

Responsibilities	Relevance to the Project
water resource planning and monitoring. ▪ Provision of centralized water-related data, standardization and consolidation of data. ▪ WAJ also carries out performance control through the Utilities Performance Monitoring Unit in order to secure work progress and implementation in accordance with the plans and agreements.	
Ministry of Local Administration (MoLA) and Local Municipalities	
MoLA's Responsibilities: ▪ MoLA supervises all activities related to the local administrative issues of the municipal councils in terms of providing services and all regulatory issues, as well as the implementation of local development projects, and the coordination of the activities and plans of these councils, to be in line with developmental issues in the entire Kingdom. ▪ Categorize and manage land uses. ▪ Supervise municipal functions and service delivery ▪ Regulate solid waste management *Municipalities' Responsibilities:* ▪ Provide municipal services within their jurisdictions ▪ Operate solid waste management within their jurisdictions ▪ Joint services councils to manage transfer stations and landfills	▪ Responsible for municipal solid waste management. ▪ Monitor prevention of nuisances and compliance.
Ministry of Agriculture (MoA)	
▪ MoA is responsible for organizing the agricultural sector in line with the national goals to contribute to achieving sustainable rural development. ▪ Responsible for overall management of grazing reserves and forest areas and trees within the project area.	▪ Responsible for management and operations of grazing reserves ▪ To be consulted with given that the Project site is located within the Al Khanasri Grazing Reserve.
Ministry of Labor (MoL)	
▪ Achieving an active labor market with qualified and productive national employment in a stable and secure working environment through supervising labor and labor affairs and contributing to the organization of the Jordanian labor market.	▪ Overall responsibility for worker health and safety as well as proper working conditions.
Ministry of Health (MoH)	
▪ Protecting and maintaining public health as it offers preventive treatment and health services. It organizes and supervises health services offered by the public and private sectors as well as providing health insurance for the public within available means	▪ They provide the health services and facilities to the local districts and to the workers during the construction phase. Furthermore, MoH have overall responsibility for public health and safety.
Ministry of Interior (MoI)	
▪ The Ministry of Interior has evolved alongside Jordan's social and economic development, providing the administrative and legal framework for a modern state founded on the rule of law and respect for the rights of individuals and groups. ▪ Maintain national security, cooperate with civil society institutions, create the appropriate environment for investment, and assign Governors the role in the supervision and following-up of projects and development plans.	▪ Local governance and ensure stable development of the Project without local issues. ▪ MoI operates with Governorates within each area (Mafraq Governorate in the case of the Project)

Responsibilities	Relevance to the Project
▪ Regulate traffic and transport operations.	
Ministry of Public Works and Housing (MoPWH)	
▪ Responsible for connecting cities, villages, residential and economic areas, and neighboring countries with a high quality of roads network. Sustain and maintain the roads network in Jordan and raise the level of traffic safety on the roads. ▪ Develop the construction sector by using and applying the best available practices and modern technologies. ▪ Overall responsibility for implementing regulations aiming to maximize employment of local communities in development projects.	▪ The Project will have to take MoPWH requirements into account in relation to traffic and transport.
Department of Antiquities (DoA)	
▪ Responsible for the protection, conservation, and preservation of antiquities in Jordan. ▪ Responsible for the management, protection, maintenance, and preservation of archaeological sites and their preservation.	▪ Conduct site visit to the Project location to ensure no cultural heritage or archaeological sites/ remains exist within the Project site. ▪ Participate in implementation of chance find procedures as applicable.
Social Security Corporation (SSC)	
▪ Provide a comprehensive insurance system that includes a group of insurances aimed at protecting the worker against some risks that he/she may suffer.	▪ Requires employers during construction and operation to register all workers, pay contributions, and ensure coverage for workplace injuries, disability, maternity, unemployment, and retirement benefits.
Jordan Standards and Metrology Organization (JSMO)	
▪ Issues, approves, reviews, and monitors the implementation of standards and regulations regarding goods, products, and services. It established a national system of measurement and grants conformity certificates.	▪ Relevant standards applicable for air quality (ambient air quality and emissions from stationary sources), wastewater discharge, and drinking water quality.
Royal Society for Conservation of Nature (RSCN)	
▪ Enforce the Wildlife Protection Act through a special mandate from the MoA, and work closely with law enforcement agencies such as the environmental police unit (Rangers), to protect biodiversity. ▪ Protect and manage natural reserves, areas of critical environment concern, wilderness areas, etc. through a special mandate from the MoEnv. ▪ RSCN is also designated as the management and enforcement authority for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). ▪ Conduct research to provide a scientific base to aid conservation efforts. ▪ Run captive breeding programs and save several endangered species from extinction and reintroduce them into the wilderness. ▪ Promote public action for environmental protection through campaigns and activities.	▪ RSCN has the mission of protecting and managing wildlife, natural reserves, and any areas of critical environmental concern. ▪ BirdLife International's partner in Jordan

2.2.2 Relevant National Policies and Strategies

Table 3 below summarizes the key national policies and strategies relevant to the Project, that support environmental sustainability, climate adaption, resource efficiency (especially water and energy), aligned with the United Nations Sustainable Development Goals (UNSDGs), and apply to the Project.

Table 3: Key National Policies and Strategies Relevant to the Project

Policy/Strategy	Overview of Relevant Provisions
The Jordan Economic Modernization Vision (2022)	A ten-year national strategy that targets transforming Jordan's economy and improving the quality of life. It is mainstreamed into two pillars: ▪ Accelerated economic growth – Unleashing Jordan's full economic potential – Creating 1 million new jobs by 2033 – Increasing per capita income by 3% annually – Enhancing competitiveness and innovation ▪ Improved quality of life – Expanding access to services like health, education, and water – Promoting sustainability and environmental protection – Doubling citizen satisfaction with living standards to 80% There are more than 350 initiatives across 35 sectors, all of which focus on the green economy, smart infrastructure, future services, and sustainable resources. Implementation of these initiatives is planned to be undertaken from 2022 to 2033. Regular reviews and monitoring are undertaken to report progress and provide updates.
The National Water Strategy (2023 – 2040)	Sets long-term water management goals, including sustainability, resource protection, and efficient water use to tackle water scarcity driven by population growth, climate change, and dwindling traditional supplies. It focuses on building a resilient water sector through a unified approach to comprehensive, socially, economically, and environmentally viable development. Key targets include: ▪ Reducing non-revenue water (leakage/losses) by 2% annually, aiming for a 25% reduction by 2040; ▪ Increasing energy efficiency in water operations and expanding renewable energy use across water projects; ▪ Promoting non-conventional sources, notably large-scale desalination, and significantly boosting treated wastewater reuse, especially in agriculture and tourism; and ▪ Improving supply efficiency for domestic, industrial, agricultural, and tourism demands.
Jordan's Climate Change Policy	The Policy measures for climate adaptation, mitigation, and reducing greenhouse gas emissions. Sets a dual target: an "unconditional" target of 1.5% reduction of GHG emissions by 2030 compared to the business-as-usual scenario, and a "conditional" target of 12.5% reduction by 2030 if financial assistance by the international community is made available. The 2022 update of the Policy (published in 2024) focuses on providing a long-term vision through 2050 for a low-carbon, climate-resilient society aligned with Jordan's Economic Modernization Vision and the UNFCCC framework. The policy is strategic and principle-based, serving as an overall roadmap to address climate change across all national and sectoral strategies, rather than prescribing specific measures.
Jordan 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. ▪ Improving grid reliability and stability by maintaining a mandatory

Policy/Strategy	Overview of Relevant Provisions
	10% generation reserve ratio during peak loads, relying on highly efficient conventional thermal assets to supply crucial spinning and non-spinning reserves; and ▪ Transitioning to high-efficiency technologies by phasing out or decommissioning older, high-emission liquid fuel units as their contracts expire, replacing them with modern Combined Cycle Gas Turbine (CCGT) facilities.

2.2.3 *Relevant National Legislation*

The table below summarizes the key national legislation for each ministry/entity relevant to each of the E&S components that shall be studied and assessed within the ESIA. The key legislations and their applicability for the Project are discussed in further detail within the chapter that is relevant. For example, the key standards on ambient air quality and emission from stationary sources are discussed within the air quality chapter of the ESIA.

Table 4: Key National Legislations Relevant to the Project

E&S Attribute	Ministry / Authority	Legislation / Regulation
Climate	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Air Protection Regulation No. 28 of 2005 ▪ Environmental Classification & License Regulation and its Amendments No. 69/2020 ▪ Climate Change Regulation No. 79 of 2019
Landscape and Visual	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020
Land Use	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020
	MoLA / Local Municipalities	▪ Regulation of Land Use for Projects Outside of Organized Boundaries for the year 2026
	MoA	▪ Agriculture Law No.13 of 2015 ▪ Instructions for Agricultural Land Protection No. 11 of 2022
Air Quality and Noise	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Air Protection Regulation No. 28 of 2005 ▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020 ▪ Instruction for Reduction and Prevention of Noise for 2003
	MEMR	▪ Energy and Minerals Regulatory Commission Law No. 8 of 2017
	JSMO	▪ JS 1140 Ambient Air Quality of 2024 ▪ JS 1189 Maximum Allowable Limits of Air Pollutants Emitted from Stationary Sources for the year 2006 ▪ Motor Vehicles - Emissions - JS 1052:1998 ▪ Motor Vehicles – Emissions (Diesel engines) – JS 1053:1998 ▪ Motor Vehicles – Emissions – Diesel engines – JS 1054:1998
Geology, Hydrology and Hydrogeology	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Waste Management Framework Law No. 16 of 2020 ▪ Non-Hazardous Solid Waste Management Regulation No. 44 of 2022 ▪ Hazardous Materials and Wastes Management Regulation No. 68 of 2020 ▪ Soil Protection Regulation No. 25 of 2005 ▪ Environmental Protection from Pollution in Emergencies

		Regulation No. 26 of 2005 ▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020 ▪ Instructions for Hazardous Waste Management and Handling of 2019 ▪ Instruction for Management and Handling of Consumed Mineral Oils for 2014
	MEMR	▪ Natural Resources Affairs Law No. 19 of 2018
	MWI/ WAJ	▪ Water Authority Law No. 18 of 1988 and its amendments ▪ Groundwater Control Regulation No. 85 of 2002 and its amendments ▪ Protection of Water Resources Instructions of 2025 ▪ Instructions and Conditions of Using Wastewater, Treated Effluent, Salt Water, and Brackish Water for Irrigation No. 16 (Z) of 2022
	MoH	▪ Public Health Law No. 47 of 2008
	JSMO	▪ Water- Drinking Water – JS 286:2015 ▪ Jordanian Standard 431/1985 – General Precautionary Requirements for Storage of Hazardous Materials ▪ Water – Reclaimed Domestic Wastewater – JS 893:2021 ▪ Water – Industrial Reclaimed Wastewater – JS 202:2007
Infrastructure and Utilities	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Waste Management Framework Law No. 16 of 2020 ▪ Non-Hazardous Solid Waste Management Regulation No. 44 of 2022 ▪ Hazardous Materials and Wastes Management Regulation No. 68 of 2020 ▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020 ▪ Instructions for Hazardous Waste Management and Handling of 2019 ▪ Instruction for Management and Handling of Consumed Mineral Oils for 2014
	MEMR	▪ General Electricity Law No. 10 of 2025 ▪ Energy and Minerals Regulatory Commission Law No. 8 of 2017 ▪ Natural Resources Affairs Law No. 19 of 2018
	MWI/ WAJ	▪ Water Authority Law No. 18 of 1988 and its amendments ▪ Groundwater Control Regulation No. 85 of 2002 ▪ Sewage System Regulation No. 66 of 1994 ▪ Protection of Water Resources Instructions of 2025 ▪ Discharge of Non-Domestic Wastewater to the Sewage System Instructions of 2017
	MoLA / Local Municipalities	▪ Municipalities Law No. 41 of 2015 ▪ Health Nuisances Prevention & Waste Collection Fees within Boundaries of Municipalities Regulation No. 68 of 2016
	MoI	▪ Traffic Law No. 49 of 2008 ▪ Driver's Licensing Regulation No. 101 of 2008 ▪ Regulation for Maximum Dimensions, Weights, and Total Engine Power for Vehicles No. 30 of 2016 ▪ Instructions for Allowable Speed Limits for 2022
Community Health, Safety, and Security	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Air Protection Regulation No. 28 of 2005 ▪ Climate Change Regulation No. 79 of 2019 ▪ Environmental Protection from Pollution in Emergencies Regulation No. 26 of 2005 ▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020

		▪ Instruction for Reduction and Prevention of Noise of 2003
	MEMR	▪ General Electricity Law No. 10 of 2025 ▪ Energy and Minerals Regulatory Commission Law No. 8 of 2017
	MWI/ WAJ	▪ Water Authority Law No. 18 of 1988 and its amendments ▪ Groundwater Control Regulation No. 85 of 2002 ▪ Protection of Water Resources Instructions of 2025
	MoH	▪ Public Health Law No. 47 of 2008
	JSMO	▪ Water- Drinking Water – JS 286:2015 ▪ JS 1140 Ambient Air Quality of 2024 ▪ JS 1189 Maximum Allowable Limits of Air Pollutants Emitted from Stationary Sources for the year 2006 ▪ Storage and Handling of Liquified Petroleum and Flammable Gases – JS 2167:2015
Occupational Health and Safety	MoEnv	▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020
	MEMR	▪ General Electricity Law No. 10 of 2025 ▪ Energy and Minerals Regulatory Commission Law No. 8 of 2017
	MoL	▪ Jordan Labor Law No. 8 for the year 1996 and its Amendments ▪ Regulation No. 31 of 2023 Occupational Safety and Health and the Prevention of Occupational Hazards in Institutions. ▪ Regulation No. (32) of Preventive and curative medical care system for workers in institutions of the year 2023. ▪ Regulation No. 42 of 1998 on Preventive and Curative Medical Care for Workers in Institutions. ▪ Decision on the Level and Directions for Training Occupational Safety and Health Supervisors in Institutions for the Year 2014. ▪ Decision to approve the occupational safety and health policy model for the employer who employs twenty or more workers for the year 2024. ▪ Decision to approve the forms for the record of reporting work accidents and injuries and the record of reporting occupational diseases for the year 2024. ▪ Decision regarding occupational safety and health records that the worker's employer must keep for the year 2024. ▪ Amending Labor Law No. (26) of 2010 Regarding the Rights and Protection of Non-Jordanian Workers. ▪ A decision regarding medical aid means and equipment for workers in the institution for the year 2024. ▪ A decision regarding occupational safety and health records that the employer must maintain for the year 2024. ▪ Regulations for forming occupational safety and health committees and appointing supervisors in institutions No. (33) of 2023. ▪ Regulation of the Formation of Occupational Safety and Health Committees and the Appointment of Supervisors in Institutions for the Year 2023. ▪ Instructions for the prevention of health hazards related to health damages resulting from residential units for workers' gatherings No. (1) of 2013. ▪ Instructions for Identifying Types of Occupational Hazard Sources in the Work Environment and the Necessary Precautions and Measures for Their Prevention for 2023.
	MoH	▪ Public Health Law No. 47 of 2008 ▪ Crafts and Industries Law 16 of 1953 and its amendments thereof ▪ Instructions for Prevention of Health Nuisances from Workers Accommodation No. (1) for the year 2013
	SSC	▪ Social Security Law No. 1 of 2014 and its amendments

		▪ Insurance benefits regulation for the Social Security Corporation No. 14 for the year 2015 and its amendments ▪ Instructions for Occupational Safety and Health of the Social Security Corporation of 2011
	JSMO	▪ Water- Drinking Water – JS 286:2015 ▪ Fire prevention in use of cutting and welding processes - JS 1810:2008 ▪ Textiles – Protective clothing for use against heat and fire – Assessment of materials when exposed to a source of radiant heat – JS 1049:1996 ▪ Safety requirements – Safety of machinery – Safety distances - JS 1048:1996 ▪ Specification for industrial safety helmets – JS 136:2009 ▪ PPE – Safety Shoes / Professional Shoes / Protective Shoes – JS 1909/1920/1919:2022 ▪ Light and Lighting – Lighting of workplaces – Part 1: Indoor workplaces – JS 2253-1:2020 ▪ Light and Lighting – Lighting of workplaces – Part 2: Outdoor workplaces – JS 2253-2:2020 ▪ Emergency Lighting – JS 2259:2019 ▪ Graphical symbols - Safety colors and safety signs Part 1: Design principles for safety signs and safety markings - JS 17-1: 2021. ▪ Graphical symbols - Safety colors and safety signs Part 3: Design principles for graphical symbols for use in safety signs - JS 17-3: 2021. ▪ Graphical symbols - Safety colors and safety signs Part 4: Colorimetric and photometric properties of safety sign Materials - JS 17-4: 2021.
Biodiversity	MoEnv	▪ Environmental Protection Law No. 6 of 2017 ▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020 ▪ Natural Protected Areas and National Parks Regulation No. 29 of 2005
	MoA	▪ Agriculture Law No. 13 of 2015 ▪ Classification of Birds and Wild Animal Species Forbidden from Hunting with Reference to the Level of their Protection Regulation No. 43 of 2008 ▪ Instructions of Protecting wild birds and animals and regulating their hunting and trade No. 2 (Z) of 2021.
Archaeology and Cultural Heritage	MoEnv	▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020
	DoA	▪ Antiquities Law No. (21) of 1988 and its amendments
Socio-economic	MoEnv	▪ Environmental Classification & License Regulation and its Amendments No. 69 of 2020
	MoL	▪ Resolution for Increasing Opportunities for Empowering Jordanian Women and Raising their Economic Participation Rate in the Jordanian Labor Market of 2018
	MoPWH	▪ Regulation for Obligatory Employment of Jordanian Workforce from Surrounding Communities in Construction Projects No. (131) of 2016

2.3 International Agreements

GoJ is a signatory to a number of international agreements that are relevant to the environmental and social topics addressed in this ESIA. These agreements cover a range of issues, including biodiversity

conservation, protection of flora and fauna, climate change, cultural heritage, labor rights, pollution prevention, and the protection of human health and the environment.

Jordan has incorporated many of the principles and requirements of these agreements into national legislation and regulatory frameworks. Accordingly, the international agreements to which Jordan is a party form an important part of the legal and policy framework within which the Project will be developed and operated.

The key international treaties and obligations relevant to the Project are summarized below.

International Agreements on Biodiversity, Flora and Fauna

- **Convention on Biological Diversity (1993)** - signed by Jordan in 1993. Under this agreement, signatories are required to develop plans and policies for the protection and monitoring of biodiversity and to integrate these into national plans for development.
- **Convention on Migratory Species (1979)** - signed by Jordan in 2000. Signatories are required to protect migratory species throughout the migration range through coordinated efforts and research.
- **Agreement on the Conservation of African-Eurasian Migratory Waterbirds (1995)** - came into force in 1999 when ratified by at least fourteen Range States, comprising seven from Africa and seven from Eurasia. The Agreement covers 255 species of birds ecologically dependent on wetlands for at least part of their annual cycle.
- **CITES Convention (1973)** - the objective of this convention is to save many and varied forms of wild fauna and flora by regulating the trade in specimens of species of wild fauna and flora.
- **International Plant Protection Convention (1970)** - the objective of this convention is to prevent the international spread of pests and plant diseases.
- **United Nations (UN) Convention to Combat Desertification (1994)** - the objective is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification through effective action at all levels; and
- **Stockholm Convention on Persistent Organic Pollutants (POP) (2004)** - the objective of this Convention is to protect human health and the environment from persistent organic pollutants.

International Agreements on Energy and Climate Change

- **UN Framework Convention on Climate Change (UNFCCC) 1992** - the UNFCCC was established to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable, aiming to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
- **Kyoto Protocol to the UN Framework Convention on Climate Change (1997)** - establishes a legally binding commitment for the reduction of four greenhouse gases produced by industrialized nations, as well as general commitments for all member countries: and
- **United Nations Environment Programme (UNEP) Montreal Protocol on Substances that Deplete the Ozone Layer (1987)** - an international treaty designed to protect the ozone layer by phasing out the production of several substances believed to be responsible for ozone depletion.

International Agreements on Cultural Heritage

- **Convention Concerning the Protection of the World Cultural and Natural Heritage, (World**

Heritage Convention, 1972) - the primary mission of the Convention is to identify and protect the world's natural and cultural heritage considered to be of outstanding universal value.

Obligations Relating to Membership of the International Labour Organization (ILO)

- C29 Forced Labour Convention, 1930 (No.29) ratified 06:06:1966
- C81 Labour Inspection Convention, 1947 (No. 81) ratified 27:03:1969
- C98 Right to Organize and Collective Bargaining Convention, 1949 (No.98) ratified 12:12:1968
- C100 Equal Remuneration Convention, 1951 (No.100) ratified 22:09:1966
- C105 Abolition of Forced Labour Convention, 1957 (No.105) ratified 31:03:1958
- C106 Weekly Rest (Commerce and Offices) Convention, 1957 (No.106) ratified 23:07:1979
- C116 Final Articles Revision Convention, 1961 (No.116) ratified 04:07:1963
- C117 Social Policy (Basic Aims and Standards) Convention, 1962 (No. 117) ratified 07:03:1963
- C118 Equality of Treatment (Social Security) Convention, 1962 (No. 118) ratified 07:03:1963
- C119 Guarding of Machinery Convention, 1963 (No.119) ratified 04:05:1964
- C120 Hygiene (Commerce and Offices) Convention, 1964 (No. 120) ratified 11:03:1965
- C122 Employment Policy Convention, 1964 (No. 122) ratified 10:03:1966
- C124 Medical Examination of Young Persons Convention, 1965 (No.124) ratified 06:06:1966
- C135 Workers' Representatives Convention, 1971 (No.135) ratified 23:07:1979
- C142 Human Resources Development Convention, 1975 (No.142) ratified 23:07:1979
- C144 Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144) ratified 5:08:2003
- C147 Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147) ratified 01:04:2004
- C150 Labour Administration Convention, 1978 (No. 150) ratified 10:07:2003
- C159 Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983 (No. 159) ratified 13:05:2003
- C185 Seafarers Identity Documents Convention (Revised), 2003 (No. 185) ratified 09:08:2004
- C111 Discrimination (Employment and Occupation) Convention, 1958 (No. 111) ratified 04:07:1963
- C138 Minimum Age Convention, 1973 (No. 138) — minimum age specified at 16 years, ratified 23:03:1998
- C182 Worst Forms of Child Labour Convention, 1999 (No.182) ratified 20:04:2000

2.4 Requirements for Project Financing

The Project will be seeking financing from International Financing Institutions (IFIs). Therefore, the Developer wishes to design and manage the project in accordance with international E&S standards

and requirements. For the ESIA, it will be based on the requirements of the following entities, each of which is discussed in further details below:

- International Finance Corporation (IFC); and
- Asian Infrastructure Investment Bank (AIIB).

2.4.1 International Finance Corporation (IFC)

The IFC of the World Bank provides a range of guidance documents related to the assessment and management of E&S issues in project development. Not only does IFC guidance provide a generally accepted basis for good practice, but it also provides the technical cornerstone for the Equator Principles which set out the E&S requirements of banks for project finance. The IFC requirements have become the *de facto* international E&S performance benchmark for project financing.

The IFC policy on E&S Sustainability puts into practice IFC's overall commitments to E&S sustainability. The policy seeks to: (i) enhance the predictability, transparency, and accountability of IFC's actions and decision making; (ii) help clients manage their environmental and social risks and impacts and improve their performance; and (iii) enhance positive development outcomes on the ground. In addition, the Policy identifies IFC's commitments, its roles and responsibilities and other as applicable.

The IFC Performance Standards (PS) on Social and Environmental Sustainability set out a framework for managing and improving project performance from planning and assessment, through construction and operations to closure. The Performance Standards requirements are summarized in Table 5 below.

Table 5: IFC Performance Standard Requirements

IFC PS	Key Points	Applicability for ESIA
PS 1: Assessment and Management of Environmental and Social Risks and Impacts	PS1 underscores the importance of managing social and environmental performance throughout the life of a project by using a dynamic social and environmental management system. Specific objectives of this Performance Standard are: ▪ To identify and assess social and environmental impacts, both adverse and beneficial, in the project's area of influence; ▪ To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment; ▪ To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and ▪ To promote improved social and environmental performance of companies through the effective use of management systems.	Applicable and considered for this ESIA
PS 2: Labor and Working Conditions	The requirements set out in the PS have been in part guided by a number of international conventions negotiated through the International Labour Organization (ILO) and the United Nations (UN). Specific objectives of this Performance Standard are: ▪ To establish, maintain and improve the worker-management relationship; ▪ To promote the fair treatment, non-discrimination and equal opportunity of workers and compliance with national labor and employment laws; ▪ To protect the workforce by addressing child labor and forced labor; and ▪ To promote safe and healthy working conditions, and to protect and promote the health of workers.	Applicable and considered for this ESIA

PS 3: Resource Efficiency and Pollution Prevention	This Performance Standard outlines a project approach to pollution prevention and abatement in line with international available technologies and practices. It promotes the private sector's ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources. Specific objectives of this Performance Standard are: ▪ To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and ▪ To promote the reduction of emissions that contribute to climate change.	Applicable and considered for this ESIA
PS 4: Community Health, Safety and Security	This PS recognizes that project activities, equipment, and infrastructure often bring benefits to communities including employment, services, and opportunities for economic development. However, projects can also increase risks arising from accidents, releases of hazardous materials, exposure to diseases, and the use of security personnel. While acknowledging the public authorities' role in promoting the health, safety and security of the public, this PS addresses the project sponsor's responsibility in respect of community health, safety and security.	Applicable and considered for this ESIA
PS 5: Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical and economic displacement as a result of project-related land acquisition. Where involuntary resettlement is unavoidable, appropriate measures to mitigate adverse impacts on displaced persons and host communities should be carefully planned and implemented.	Applicable and considered for this ESIA.
PS 6: Biodiversity Conservation and Sustainable Management Of Living Natural Resources	This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the use of renewable natural resources in a sustainable manner. This Performance Standard addresses how project sponsors can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources. Specific objectives of this Performance Standard are: ▪ To protect and conserve biodiversity; and ▪ To promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.	Applicable and considered for this ESIA
PS 7: Indigenous Peoples	Indigenous peoples may be particularly vulnerable to the adverse impacts associated with project development, including risk of impoverishment and loss of identity, culture, and natural resource-based livelihoods. PS7 seeks to ensure that business activities minimize negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways. PS 7 (Indigenous Peoples) is not considered to be applicable to this Project. The Indigenous World 2018 Report (IWGIA, 2018) states that Jordan is not classified as a country with indigenous people.	Not applicable.
PS 8: Cultural Heritage	Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to protect irreplaceable cultural heritage and to guide project sponsors on protecting cultural heritage in the course of their business operations.	Applicable and considered for this ESIA

In addition, to the Performance Standards, the IFC have sector-specific EHS guideline documents. With regards to the ESIA the following are applicable:

- IFC General EHS Guidelines (2007): identifies detailed EHS management and technical recommendations which are applicable for all development projects; and

- EHS Guidelines for Thermal Power Plants (IFC, 2008*):* Provide guidance and information to users on EHS issues related to thermal power plants. The Guideline provides a summary of EHS impacts associated with thermal power plant facilities along with recommendations for their management as well as performance indicators and monitoring programs for environmental, occupational health and safety and community health and safety. Where relevant, the requirements of this guideline are reiterated clearly in subsequent chapters that discuss the environmental attributes they relate to where national legislation is not available.

- EHS Guidelines for Electric Power Transmission and Distribution (IFC, 2007): Provide guidance and information to users on EHS issues related to transmission and distribution lines. The Guideline provides a summary of EHS impacts associated with transmission and distribution lines along with recommendations for their management as well as performance indicators and monitoring programs for environmental, occupational health and safety and community health and safety. Where relevant, the requirements of this guideline are reiterated clearly in subsequent chapters that discuss the environmental attributes they relate to where national legislation is not available.

2.4.2 Asian Infrastructure Investment Bank (AIIB)

AIIB also sets out E&S requirements that apply to AIIB-financed projects. AIIB is a multilateral financial institution established to foster sustainable economic development, create wealth and improve infrastructure connectivity in Asia, while promoting regional cooperation through collaboration with other multilateral and bilateral development institutions. Under its Articles of Agreement, AIIB must conduct its operations in accordance with policies addressing E&S impacts.

AIIB has established an Environmental and Social Framework (ESF) that defines the E&S requirements for AIIB-financed projects. The ESF consists of the Environmental and Social Policy (ESP), three (3) Environmental and Social Standards (ESSs), and an Environmental and Social Exclusion List (ESEL). The ESF replaced the May 2021 version and became effective on 22 November 2022, with a further revised ESF entering into effect on 26 June 2024. The ESP contains the mandatory E&S requirements for all projects and is supported by ESSs and the ESEL, which defines activities that AIIB will not finance and that Developers must exclude from the Project.

The three ESSs cover the following areas:

- ESS 1 Environmental and Social Assessment and Management: applies to projects that may generate adverse environmental or social risks or impacts and requires Developers to undertake environmental and social assessment proportional to risks and to implement measures to avoid, minimize, mitigate, offset or compensate for impacts. This is considered applicable for the Project and has been considered within the ESIA.

- ESS 2 Land Acquisition and Involuntary Resettlement: applies where projects may involve Involuntary Resettlement and requires Developers to avoid it where feasible and, when unavoidable, minimize displacement and restore or improve the livelihoods of affected persons through appropriate planning instruments. This is considered applicable for the Project and has been considered within the ESIA.

- ESS 3 Indigenous Peoples: applies when projects may affect Indigenous Peoples as defined under the ESF and requires Developers to prepare and implement measures to avoid or mitigate adverse impacts and enhance benefits, where applicable. This is not considered applicable.

AIIB also requires meaningful stakeholder engagement, accessible grievance mechanisms, monitoring and reporting throughout the project lifecycle, and allows for reliance on co-financier or host country

systems where these are materially consistent with the ESF. This positions AIIB's requirements in alignment with good international industry practice for E&S risk management.

2.4.3 Guidelines and Good Practice

There are additional guidelines and good practices that were considered throughout the ESIA study. Those are identified in Table 6 below along with their applicability.

Table 6: Other International E&S Requirements and Standards

Guidelines and Good Practice	Applicability for ESIA
IFC Good Practice Note – Addressing Grievances from Project-Affected Communities & IFC Good Practice Manual – Doing Better Business Through Effective Public Consultation and Disclosure	Those identify additional requirements that should be considered and taken into account as part of the planned stakeholder engagement activities as well as the SEP that is provided as a standalone document.
IFC Good Practice Note: A Good Practice Handbook for Companies Doing Business in Emerging Markets	The note identifies key concepts and principles of stakeholder engagement and how to integrate stakeholder engagement with the project cycle. This has been considered for the SEP that is provided as a standalone document.
EBRD and IFC Guidance Note on Worker's accommodation	Identify key issues of concern that should be addressed as well as best practice requirements to be taken into account in relation to worker accommodation
▪ IFC Good Practice Note on Non-Discrimination and Equal Opportunity ▪ IFC Good Practice Note – Managing Retrenchment ▪ IFC Handbook for Labor and Working Conditions - Measure & Improve Your Labor Standards Performance ▪ IFC Projects and People: Handbook for Addressing Project Induced In-Migration ▪ Good Practice Note: Managing Contractors' Environmental and Social Performance ▪ Good Practice Note: Managing Risks Associated with Modern Slavery ▪ International Labour Organization (ILO) Conventions. This will include all ILO conventions signed and ratified by the Government of Jordan and at a minimum all ILO conventions covering core labour standards and all ILO conventions covering the basic terms and conditions of employment	Those are related to workforce management as applicable within the ESIA and associated management plans.
Good Practice Note (GPN) IFC's Use of Security Forces: Assessing and Managing Risks and Impacts	The handbook provides practical, project-level guidance for companies to better understand and implement the requirements outlined in PS 4. Chapters focus on risk assessment, managing private security, managing the relationship with public security, preparing a security management plan, and assessing allegations or incidents related to security personnel.
UN Voluntary Principles on Security and Human Rights	Promotes implementation of a set of principles on providing security for their operations in a manner that respects human rights
Addressing Gender-Based Violence and	The note addresses the physical, sexual, emotional and

Harassment (GBVH): Emerging Good Practice for the Private Sector	financial harm GBVH causes to individuals, as well as the financial, reputational and legal risks it poses to businesses and investors
IFC Good Practice Note on Child Safeguarding in the Private Sector (2026)	The note identifies risks, industry specific factors, and corporate actions required to manage, prevent harm, exploitation, or abuse of children within project operations and supply chains. It is applicable for assessing workforce and community interactions, constructing specialized codes of conduct, and embedding child protection safeguards directly into the ESMPs.

3. ESIA APPROACH AND METHODOLOGY

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

3.1 Analysis of Alternatives

The examination of alternatives is considered to be a key element of the ESIA process under good international practice, including the IFC PS 1.

The analysis of alternatives is presented in "Chapter 4". The chapter discusses and compares several alternatives to the Project development in relation to: (i) the Project site, (ii) the Project design, and (iii) the 'no-action alternative' - which assumes that the Project development does not take place.

3.2 Stakeholder Consultation and Engagement

Stakeholder consultation and engagement is an essential part of the ESIA process and has been carried out in accordance with the regulatory requirements in Jordan and the international E&S standards and requirements. The previous and future stakeholder consultation and engagement for the Project are summarized below and discussed in detail in "Chapter 7".

To date, the Project has included extensive stakeholder consultation and engagement with various stakeholder groups such as national governmental entities, regional and local governmental entities, Non-Governmental Organizations (NGOs), local communities, and others as appropriate. This has been undertaken through bi-lateral meetings, Focus Group Discussions (FGD), e-mail communication, phone communication, formal letters, and other means.

"Chapter 7" also discusses future stakeholder engagement and consultations, which are to take place at a later stage. This mainly includes: (i) disclosure of Project documentation on the Developer's website; (ii) distribution of Project documentation at key local community platforms; and (iii) implementation of the Stakeholder Engagement Plan (SEP) by the Developer, which describes the planned stakeholder consultation activities and the engagement process to take place after the ESIA approval.

3.3 Delineation of Study Boundaries and Scope of Assessment

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

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

Definition of Spatial Study Area

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

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

The AoI (or study area) has been identified using a qualitative and semi-quantitative approach, taking into account the Project footprint, associated facilities, nearby receptors, expected construction and operational activities, and the likely extent of potential impacts.

An area of 5 km radius, encompassing the Project site, the gas pipeline tie-in and the expected extent of the water pipeline tie-in was defined based on professional judgmentjudgment and experience for similar projects and also informed by the worst-case potential extent of possible noise and air quality impacts (anticipated to be the key impact associated with the Project). For noise, propagation over long distances is generally limited, and beyond 5 km Project-related noise levels are expected to be substantially attenuated and unlikely to result in measurable impacts at sensitive receptors.

For air quality, the highest ground-level pollutant concentrations are typically expected relatively close to the emission sources. Based on experience from similar projects, maximum concentrations generally occur within a few kilometers of the source and are unlikely to extend beyond 5 km under normal operating conditions.

This is further supported by preliminary screening assessments undertaken under conservative meteorological conditions, which indicate that maximum predicted concentrations are expected to occur approximately 1–2 km from the source, with concentrations decreasing by more than 50% within 5 km. Therefore, a 5 km radius is considered conservative and technically justified for identifying receptors that may be affected by Project-related noise and air emissions.

The study area also includes the OHTL that has a total length of 6.8 km. The main components of the OHTL are the transmission towers which will transport electricity to the High Voltage National Grid. Refer to “Chapter 5.3.5” for additional details.

The study area as shown in Figure 2 is intended to encompass the areas surrounding the Project that may be affected by construction and operation activities, including nearby communities, scattered dwellings, land users, grazing areas, road users, utilities and sensitive environmental receptors such as the shallow wadi within the Project site and areas within the Project site noted as supporting relatively higher vegetation cover.

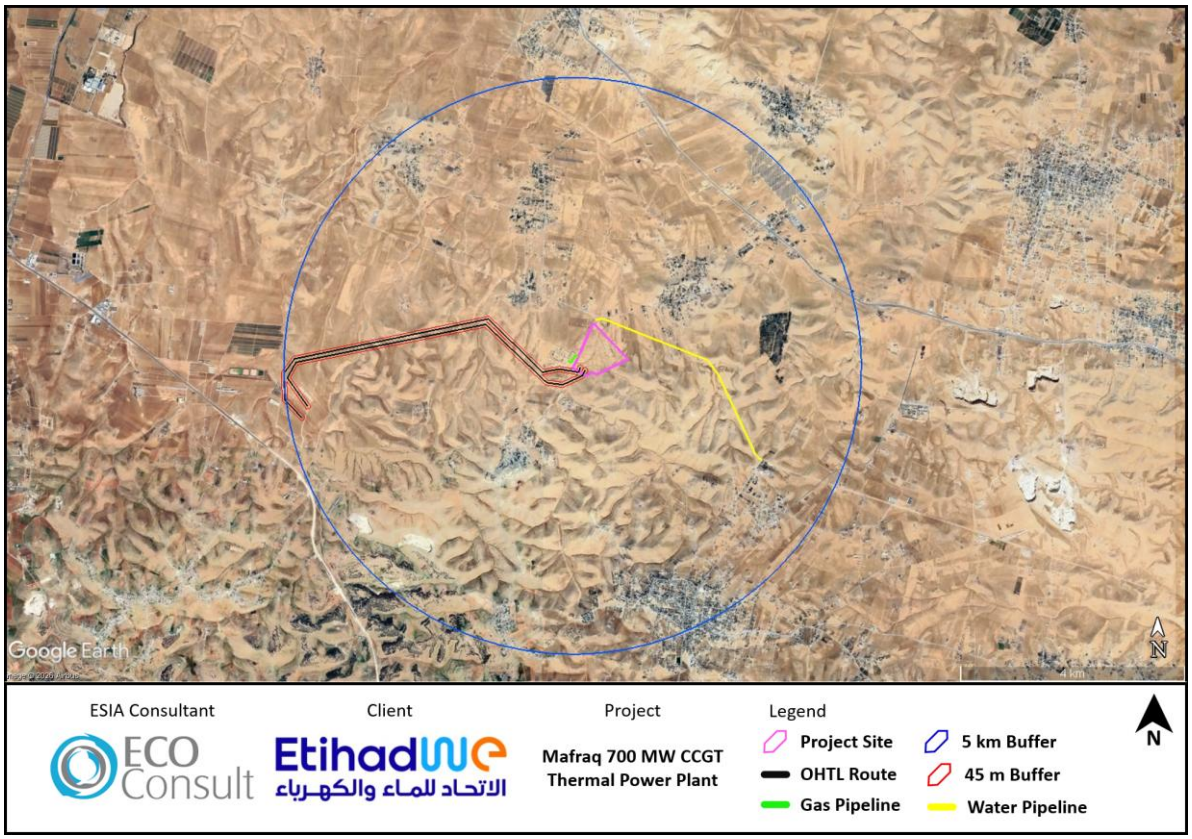


Figure 2: Study Area

3.3.2 *Temporal Scope of the Assessment*

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

- Planning and Construction Phase;
- Operation Phase; and
- Decommissioning Phase.

(i) Planning and Construction Phase

This includes onsite construction activities, which will be undertaken by the EPC Contractors under the supervision of the Developer. This mainly includes preparing the detailed design and layout, transportation of Project components to the site, construction of the substation, as well as site preparation and construction activities for installation of the CCGT plant and associated facilities.

(ii) Operation Phase

This includes activities to be undertaken by the Project Operator. Activities expected to take place mainly include the normal daily operation of the Project and the routine maintenance activities.

(iii) Decommissioning Phase

Generally, the anticipated impacts throughout the decommissioning phase are similar in nature to impacts assessed during the construction phase – specifically impacts related to soil and groundwater (from improper management of waste streams), air quality and noise, and occupational health and safety. Therefore, the assessment of impacts for those receptors and mitigation identified during the construction phase is assumed to apply to this phase in particular without the need to reiterate or emphasize this throughout subsequent chapters.

3.3.3 Environmental and Social Baseline Conditions

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

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

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

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

Studies of the environment and social baseline are described in “Chapter6” and include the following: landscape and visual; land use; geology/hydrology/hydrogeology; biodiversity, archaeology and cultural heritage; air quality and noise; infrastructure and utilities; and socioeconomic conditions. Within each chapter, the methodology which was undertaken for assessment of each of those baseline conditions is described in detail.

3.4 Impact Assessment Methodology

Given the scale and type of the Project, the ESIA commences with an assessment of the positive environmental and economic impacts on the strategic and national level given the current challenges the energy sector in Jordan faces – as highlighted in “Chapter 1.2 ”.

“Chapter 0” provides a description of the approach, methodology and process adopted for the impact assessment presented within this ESIA. Following the environmental and social baseline in “Chapter6” Studies of the environment and social baseline, it then moves forward into the main body of the ESIA undertaking the assessment of impacts on environmental and social parameters for each receptor under the relevant chapter, in “Chapter 9”.

3.4.1 Approach to Assessment of Impacts

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

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

In order to determine the significance of each impact, two overall factors are considered:

- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions; and
- Magnitude and Nature of the impact.

3.4.2 Sensitivity of the Receiving Parameter

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

- High: The E&S parameter/receptor is of significant importance/value or vulnerable, and an impact is likely to leave it in an altered state from which recovery would be difficult or impossible.
- Medium: The parameter/receptor is of moderate importance/value, has a degree of adaptability and resilience and is likely to cope with the changes caused by an impact, although there may be some residual modification as a result; and
- Low: The parameter/receptor is of low or no importance/value, is adaptable and is resilient to change.

In determining the receptor sensitivity, it is important to take into account the following:

- Importance / Value: extent to which a receptor is valued or protected, with higher value receptors having a higher sensitivity
- Vulnerability: extent to which a receptor is vulnerable to change and seasonal variability
- Resilience: the extent to which a receptor can recover from an impact

3.4.3 Magnitude of Effect

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

- High: a significant change compared to variations in the baseline; potentially a clear breach of regulatory thresholds.
- Medium: a moderate change compared to the baseline, which may be noticeable and may breach regulatory thresholds; and
- Low: a minor change compared with the baseline, change which may only just be noticeable. Regulatory thresholds would not be exceeded.

For impacts resulting from accidental events, determination of the magnitude of the impact takes into account the likelihood of such accidental event. Furthermore, in determining the magnitude of the impact it is important to take into account and consider several other factors which define the nature of the impact. This includes the following:

Type of Impact

- Positive: applies to impacts that have a beneficial E&S effect, such as enhancement of conditions; and
- Negative: applies to impacts that have an adverse effect such as loss or degradation of environmental resources.

Type of Effect

- Direct: applies to impacts which result from a direct interaction between a planned project activity and an E&S receptor (e.g. generation of dust directly impacts air quality); and
- Indirect: applies to impacts which are subsequent to a particular direct impact on a certain E&S receptor (e.g. high levels of dust could affect occupational health and safety).

Duration (how long the stressor or its effect last)

- Short Term: applies to impacts whose effects on the E&S receptor will discontinue to manifest within a 1-year period, or once the planned Project activity ceases.
- Medium Term: applies to impacts whose effects on the E&S receptor will discontinue to manifest within a 5-year period; and
- Long Term: applies to impacts whose effects on the E&S receptor will continue to manifest beyond a 5-year period.

Reversibility

- Reversible: applies to impacts whose effect will reduce and/or discontinue over time (either naturally or artificially), once the project activity ceases; and
- Irreversible: applies to impacts whose effect will not reduce nor discontinue over time (either naturally or artificially), once the project activity ceases.

3.4.4 Assessing the Significance of the Impacts

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

Table 7: Determination of Significance

Sensitivity of Receiving Parameter/Receptor \ Magnitude of Impact	Low	Medium	High
Low	Negligible	Minor	Moderate
Medium	Minor	Moderate	Moderate
High	Minor	Moderate	Major

While the above matrix provides a framework for the determination of significance, and enables comparison across E&S parameters, a degree of professional judgment must be used and some parameter-specific factors must be considered in making the determination of significance. Additional guidance on the degrees of significance used in this ESIA is provided below, noting that positive impacts are defined but are not rated for significance.

- *Major*: Based on the above methodology such impacts result in high magnitude and affect receptors that are highly sensitive. These are impacts that are considered to have potentially significant and adverse effects and will be a key factor in the overall decision-making process of the Project. In addition, they will also require detailed considerations for mitigation and monitoring measures.

- *Moderate*: Based on the above methodology such impacts either (i) result in medium magnitude and affect receptors that are of medium or high sensitivity; or (ii) result in high magnitude and affect receptors that are of medium sensitivity; or (iii) result in high magnitude and affect receptors that are of low sensitivity. Those are impacts that are considered to have potentially limited adverse effects and are unlikely to have a significant role on the overall decision-making process. In addition, mitigation and monitoring measures require some consideration.

- *Minor*: Based on the above methodology such impacts either: (i) result in low magnitude and affect receptors that are of medium or high sensitivity; or (ii) result in medium magnitude and affect receptors that are of low sensitivity. Those are impacts that are considered to have minimal effects and are unlikely to be of importance for the overall decision-making process. In addition, mitigation and monitoring measures are readily available to address such risks; and

- *Negligible*: Based on the above methodology such impacts result in low magnitude and affect receptors that are of low sensitivity. Such impacts are not expected to cause any noticeable change to the baseline conditions or to receptor conditions and do not require any mitigation or monitoring measures.

It is important to note that major impacts are considered 'Significant Impacts', while minor and moderate impacts will be considered 'Not Significant'.

3.4.5 Management Measures

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

- *Additional Requirements*: those are generally regulatory requirements which have been identified and which must be taken into account at a later stage;

- *Additional Studies*: for certain E&S receptors additional studies must be undertaken at a later stage. Such studies and their scope, timing, etc. have been highlighted where relevant;

- *Mitigation Measures*: a vital step in the ESIA process is the identification of measures that can be taken to ensure that impacts are mitigated or reduced to acceptable levels. The ESIA will firstly

consider the significance of any impacts caused by the Project and then assigned mitigation options through applying the following hierarchy:

- Avoiding or 'designing out' impacts wherever possible;
- Applying measures to minimize and manage impacts on the receptor; then
- As a last resort, identify fair compensation, remediation and offsetting measures to address any potentially significant effects.

Some negative impacts can be easily mitigated, while others cannot or are too difficult and costly to mitigate. The various potential impacts are described in this ESIA, along with the provision of 'feasible mitigation measures' that can be implemented; and

- *Recommendations*: for positive impacts it is not possible to identify mitigation measures, but rather recommendations have been identified which aim to enhance the positive impact.

3.4.6 *Assessment of Residual Significance*

Where mitigation measures are identified, it is then necessary to make an assessment of the 'residual significance' after mitigation has been taken into account. A re-assessment of Project impacts is then made, taking into account the effect of the proposed mitigation measures in order to determine the significance of the residual effects. Residual effects are discussed for each E&S theme in the ESIA chapters, and their significance determined in Chapter 9.

3.4.7 *Assessment of Cumulative Impacts*

For each of the impacts assessed, the ESIA investigates the cumulative impacts which could result from incremental impacts from other known existing and/or planned developments in the area and based on currently available information on such existing/planned developments. Assessment of cumulative impacts is presented in "Chapter 8.13".

In addition, transboundary impacts have also been assessed and investigated. Given that the Project is located 12 km from the nearest border (with that being Syria to the north), the only relevant transboundary impacts to be investigated include those related to air quality and noise. Those are discussed in further detail within the relevant section.

3.5 Development of Framework Environmental and Social Management Plan (ESMP)

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

The framework ESMP aims to provide high level mitigations and requirements for managing the E&S risks anticipated from the Project.

Throughout the Project's construction and operation phase an Environmental and Social Management System (ESMS) must be implemented by all relevant parties (i.e. EPC Contractor and Project Operator). The ESMS must be Project and site specific and must build on and take into account the requirements of the framework ESMP presented throughout this document. The development and implementation of an ESMS is considered a key requirement under international E&S standards and requirements. The ESIA also identifies the overall framework, structure and key requirements for the ESMS for the key entities involved in the Project.

4. PROJECT ALTERNATIVES

This Chapter of the ESIA presents an overview of the alternatives considered for the Project including site selection and technology alternatives. Input has been provided through consultation with the Project team and key details as provided by NEPCO, under whom the Project concept was initially developed and who are responsible for the Associated Facilities scope (refer to "Chapter 5" for further details).

A summary of the current reference case Project design is provided within "Chapter 5" of this ESIA including the aspects incorporated into the design that contribute to minimizing potential adverse impacts through design e.g. through maximizing water efficiency by adopting a Zero Liquid Discharge (ZLD) objective and verified stack design parameters informed by air quality modeling (see "Chapter 8.2"). Measures are included as relevant in "Chapters 6.1" and "Chapter 8.3" to manage and mitigate E&S impacts such as emission and noise controls during both construction and operations.

4.1 The Need for the Project

Jordan is currently facing the challenges of limited local energy resources and a high reliance on imported energy. The Kingdom has adopted a policy direction focused on energy transition, with the GoJ having announced a comprehensive portfolio of investments that includes more than 200 MW of renewable energy projects by 2029 and approximately 1,400 MW of new CCGT capacity by 2030.

These investments are incorporated within the "Jordan Economic Modernization Vision" and are part of NEPCO's Master Plan 2024–2035 and MEMR's "Jordan Energy Strategy" as part of a balanced expansion portfolio of renewable energy projects, storage projects and CCGT projects.

Power system expansion planning is required to consider system adequacy requirements, operational reliability, technology maturity, affordability, fuel security, and overall lifecycle costs alongside sustainability goals and emission control requirements in a manner that satisfies the Least Total System Cost Expansion Criteria. CCGT forms a key part of the expansion portfolio under the Energy Strategy and Master Plan, contributing to the vision for a secure and reliable electricity system while accommodating a rapidly increasing share of variable renewable generation.

Modern CCGT technology represents a proven and well-established solution that contributes to lower risk and costs within the context of the electricity system as a whole, with CCGT offering benefits in terms of efficiency and lower emissions over conventional thermal generation technology. Key benefits of CCGT technology include:

- System reliability and adequacy: CCGT plants provide reliable, dispatchable capacity capable of meeting peak demand and maintaining system security under a wide range of operating conditions.
- Supports renewable energy development and integration: As more renewable power is introduced into the grid, flexible thermal generation remains essential to balance variability, provide operating reserves, and deliver critical system services without the potential supply interruption risks associated with renewables.
- Technology maturity and reliability: CCGT technology has a long operational track record, well-established supply chains, proven performance, and broad lender familiarity, reducing technology and execution risks.

The CCGT technology selected for the Project will allow the plant to routinely operate using gas. However, the plant will be designed to also run on diesel in the event of an interruption to the gas supply. This dual fuel ability enhances operational resilience and supports continuity of supply during

fuel disruptions or market volatility thus contributing to energy security and a robust and reliable source of power into the Jordanian grid.

Dual fuel CCGT is a mature, commercially proven and widely adopted generation solution. The technology is already extensively utilized within Jordan's power sector, where several key operational power plants operate on natural gas with liquid fuel back up – this includes Amman East, Qatrana, Samra, and Zarqa CCGT power plants. This technology has also been selected for future generation projects such as the planned IPP 8 CCGT facility.

Without the Project there is a risk that the objectives of Jordan's "Energy Strategy" and the "Economic Modernization Vision" are not met, including the objectives around energy security and diversification of supply, which is underpinned by the efficient, reliable supply offered by CCGT.

4.2 Site Selection and OHTL Routing

4.2.1 Project Site

As discussed above, the Project concept was initiated and developed by NEPCO with MEMR responsible for implementation of the IPP7 Framework, under which is the Project site, as discussed in "Chapter 1" of this ESIA. The selection of the Project site was made during this initial phase and incorporated into the legal agreements signed by the Developer (see "Chapter 1" for further details). Consultation with NEPCO indicates that, in general, identification of the potential site was primarily guided by technical, operational, and development considerations to ensure the feasibility and long-term operability of the Project.

The main considerations taken into account for selection of the Project site are summarized in the table below along with the relevance of these considerations from an E&S perspective.

Table 8: Site Location Considerations & E&S Relevance

Consideration	Project Site Characteristics	E&S Relevance
Availability of a sufficiently sized land parcel suitable for accommodating the power plant including availability of sufficient areas for temporary laydown and staging areas.	Sufficient area available for both Project site requirements as well as laydown and staging areas.	N/A
Requirement for state-owned land to minimize development risks and facilitate Project implementation.	Site is located within governmental owned land.	Eliminates requirement for private land acquisition and potentially livelihood restoration and/or physical displacement impacts.
Proximity to existing and planned natural gas infrastructure is a key requirement to reduce to extent possible the gas interconnection requirements.	Site is 140 m from an existing natural gas infrastructure facility. Shortest direct pipeline tie-in route planned.	This is a key consideration as it significantly reduces requirements for long distance gas pipelines and associated E&S impacts with such facilities such as: (i) potential for land acquisition, economic / physical displacement, (ii) potential for health and safety considerations to local communities from emergency incidents; (iii) air quality/dust and noise impacts from construction related activities; (iv) habitat loss; and other.

Proximity to existing and planned water connection infrastructure is a key requirement to reduce to extent possible the water interconnection requirements.	Site is 4 km from an existing water pumping station. Route follows an existing road network and is within its RoW.	This is a key consideration as it significantly reduces requirements for long distance water pipeline and associated E&S impacts with such facilities such as: (i) potential for land acquisition, economic / physical displacement, (ii) air quality/dust and noise impacts from construction related activities; (iii) habitat loss; and other.
Proximity to extent possible to the existing and/or planned transmission networks to reduce to extent possible the electricity interconnection requirements.	Site is 6 km from the planned substation that is part of the wider "NEPCO Electricity Infrastructure Upgrade Project for the North of Jordan".	This is a key consideration as it significantly reduces requirements for long distance electricity lines and associated E&S impacts with such facilities such as: (i) potential for land acquisition, economic / physical displacement, (ii) air quality/dust and noise impacts from construction related activities; (iii) habitat loss and more importantly impacts on avifauna from collisions; and other.
Site accessibility and availability of suitable access roads to reduce to extent possible access road requirements.	Site is 30 m from an existing road network.	This is a key consideration as it significantly reduces requirements for long distance access road requirements and associated E&S impacts with such facilities such as: (i) potential for land acquisition, economic / physical displacement, (ii) air quality/dust and noise impacts from construction related activities; (iii) habitat loss; and other.
Impact of site elevation on plant performance, efficiency, and project economics.	Site of proper elevation that will optimize plant performance and efficiencies.	N/A
Topographical suitability and constructability considerations	Site has a relatively uniform topography with minimal changes in elevation.	Reduces requirements for extensive grading, leveling and cut-and-fill activities. This reduces E&S impacts associated with soil erosion and sedimentation, loss of vegetation and habitat, changes to surface water drainage, dust emissions, disposal of excess material and waste management, and other.

The Project site selected also has the following benefits:

- Located outside of any Key Biodiversity Areas (KBAs) as discussed in further detail in "Chapter 6.3". Closest KBA is around 10 km from the site;
- Located outside of any known archaeological or cultural heritage sites, including World Heritage Sites (WHS) as discussed in further detail in "Chapter 6.6". Closest site is around 30 km; and
- No residences within the site boundary.

Feedback from NEPCO indicates the site selected was considered to be the best option for the Project given the technical, economic and other considerations.

4.2.2 OHTL

As part of the Project concept, the decision was taken to export the generated electricity from the new substation to be located adjacent to the CCGT plant site (within the Project site) to a new substation grid connection via an OHTL.

Issues associated with electrical supply within the north of Jordan include:

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

As such, the "NEPCO Electricity Infrastructure Upgrade Project for the North of Jordan" has been established to address these challenges. The upgrade project includes an extensive network of transmission lines and substations. One of the key substations that forms part of the Electricity Upgrade project is the one that this Project will connect to via the OHTL (see figure below).

With regard to the OHTL, the main considerations taken into account to develop the project concept, as provided by NEPCO, include:

- Requirement to comply with NEPCO's transmission planning requirements and grid studies.
- Electrical characteristics and capacity requirements of the selected generating facility.
- System reliability and network security considerations.

Other considerations relevant to the routing include:

- Proximity to suitable existing substations and transmission infrastructure.
- Minimization of transmission line length and overall project cost.
- Constructability, right-of-way requirements, and land accessibility.

The 'E&S Team' discussed with the NEPCO team two (2) key points on OHTL route selection to include:

- Land Acquisition. NEPCO indicated that the entire area within which the connection is required is private land. Therefore, avoiding land acquisition in that sense is not possible under any option or scenario. Figure 3 below presents land ownership within the entire area which demonstrates that it is all private lands.

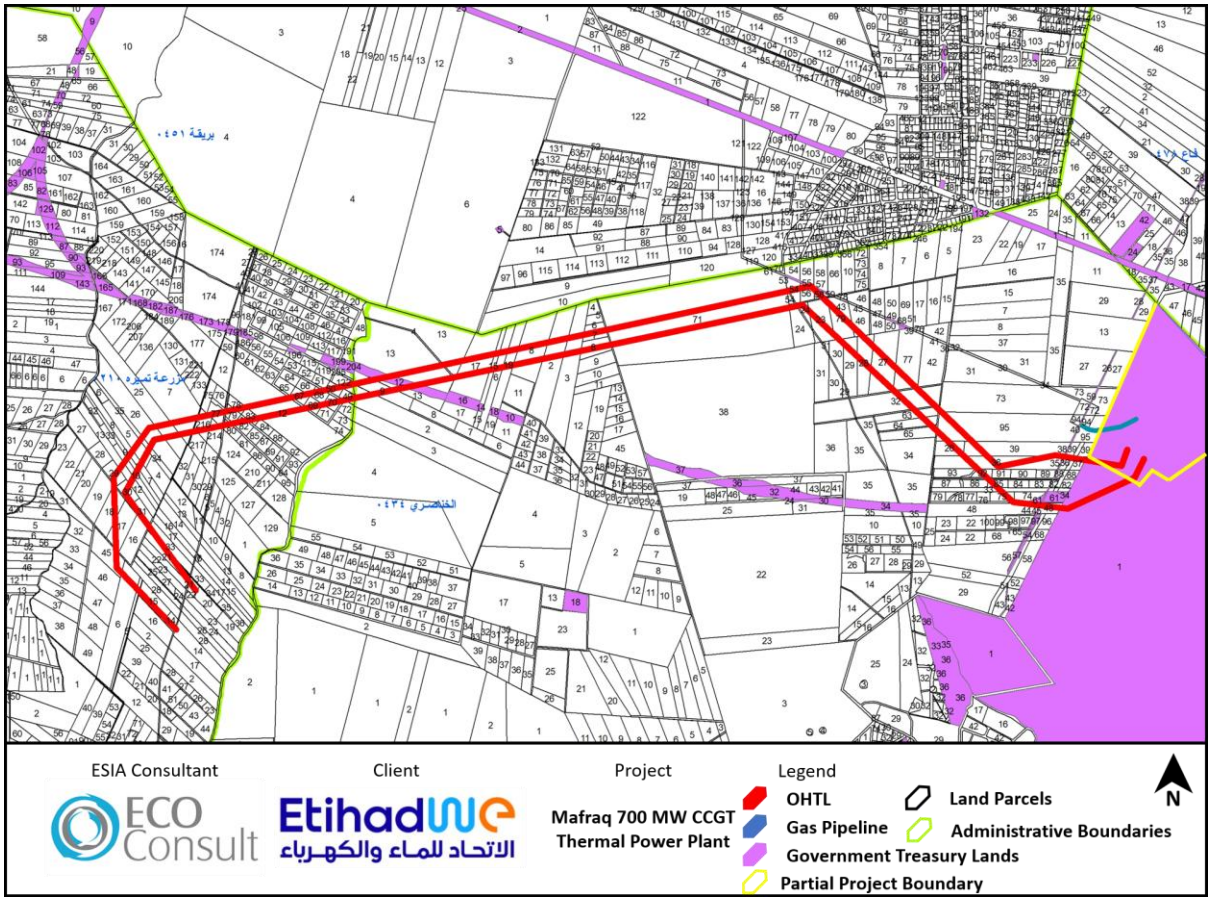


Figure 3: Cadaster Map

- Route Direction. NEPCO indicated that a straight-line connection between the Project substation and the "NEPCO Electricity Infrastructure Upgrade Project for the North of Jordan" substation was not feasible. Although a straight-line route would have been approximately 2 km shorter, a key consideration was avoiding existing structures along the alignment, as shown in the figure below. This alternative route reduces the extent of land acquisition and associated compensation requirements, resulting in both social and financial benefits.



Figure 4: Structures within the Straight-Line Route for the OHTL

4.3 Technology Alternatives

4.3.1 *Selection of GTCC Class Type*

The Project concept comprises a CCGT Power Plant with an installed capacity of approximately 700 MW. A number of turbine types or "classes" are available to meet this capacity requirement. Those considered for the Project include the established E class and F class technologies and the more recent H class technologies. The performance comparison between the technologies is shown in the table below.

Table 9: Performance Comparison Between H Class, F Class and E Class GTCC

Description	H Class GTCC	F Class GTCC	E Class GTCC*
Plant Configuration			
Combined Cycle Configuration	1 on 1	2 on 1	3 on 1
Plant Performance			
CC Net Power Output (MW)	612	750	741
CC Net Efficiency (LHV)	58.7%	57.2%	52.5%

*Notes: Performances are based on standard ISO conditions, Natural gas firing and Air-Cooled Condenser application. * indicates the selected technology.*

The analysis of class types shows that the H class type is the least preferable from a performance perspective as, while it is the most efficient, it does not meet the required net power output requirement. The F class is most preferable on performance alone, however technical feedback from the Project team indicated that known grid constraints mean that selection of either the H or F class

type would result in significant outages and trips, leading to unacceptable reliability of the CCGT supply and significant grid instability[2].

Given these grid constraints the E Class Gas Turbine technology in combined cycle configuration was selected. The efficiency of this technology is lower than for the alternative class types (resulting in higher emission rates on an equivalent basis) but within the same magnitude of scale. The benefit of this technology lies in meeting the power output requirement and avoiding the outages and trips caused by grid limitations, which could themselves result in additional emissions through alternative supply, or in an interruption to supply. The latter is a critical consideration within the design process.

The 'E&S Team' undertook an analysis on Greenhouse Gas (GHG) emissions for the various class turbines. The analysis takes into account the specific class turbines presented in the table above and the assumptions presented in **Error! Reference source not found.** below. The outcomes are presented in Table 10.

As expected, the H-Class turbine, being the most efficient technology, results in the lowest annual GHG emissions. The Project's selected E-Class turbine is associated with higher emissions relative to both the H-Class and F-Class turbines, resulting in an additional approximately 637,000 tCO_2e/year and 173,000 tCO_2e/year, respectively. While these differences equate to approximately 16 million tCO_2e and 4.3 million tCO_2e over the assumed 25-year operating life, they should be considered in the context of the overall GHG performance of modern CCGT technology. The difference in GHG intensity between the E-Class turbine and the more efficient H-Class turbine is approximately 40 gCO_2e/kWh (around 12%), while the difference relative to the F-Class turbine is approximately 31 gCO_2e/kWh (around 9%).

While different turbine options were considered during concept design, the grid constraint aspect was the most significant driver for turbine selection; selecting a turbine that did not meet the grid constraint requirements would make the project infeasible and would be deemed unacceptable to the GoJ. Given the selected E-Class turbine remains within the range of emissions performance typically associated with modern CCGT facilities, continues to represent a substantially lower-emission generation technology than conventional oil-fired or coal-fired thermal power plants, incorporates combined cycle technology and provides a robust and reliable grid power source that in turn enables other renewable grid supply, then the selection is considered to represent Best Available Technology (BAT) for the Project.

Table 10: GHG Emissions from Various Turbine Options

Outcome	Unit	Turbine Class Type		
		H-Class	F-Class	E-Class
Total CO_{2eq} Emissions	tCO_{2eq}/y	1,801,523	2,265,644	2,438,852
GHG Intensity	gCO_{2eq}/kWh	336.0	344.8	375.7
Difference in relation to project Turbine Class	tCO_{2eq}/y	637,329	173,208	N/A
Difference during project operation	tCO_{2e} / 25 years	16,000,000	4,300,000	N/A

Table 11: Assumptions for GHG Calculations

Parameter	Unit	Input / Calculation			Reference
		E-Class	F-Class	H-Class	
Fuel Type	-	Natural Gas	Natural Gas	Natural Gas	
Power Output (Net)	MW	741	750	612	

[2] Jordan's grid limitation necessitates that the power loss in case of a single GT trip in combined cycle configuration shall not exceed 290 MW, across the entire site temperature range.

CCGT Plant Efficiency	%	52.5%	57.2%	58.7%	CCGT overall plant efficiency with E Class Turbine
Thermal Input	MW	1,411	1,311	1,043	Plant total thermal input
Total Fuel Consumption	kg/s	29	27	21.15	Estimated plant total based on LHV of Nat Gas (49.3 MJ/kg)
Annual Operational Hours	h	8760	8760	8760	Continuous operation
Annual Fuel Consumption	t/y	902,856	838,735	666,919	Calculation
CO2 Emission Factor	tCO2/t fuel	2.6928	2.6928	2.69218	GHG Protocol Emission Factors
CH4 Emission Factor	tCH4/t fuel	0.00024	0.00024	0.00024	GHG Protocol Emission Factors
N2O Emission Factor	tN2O/t fuel	0.0000048	0.0000048	0.0000048	GHG Protocol Emission Factors
CO2 Emissions	t/y	2,431,211.2	2,258,546.4	1,795,879.1	Calculation
CH4 Emissions	t/y	216.7	201.3	160.1	Calculation
N2O Emissions	t/y	4.3	4.0	3.2	Calculation
Total CO2eq Emissions	tCO2eq/y	2,438,851.5	2,265,644.1	1,801,522.9	Calculation
IFC Benchmark Comparison					
GHG Intensity	gCO2eq/kWh	375.7	344.8	336.0	Calculation
Typical Net CO2 Emissions Performance	gCO2/kWh	348 - 374	348 - 374	348 - 374	IFC Benchmark for Gas CCGT (Net)

4.3.2 Selection of GT Model

Selection of the E class technology GT model to be adopted for the Project was undertaken based on a number of considerations including a techno-commercial evaluation, GT availability amid increased demand for gas turbines in recent times and performance. A performance comparison between the various E class technology GT models in combined cycle power plants configuration that meet the capacity requirement of 700 MW is summarized in the table below.

Table 12: Performance Comparison of E-Class Gas Turbine Combined-Cycle Configurations

Description	**E Class GTCC Technology**		
Plant Configuration			
GT Model	AE V94.2*	SGT5-2000E	GE9E4
Combined Cycle Configuration	3 on 1	3 on 1	4 on 2
Plant Performance			
CC Net Power Output (MW)	741	746	750
CC Net Efficiency (LHV)	52.5%	52.3%	52.4%

*Note: Performances are based on standard ISO conditions, Natural gas firing and Air-Cooled Condenser application. *indicates the selected technology.*

As the table shows, the E-Class GT models considered are similar in terms of plant performance with slightly improved performance for the Ansaldo Energia V94.2 GT Model. On the basis of the technology evaluation for all aspects this model was selected for the Project.

4.3.3 Selection of Air-Cooling Technology

Water availability is a key issue of concern within Jordan with water scarcity considered a critical development challenge in the Kingdom (see "Chapter 6" for further details). Therefore, extensive considerations were taken into account to maximize water efficiency for the Project.

A key design philosophy was the emphasis on limiting the need for water through design. This has included, most notably, the adoption of Air-Cooled Condensers (ACC), as compared to wet cooling techniques. As described in "Chapter 5", ACC technology uses large air-cooled finned tubes and fans to remove heat from the exhaust steam from the Heat Recovery Steam Generators (HRSGs), converting it back into liquid water (condensate). The main feature of wet cooling technology is the use of cooling towers, where water is lost to the environment through evaporation, resulting in a significant water make up demand. This will vary depending on the plant capacity and design but typically may require volumes in the range of 1,000 m^3 per hour to meet the cooling requirements[3]. This demand is avoided through use of air-cooling techniques.

Adoption of ACC technology is estimated to have a negative overall impact on efficiency of approximately 1% ~1.5%[4]. However, while the plant's electrical efficiency is lower, local water availability constraints strongly support the adoption of ACC technology for all modern CCGT across Jordan.

4.4 No-Project Alternative

The 'No Project' alternative assumes that the Project will not be developed. Should this be the case, then the Project site area would remain the same. The land area would remain with its current characteristics.

Should the Project not move forward, then the Project-related negative E&S impacts discussed throughout this ESIA would be averted. However, as noted throughout the ESIA, generally such impacts can be adequately controlled and mitigated through the implementation of the ESMP discussed in "Chapter 10".

Nevertheless, should the Project not move forward, the significant and crucial positive and strategic economic and E&S benefits would not be realized. Such benefits include the following:

- Overarching objective of the Project in supporting Jordan's Energy Strategy and energy transition aims including the objectives around energy security and diversification of supply will not be realized if the Project does not go ahead;
- Project is considered an integral part of the wider "NEPCO Electricity Infrastructure Upgrade Project for the North of Jordan" to address challenges around congestion, voltage problems and bottleneck which could result in cascading outages if not addressed; and

[3] Microsoft Word - 00_Contents of FR Main Report.doc
[4] https://www3.epa.gov/region1/npdes/merrimackstation/pdfs/ar/AR-1167.pdf?utm_source=chatgpt.com

- Project is expected during the construction and operation phase to generate local employment and commit to other social responsibilities. As such, this is expected, to a certain extent, to subsequently enhance the socio-economic conditions and standards of living of the local communities.

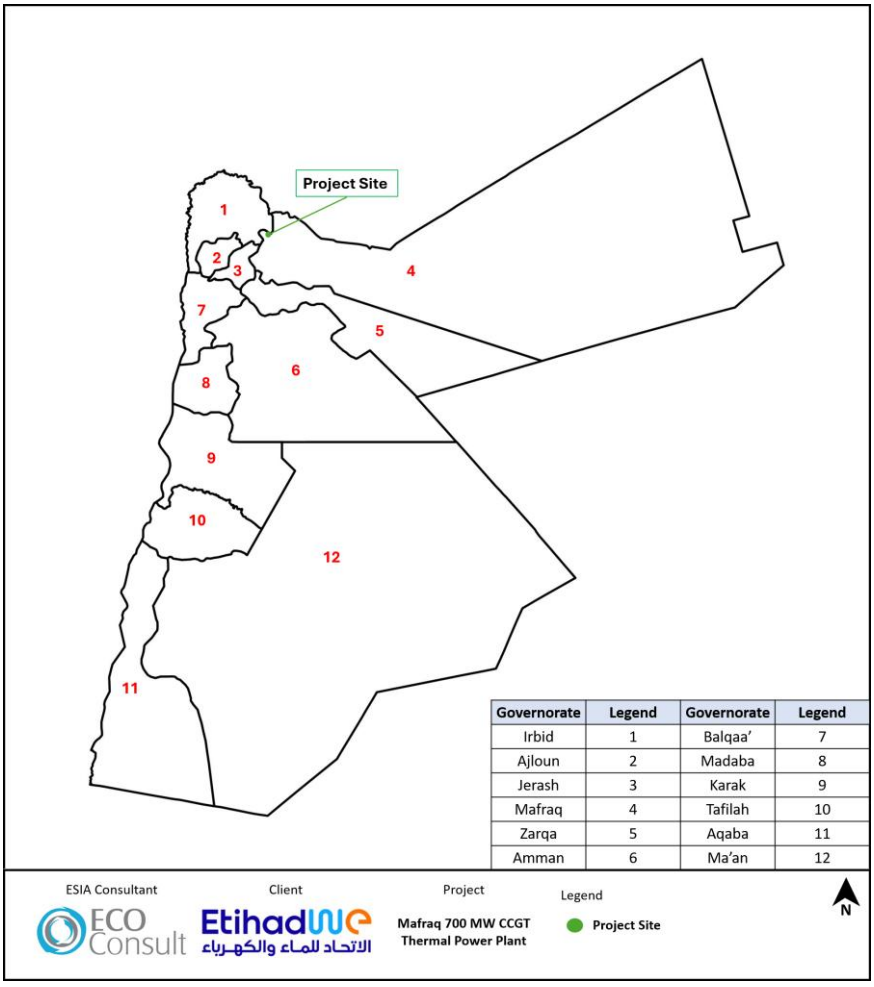
5. PROJECT DESCRIPTION

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

5.1 Administrative Setup and Project Location

Administratively, Jordan is divided into twelve (12) Governorates (*Muhafazat*). Governorates are further divided into Districts (*Liwaa'*), which may in turn be subdivided into Sub-Districts (*Qadaa'*). These administrative units encompass cities, towns, villages, and rural settlements. Local governance is also supported through municipalities responsible for the provision of municipal services (e.g. waste collection, roads, lighting, etc.) and local development activities (parks, etc.).

The Project is located within Mafraq Governorate, around 55 km northeast of the capital city, Amman. It is the second largest governorate in terms of area after Ma'an Governorate. The governorate is located in the northeast of Jordan, bordered by Iraq to the East, Syria to the North, and Saudi Arabia to the South and East as shown in Figure 5 below.



Governorate	Legend	Governorate	Legend
Irbid	1	Balqaa'	7
Ajloun	2	Madaba	8
Jerash	3	Karak	9
Mafraq	4	Tafilah	10
Zarqa	5	Aqaba	11
Amman	6	Ma'an	12

Figure 5: Administrative Division of Jordan

Within Mafraq Governorate, the Project is located within the Northwestern Badia District, specifically within Hosha Sub-District (*Qadaa' Hosha*) as shown in Figure 6. Hosha Sub-District comprises two municipalities: Al-Basiliyah Municipality and Hosha Municipality, both of which encompass several local communities.

Al-Basiliyah Municipality includes the communities of AlHarsh, Faa', Buraiqa, and AlKhanasri. Hosha Municipality includes the communities of Hosha, AlHamra AlMansoura, AlHaditha, AlSuweilah, AlMashrifah, Al Ekader, and Adurrah.

The Project is not located within any municipal boundaries as noted within the figure below, but the closest is Al-Basiliyah municipality.

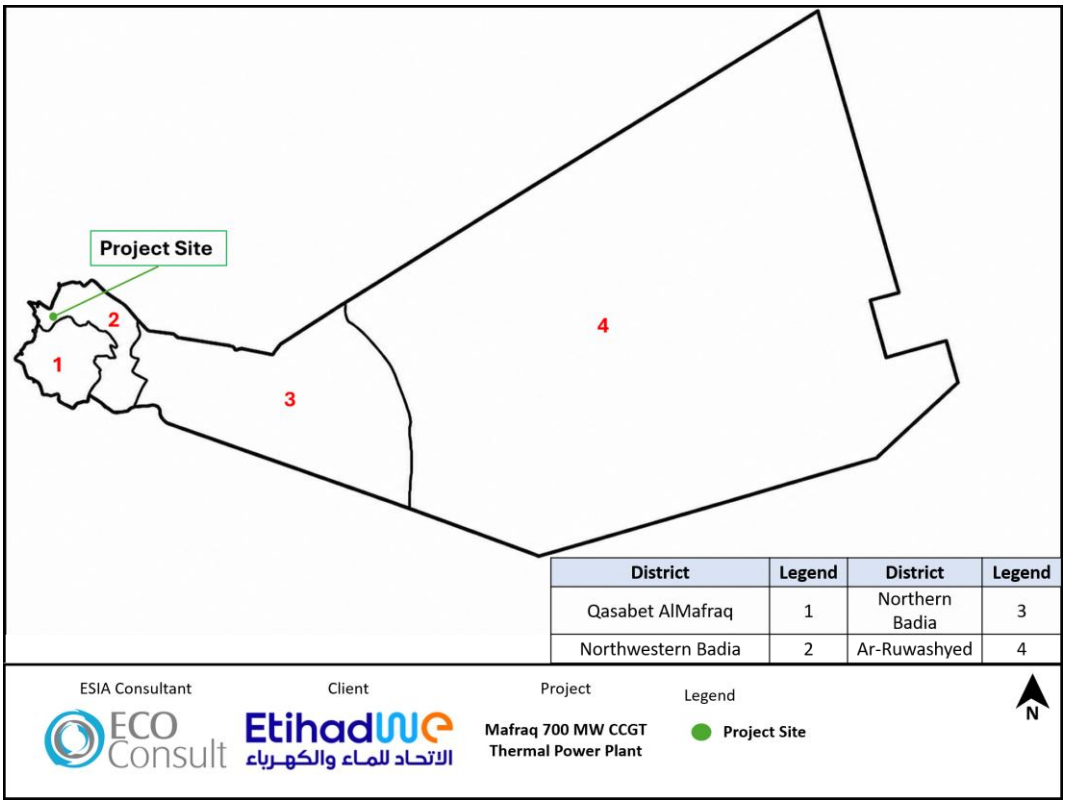


Figure 6: Administrative Division of Mafraq

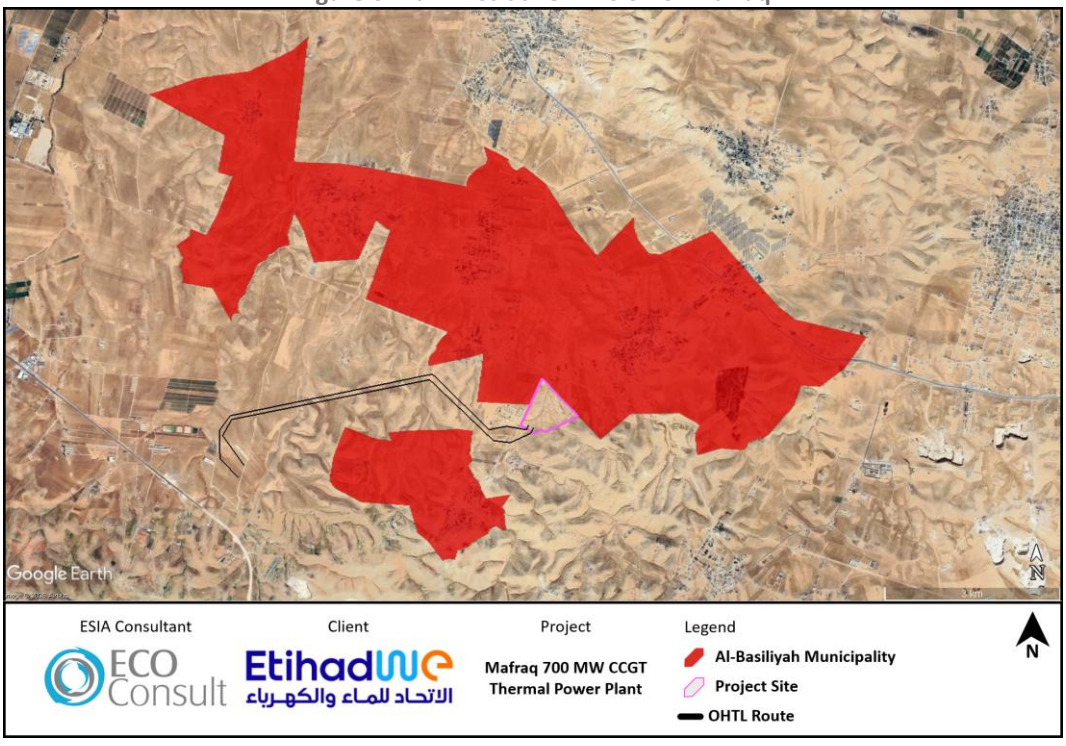


Figure 7: Project Site in Relation to Al-Basiliyah Municipality

Table 13 shows the coordinates of the Project site (with a total area of 0.45 km2), which comprises: (i) Plant Site (with an area of 0.25 km2), (ii) the Substation Area (with an area of 0.07 km2), and (iii) the Temporary Laydown Area (with an area of 0.13 km2), and the following figure shows the location of the Project site. As discussed in "Chapter 6.7" later, the Project falls entirely within government-owned land.

Table 13: Site Coordinates

Point	WGS Coordinates	
	Latitude	Longitude
P1	32.4176°	36.06283°
P2	32.41408°	36.06671°
P3	32.41396°	36.06686°
P4	32.41176°	36.06941°
P5	32.40934°	36.06346°
P6	32.40974°	36.06255°
P7	32.40907°	36.06178°
P8	32.41035°	36.05896°
P9	32.4121°	36.05995°

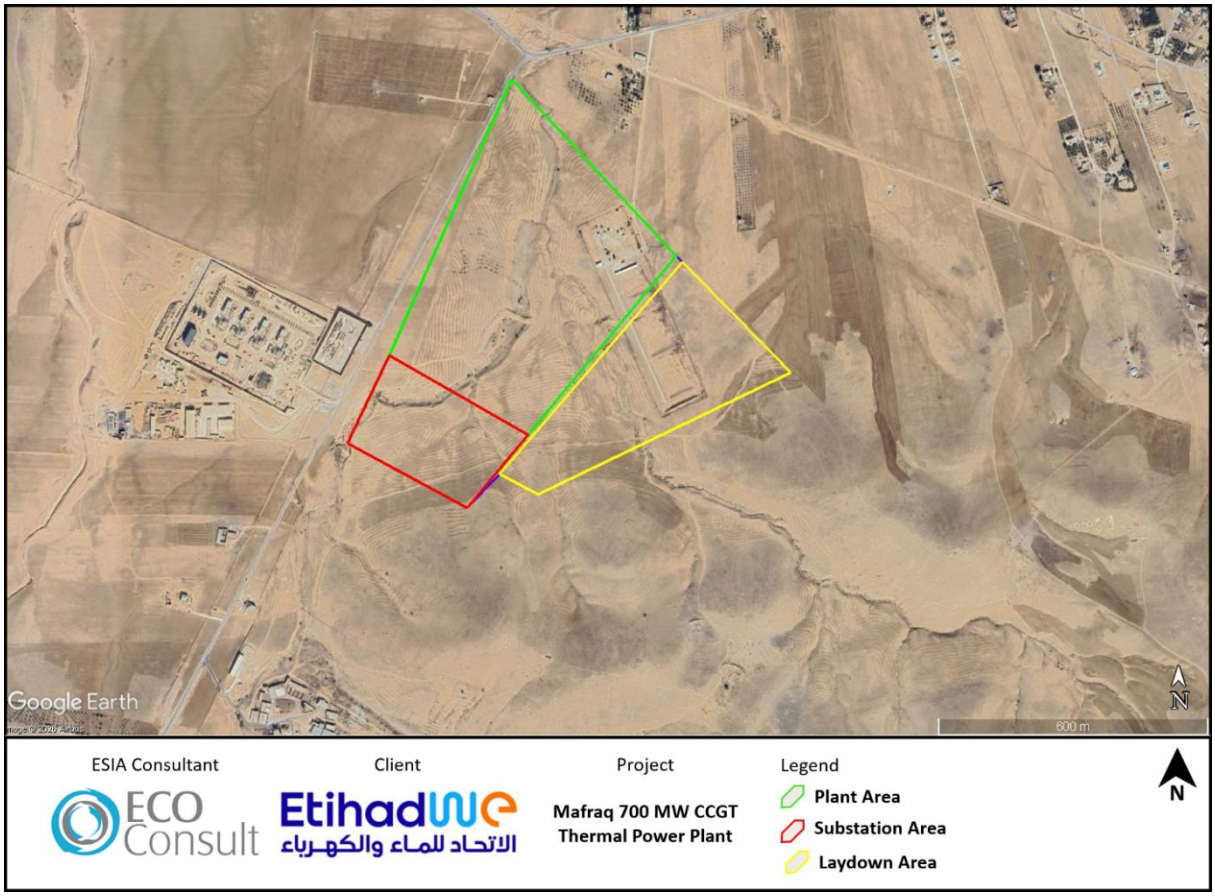


Figure 8: Project Site

5.2 Local Communities

Project Affected Communities (PACs) or local communities comprise those settlements in the vicinity of the Project which may be affected by the Project activities i.e. within the Project Area of Influence (see "Chapter 3.3.1" on justification for selection).

Those communities closest to the Project site are located within Northwestern Badia District (as it is the District within which the Project site is located). This includes the following:

- Faa' located around 0.76 km northeast of the Project site with a population of 3,076.
- AlHarsh located around 1 km northwest of the Project site with a population of 1,833.
- AlKhanasri located around 1.2 km southwest of the Project site with a population of 1,033.
- Buraiqa located around 3.5 km northwest of the Project site with a population of 1,437.
- Hosha located around 3.83 km northeast of the Project site with a population of 3,029.

The communities located in Qasabet AlMafraq District, which is the closest District to the Project site, comprise:

- Umm Al Lulu located around 2.76 km southeast of the Project site.
- Deir Al Waraq located around 3.1 km south-southwest of the Project site.
- Manshyet Bani Hassan located around 3.2 km south-southeast of the Project site.

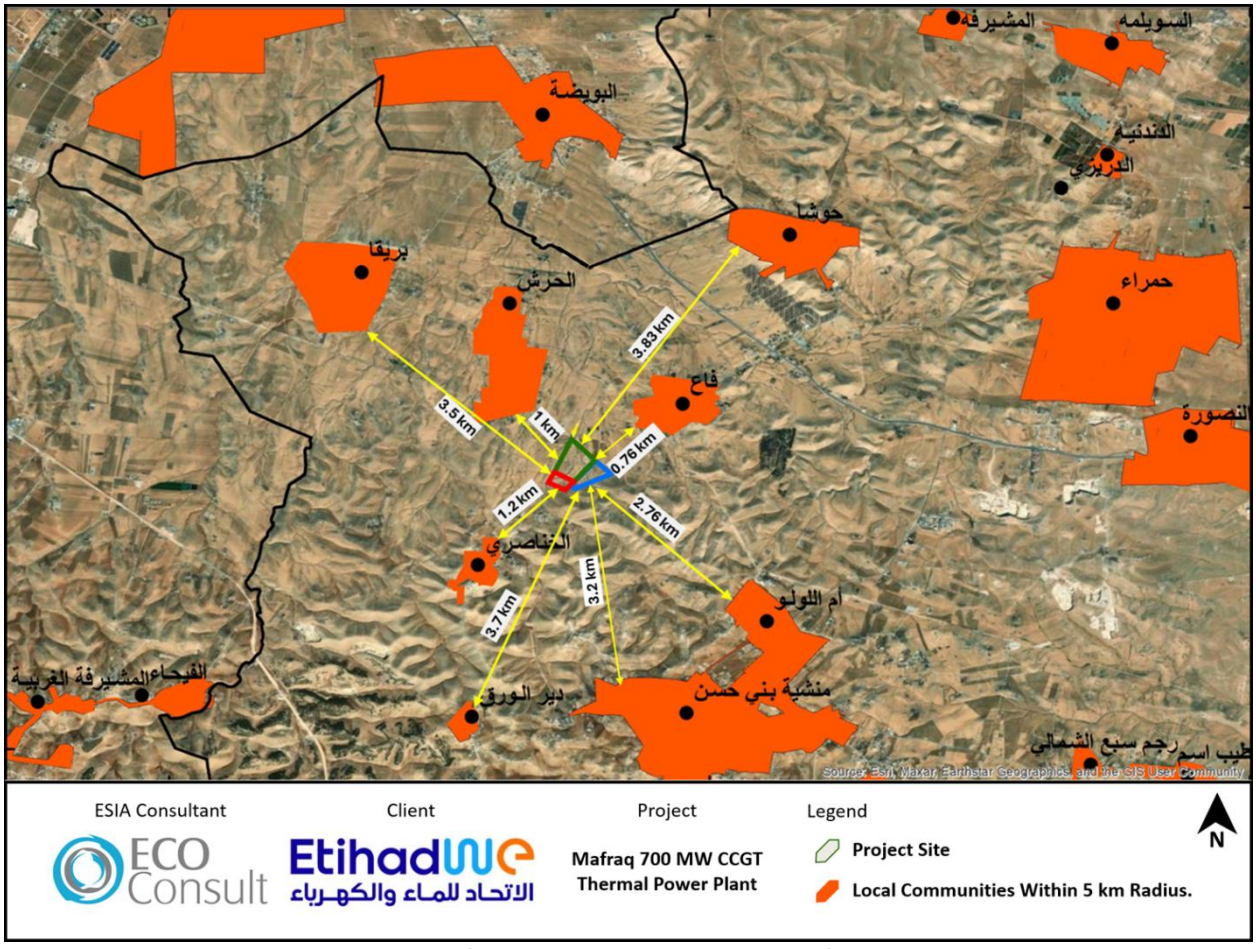


Figure 9: Location of Local Communities in Vicinity of Project Site

5.3 Project Components

This chapter presents the outline of the CCGT Technology followed by the Project components. This has been presented in the following approach:

- Outline of the CCGT Technology: This presents the operation of the CCGT Technology in both simple cycle and combined cycle.
- Primary Power Generation Components: Those are the key components that are needed to generate electricity.
- Auxiliary Components: Those are supporting components that are needed to ensure primary components operate efficiently and effectively.

5.3.1 Outline of the CCGT Technology

The Project comprises a CCGT Power Plant with an installed capacity of approximately 700 MW. The combined cycle power plant comprises a gas turbine and water and steam cycle as shown in Figure 10.

- Simple Cycle Operation:

During Simple Cycle operation, only the gas turbine cycle is operational. As shown in Steps 1–3 of the figure, ambient air is drawn into the gas turbine compressor and compressed before entering the combustion chamber, where fuel is injected and combusted. The resulting high-temperature gases expand through the gas turbine, causing the turbine shaft to rotate and drive a generator, which produces electricity (Step 7). The generated electricity is then transmitted to the high-voltage grid (Step 8). In this mode, the water-steam cycle is not operational and the hot exhaust gases are discharged through the bypass stack without further energy recovery. The plant is designed to operate in Simple Cycle mode during commissioning, maintenance activities, or whenever the steam-water cycle is unavailable.

- Combined Cycle Operation:

The Project is designed to operate primarily in Combined Cycle mode, which integrates both the gas turbine cycle and the steam-water cycle to maximize efficiency. As shown in Steps 1–3 of the figure, compressed air and fuel enter the gas turbines, where combustion produces high-temperature gases that generate mechanical energy and drive the gas turbines. Rather than being discharged directly to the atmosphere, the hot exhaust gases are routed to the Heat Recovery Steam Generators (HRSGs) (Step 4), where their residual heat is used to convert feedwater into steam. The steam is then directed to the steam turbine (Step 5), generating additional electricity. Following expansion through the steam turbine, the low-pressure steam is cooled and condensed within the Air-Cooled Condenser (ACC) and returned to the HRSG as feedwater for reuse (Step 6). Electricity generated from both the gas turbines and steam turbine is transmitted to the high-voltage grid (Steps 7 and 8). By recovering and utilizing waste heat from the gas turbine exhaust, Combined Cycle operation significantly increases the overall plant efficiency from approximately 35–40% achieved during Simple Cycle operation to around 52% and represents the normal operating mode of the facility.

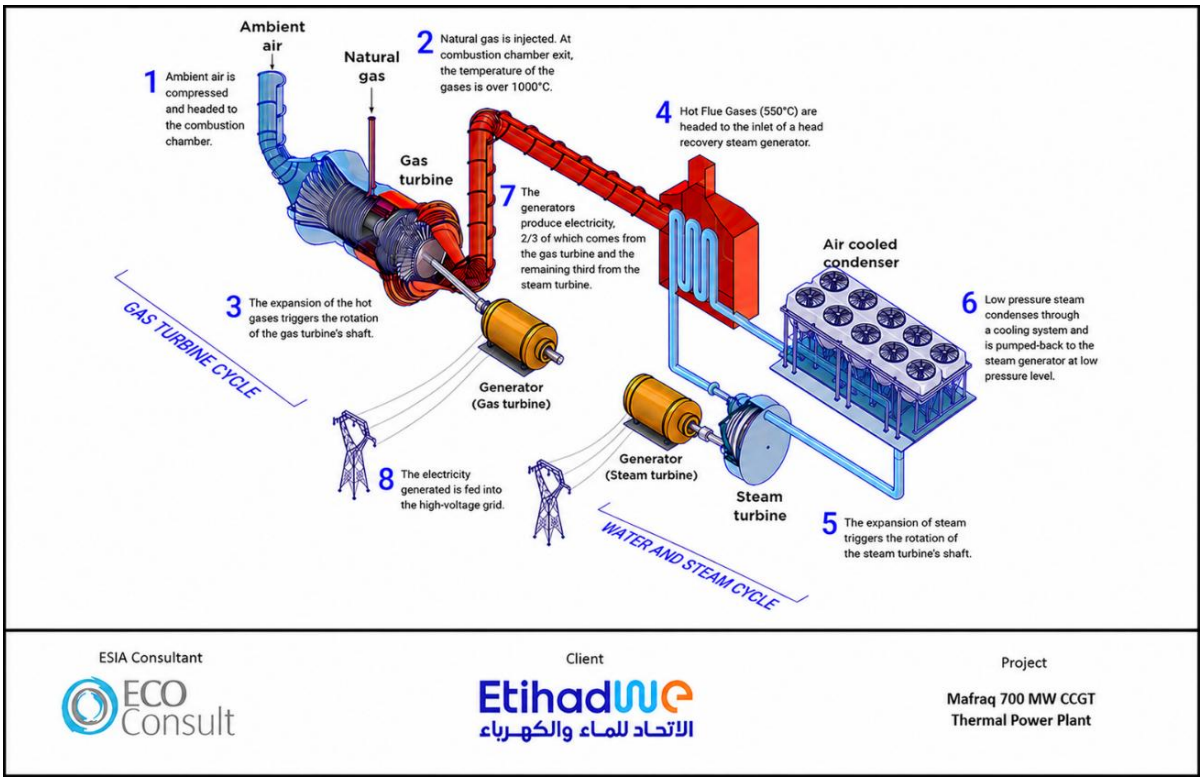


Figure 10: Overview of CCGT Process

5.3.2 Primary Power Generation Components

The key CCGT components of the Project comprise the following and the figure that follows:

- Three Gas Turbines (GTs) - Ansaldo AE94.2: type turbines with dual-fuel capability (natural gas as the primary fuel and distillate oil as the backup fuel) and equipped with turbine inlet air cooling systems (including fogging systems). Each combustion turbine generator shall be of heavy duty, single shaft, industrial type, of proven design, directly coupled to a 50 Hz generator and provided with all associated ancillary and auxiliary equipment and systems to operate in open and combined cycle modes including bypass stacks for use in open cycle mode.
- Three Heat Recovery Steam Generators (HRSGs): comprising economizer (preheats the feedwater using the cooler portion of the exhaust gas), evaporator (converts the water into steam), and superheater (further heats the steam above its saturation temperature before it enters the steam turbine) to maximize heat recovery and efficiency. The HRSGs will be equipped with appropriately designed main stacks;
- One Steam Turbine (ST): designed to generate electricity from high pressure steam from the HRSGs, thus increasing the overall efficiency of the Project and contributing additional power generation without additional fuel consumption; and
- One Air-Cooled Condenser (ACC): uses large air-cooled finned tubes and fans to remove heat from the exhaust steam, converting it back into liquid water (condensate). This condensate is then returned to the feedwater system and subsequently pumped back to the HRSGs, where it is reheated to produce steam again. The system also includes a drain tank between the turbine exhaust and the ACC inlet, an air extraction and hogging system to maintain the required vacuum during start-up and normal operation, a condensate filtration system, and an online and offline cleaning system to maintain ACC performance.

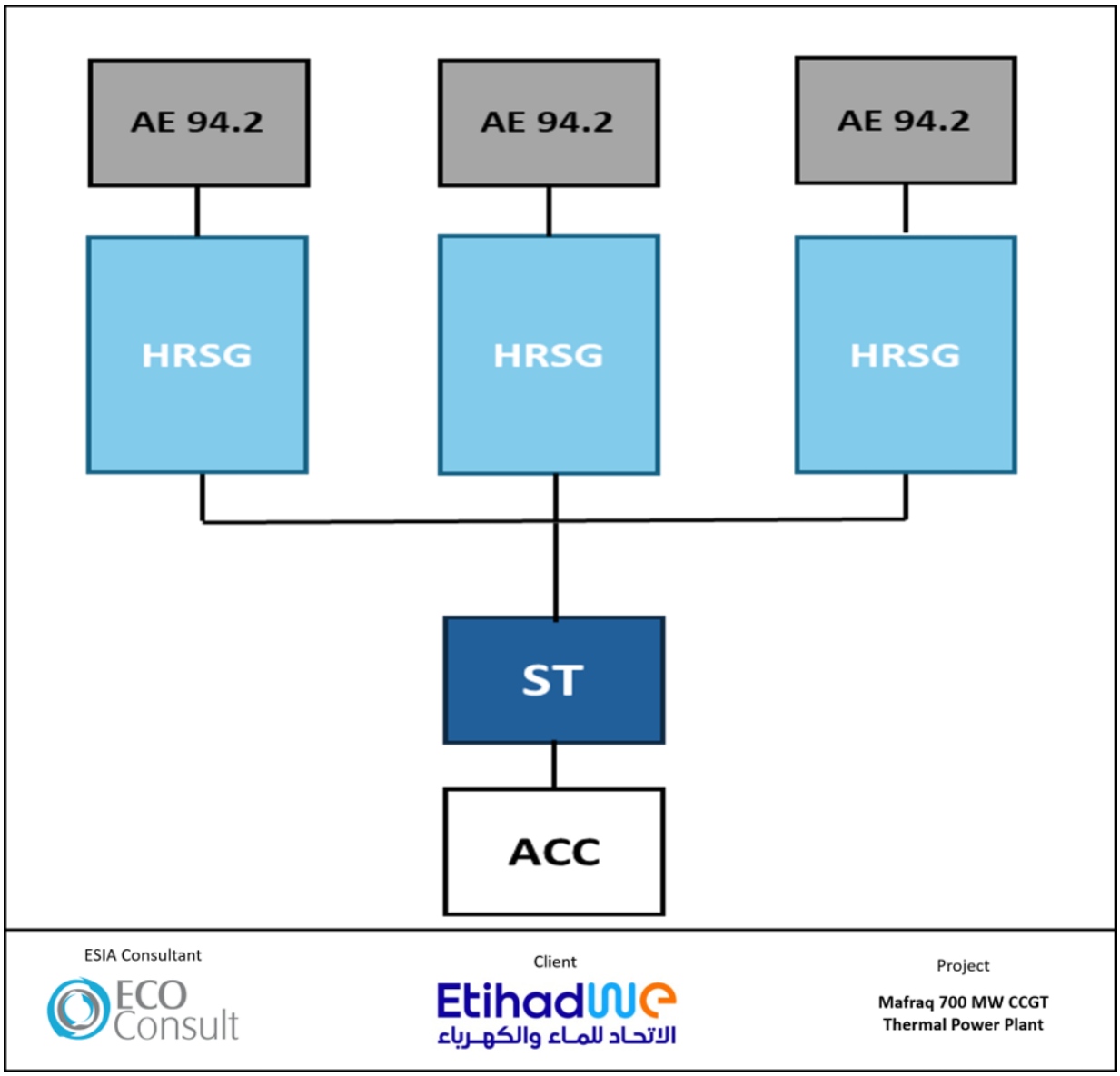


Figure 11: Primary Project Components

5.3.3 *Auxiliary Components*

In addition to the main power generation components, the Project will include several supporting systems essential for its operation. These are described in detail below, and their relationship to the primary power generation components is illustrated in the figure below.

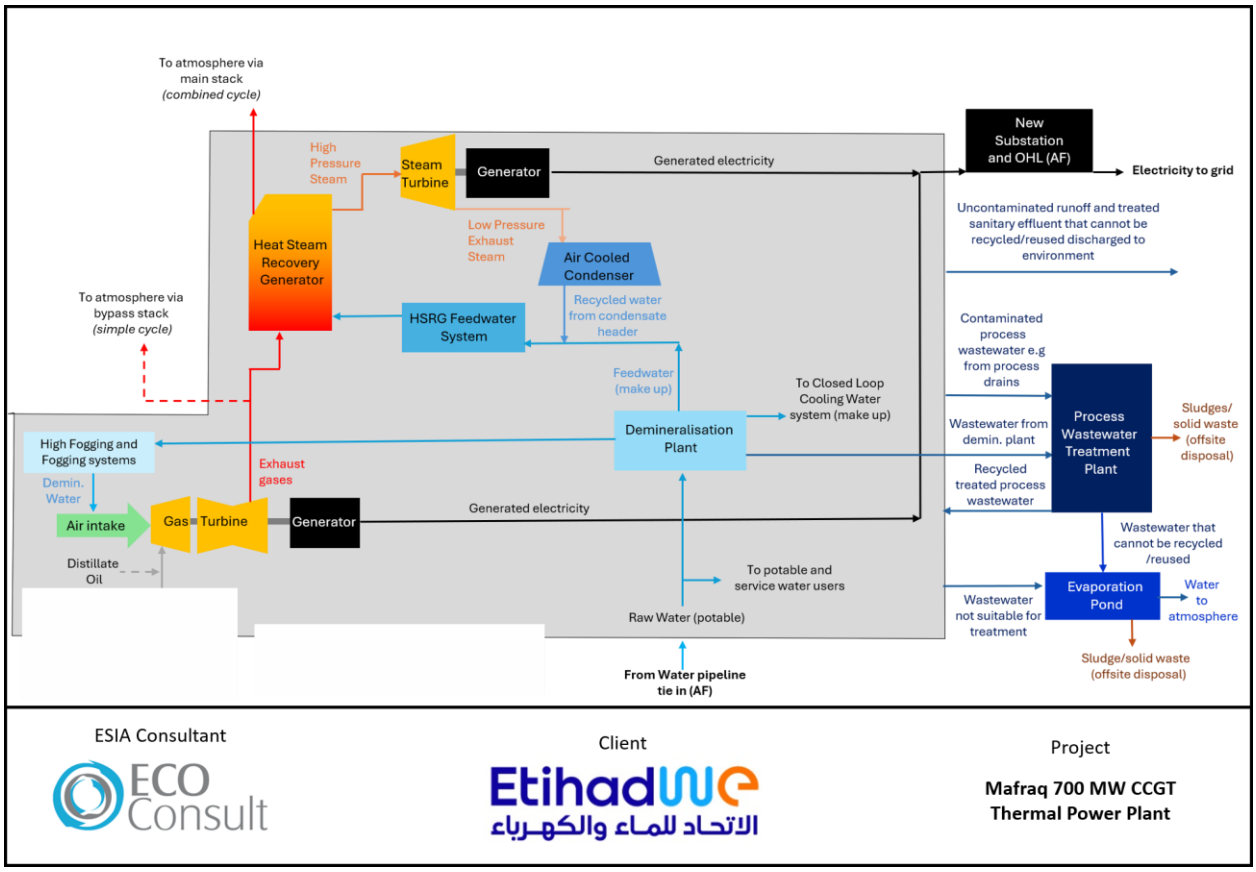


Figure 12: Auxiliary Project Components

- Feedwater System: supplies treated water to the HRSGs for steam production as required. The feedwater pumps are designed with sufficient redundancy to maintain full plant output even if one pump is out of service. The system comprises a deaerator vessel that removes dissolved oxygen from the water prior to delivery to the HRSGs, high-pressure feedwater pumps that pressurize and deliver the treated water through dedicated feedwater piping and control valves to the HRSGs, and a chemical dosing system to maintain water quality within specified limits throughout the steam cycle.

- Closed Cooling Water System: comprises a closed-circuit water-cooling system for turbine and plant auxiliary cooling. The system includes fin fan heat exchangers that reject heat to ambient air; duty and standby circulation pumps that circulate cooling water through dedicated pipework to turbine lube oil systems, generator coolers, and other plant auxiliaries; a head and storage tank that maintains circuit pressure and provides makeup water; and a chemical dosing system to prevent corrosion within the closed loop.

- Fogging & High Fogging Systems: the fogging system utilizes fine droplets of demineralized water sprayed into the gas turbine intake air stream to cool the inlet air and increase its density, thus allowing a greater mass of air to enter the gas turbine, reduce compression load and improve efficiency and power output. The high fogging system operates at higher pressure, injecting very fine water droplets that continue to evaporate within the compressor itself, reducing the work required for air compression and further increasing mass flow and power output. Both systems are integrated with the gas turbine control system and operate automatically under suitable operating conditions.

- Water Treatment Plant: comprises a Treatment Plant with Reverse Osmosis (RO) +Electro-Deionization (EDI) system to treat raw water supplied under the Water Supply Agreement (WSA) and produce water suitable for the steam cycle and other Project requirements. Recycling of

demineralized drain water will be implemented to reduce raw water consumption and improve water use efficiency. The water treatment system will be designed to meet the water demands of the steam cycle, fogging system, high fogging system, and other plant processes requiring demineralized water.

- Wastewater Handling Facilities: to be designed to achieve a Zero Liquid Discharge (ZLD) objective, meaning no process wastewater is discharged outside the plant boundary. All wastewater streams generated during plant operation are collected, treated, and either reused within the process or directed to the evaporation pond for natural evaporation.

  Facilities comprise:

  - Wastewater Treatment Plant: designed to ensure wastewater generated by the Project operations meet applicable national and lender standards. Oily water and process drains are collected and transferred to an oil-water separator, before being conveyed to the evaporation pond; and

  - Evaporation Pond: designed to manage wastewater streams that cannot be recycled or reused within the process and enable natural evaporation. Treated effluent is conveyed to the pond where water evaporates naturally through exposure to ambient temperatures and solar radiation. The pond will be fully lined to prevent seepage to groundwater, with suitable lining specification and sufficient capacity which shall be confirmed during detailed design.

- Natural Gas System: designed to receive, treat, and supply natural gas from the connection point with the natural gas supplier to the combustion turbine generators to ensure a reliable supply that meets the quality and operational requirements of the gas turbines. The system comprises a gas connecting flange at the plant boundary, emergency shutdown valves, pressure reducing stations, filter systems and separators, fuel gas preheaters, gas chromatograph for fuel quality monitoring, and dedicated gas piping with associated instrumentation and metering equipment at each gas turbine inlet.

- Backup Fuel System: the Project will utilize distillate fuel as a backup fuel source to ensure continuity of power generation in the event of interruptions to the natural gas supply. The system will include facilities for receiving, metering, storing, and supplying distillate fuel to the combustion turbine generators. The system will comprise fuel storage tanks, pumps, heaters, metering equipment, and associated infrastructure required for fuel handling and transfer. The storage facilities will be designed to maintain sufficient distillate fuel inventory to enable operation of the Project at full load for a minimum of 14 continuous days. The storage capacity of 2 × 25,000 m^3 will be confirmed during detailed design.

- Black Start Diesel Generator: the Project design incorporates black start diesel generators, sized to enable start-up of one of the three gas turbines in the event of a power blackout. The aim is to allow the power plant to restart itself independently without relying on the external electric power grid. The black start generators will also function as emergency diesel generators, providing auxiliary power to enable shutdown in emergency conditions. The facility incorporates four black start diesel generators with N+1 redundancy, generating at 6.6 kV with a power factor of 0.8. As the black start generators also serve as emergency diesel generators, no separate emergency diesel generation equipment is required.

5.3.4 Temporary Construction Components

Temporary Project facilities required throughout the construction phase of the Project will include components such as site offices and welfare facilities, laydown areas, temporary access routes, mobile and temporary plant and equipment including temporary diesel generators and temporary storage and waste areas. At the time of writing, it is anticipated that the Project temporary components will be located within the Project site laydown area, as defined within Figure 8 earlier.

5.3.5 Associated Facilities

Associated Facilities are facilities that would not have been constructed or expanded if the Project did not exist and without which the Project would not be viable. The Project will rely on several Associated Facilities that are required to support its operation, including fuel supply infrastructure, electrical interconnection facilities, and water supply systems.

- Overhead Transmission Line (OHTL) and Substation

NEPCO will be responsible for the off-site electrical interconnection required to connect the Project to the national grid. The Project will be connected directly to the internal substation that will be constructed and operated by NEPCO, which will serve as the power evacuation point. NEPCO will be responsible for the design, construction, operation, and maintenance of the substation and associated interconnection facilities. The location of the substation and current indicative OHTL route is shown in Figure 14 below.

Total length of the OHTL is 6.8 km. The main component of the OHTL is the transmission tower. There will be a total of 208 towers, each will be a three (3) phase steel beam tower, which will transport the electricity to the High Voltage National Grid. The typical structure of the tower is presented in the figure below. Each transmission tower will consist of the following:

- **Foundations:** each tower will be fixed and bolted to the ground through reinforced concrete foundations. There will be four (4) foundations for each tower. The footprint of individual towers is likely to range from approximately 15 m × 15 m to 30 m × 30 m, depending on the tower type and location;
- **Steel structure:** the foundations will support the steel structure that will carry the conductors, cross-arms, insulators and shield wire. The height of the tower is around 50 m;
- **Conductors:** the conductor is the line used to transmit electrical energy from one tower to the next until its connection with the High Voltage National Grid. There will be three (3) conductors that will connect through the cross-arms. The conductor will be a 400 kV line;
- **Cross-Arms:** each tower will have three (3) steel beam cross arms which connect the conductors (discussed below) with the towers;
- **Optical Ground Wires (OPGW)** (or **Shield Wire):** positioned above the phase conductors, the shield wire is grounded at each tower to facilitate the safe and rapid dissipation of voltage surges caused by technical issues or external factors (e.g. lightning). There will be one per side of the double-circuit tower peak arrangement; and
- **Insulators:** provide electrical isolation and support for the conductors, which are typically made of aluminum or aluminum alloy. Insulators isolate the towers from the live wires that carry the electricity.

In addition, the following is noted:

- A temporary construction corridor of approximately 90 m will be utilized during construction activities, including tower foundation works, erection, and stringing operations.
- The permanent Right-of-Way (ROW) for the OHTL is approximately 30 m buffer corridor, to be maintained for the operational phase of the line.

  As discussed in "Chapter 6.7" later, the OHTL falls mainly within private lands and will therefore require a land acquisition process.



Figure 13: Components of an OHTL

- Gas Pipeline Tie-in

Natural gas, which will serve as the primary fuel for the Project, will be supplied by NEPCO through a dedicated approximately 300 m pipeline connection to the existing natural gas pipeline to the west of the Project boundary as shown in Figure 15. NEPCO will provide a spur line from the main gas pipeline and install a gas metering station within a fenced area of around 40 m × 60 m located outside the CCGT power plant boundary.

The spur line connects to an existing gas compression station that has been in place since 2019. Such gas compression stations are located all throughout the gas pipeline route that runs throughout Jordan from south (starting in Aqaba) to north (in Irbid), and controls the gas pressure throughout the main pipeline. The compression stations will be expanded to account for the metering station noted above.

As discussed in "Chapter 6.7" later, the pipeline falls mainly within private lands and will therefore require a land acquisition process.

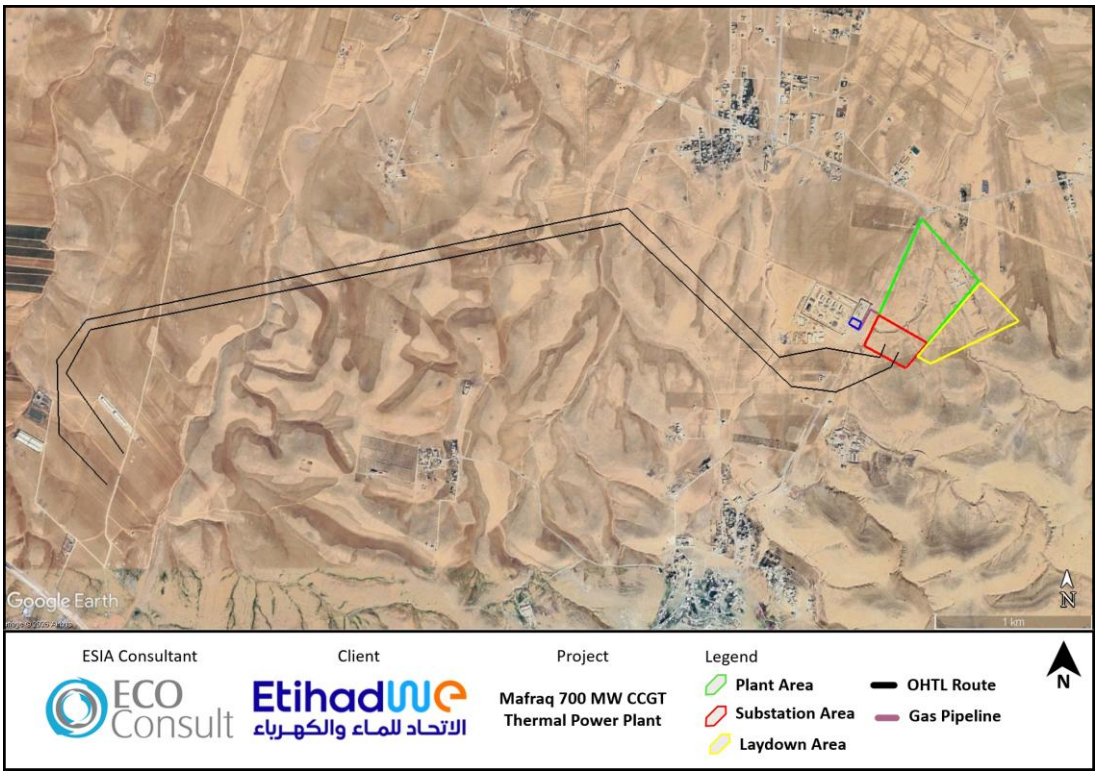


Figure 14: Project Site and Associated Facilities

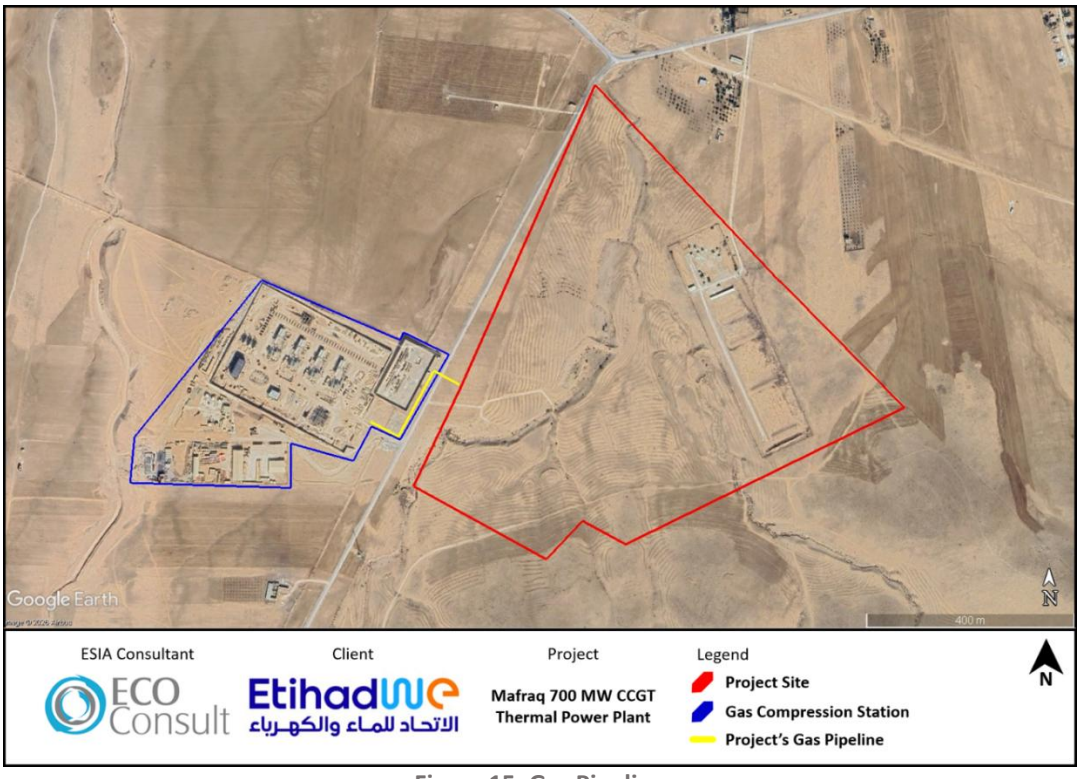


Figure 15: Gas Pipeline

- Water Supply Pipeline Tie-in

Raw water of drinking quality will be supplied by the Water Authority of Jordan (WAJ) and Yarmouk Water Company (YWC). The Project will include seven days of on-site raw water storage capacity. At the time of writing, the supply of water is expected to be via a local tie-in to the existing water supply network.

Recently (on 22 June 2026), the pipeline route was obtained unofficially as a map as presented in the figure below. The pipeline runs from an existing water pumping station in Umm Al Lulu village to the Project site, for a total distance of 4.5 km. The pipeline follows the existing RoW of a dirt road which already contains another operating water pipeline, and will therefore not require a land acquisition process.

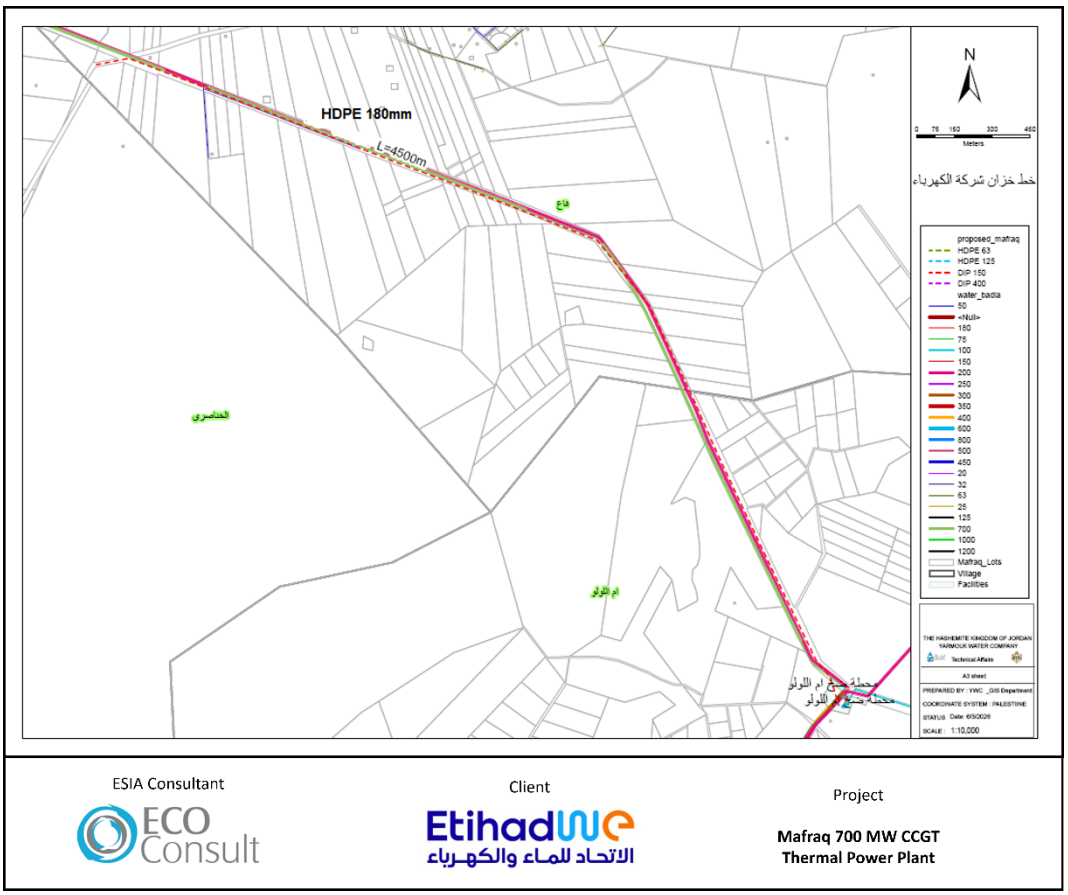


Figure 16: Water Pipeline

5.4 Overview of Project Activities

This chapter presents the likely activities to take place during the Project development and which will include four distinct phases: (i) planning and design, (ii) construction, (iii) operation, and (iv) decommissioning. Each of which is summarized below.

5.4.1 Planning and Design Phase

This phase will involve the following:

- Completion of all required studies for Project development. This will include, but not be limited to, ESIA, topography study, geotechnical study, stakeholder engagement, resettlement planning (if applicable), etc.;
- Obtaining and finalizing required financing from IFIs;
- Obtaining required permits;
- Appointment of EPC Contractor; and
- Preparation of detailed design and layout requirements.

5.4.2 Construction Phase

The typical activities that will take place during the construction phase for the Project include the following:

- Mobilization of the Project workforce, equipment, and materials to the site including but not limited to:
  - Establishment of site fencing and security measures.
  - Establishment of temporary site facilities, including laydown areas and welding areas.
  - Establishment of maintenance workshops and plant compound areas.
  - Establishment of temporary facilities for site workers.
  - Installation of temporary utility connections (power, water, sewage, and telecommunications) or provision of temporary site utilities where permanent connections are not available.
- Recruitment and onboarding of construction personnel.
- Procurement and delivery of plant equipment and materials.
- Mechanical and electrical installation of power generation equipment and associated facilities.
- Civil works, foundations, and supporting infrastructure construction.
- Pre-commissioning and system testing activities.
- Simple open cycle commissioning with three gas turbines operating independently (Phase 1).
- Combined cycle integration, including installation and commissioning of the HRSGs and steam turbine (Phase 2).
- Equipment and system commissioning, including tie-in to associated facilities.
- Performance testing and start-up activities prior to commercial operation.
- Decommissioning of temporary facilities and reinstatement.

5.4.3 Operation Phase

Operational activities will comprise:

- Generation and supply of around 700 MW of reliable, dispatchable baseload electricity to Jordan's national grid on a continuous 24-hour basis.
- Implementation of Operation and Maintenance (O&M) activities through a long-term contract with an appointed O&M Contractor.
- Execution of long-term service agreements with Ansaldo for the gas turbine fleet.
- Routine operation, monitoring, inspection, and maintenance of the power generation units and associated auxiliary systems.
- Daily Project management activities in accordance with the established operation and maintenance framework.
- Operation of the Project as a key component of Jordan's baseload electricity generation infrastructure throughout its operational life.

5.4.4 Decommissioning Phase

According to the PPA Agreement, prior to the end of the Project term, the Developer and NEPCO will meet to agree on whether the term should be extended or not. If it is agreed that the term shall not be extended, NEPCO will decide whether it will purchase the facility or the facility will be dismantled and the site shall be restored to its original condition.

In case of dismantling, decommissioning activities shall take place and robust decommissioning plans will be developed. At this stage it is envisaged that the power generation equipment, including the CTGs, HRSGs, STG, ACC, transformers, tanks, pipelines, and associated auxiliary equipment, will be dismantled and removed from the site. Equipment and materials that remain suitable for further use may be refurbished and reused at other facilities, while materials that cannot be reused will be recycled or disposed of at licensed facilities in accordance with applicable regulatory requirements. Foundations and below-ground infrastructure may either be removed or left in place, subject to the requirements in force at the time of decommissioning. Internal roads, drainage systems, and other civil infrastructure may be retained for future land use unless otherwise required by the relevant authorities. Buildings, fences, gates, and other above-ground structures associated with the Project will be removed as part of the decommissioning process, and the site will be restored in accordance with applicable regulatory requirements and agreements in place at that time.

5.5 Project Schedule

The preliminary Project schedule for the overall Project development at the time of writing comprises the following phases.

- Planning and Design phase: This phase is ongoing and is expected to be completed by Q3 2026.
- Construction phase: This will involve undertaking of all construction and commissioning activities with start-up of the Project occurring in two Phases with Phase 1 comprising simple open cycle commissioning with three gas turbines to be operational in September 2028, and Phase 2 comprises combined cycle integration, including installation and commissioning of the HRSGs and

steam turbine, to be operational in September 2029. A total construction period of approximately 20 months is anticipated from the start of construction to start-up of the simple cycle operations.

- Operation phase: This is expected to start in September 2028 with the start of Phase 1 simple cycle operation followed by Phase 2 combined cycle operations in September 2029. Operations are expected to occur for the duration of the PPA (i.e. 25 years from Phase 1).

5.6 Workforce Requirements

According to information provided by the Developer, the Project will require the following workforce throughout the construction and operation phase:

- Around 1,500 job opportunities at peak during the construction phase for a duration of around 20 months. This will mainly include skilled job opportunities (to include engineers, technicians, consultants, surveyors, etc.) and semi-skilled and unskilled job opportunities (such as laborers, security personnel, housekeeping, etc.).

  It is important to note that there is no information available at this stage for the accommodation requirements during construction – particularly whether accommodation will be onsite or at the closest cities.

- Around 60 job opportunities during the operation phase for a duration of 25 years. This will include skilled job opportunities (such as engineers, technicians, administrative employees, etc.) and unskilled job opportunities (such as security personnel, drivers, etc.).

The Developer is committed to adhering to transparent recruitment procedures which include local community members. In addition, the Developer is aiming to hire local community members to the greatest extent possible throughout the construction and operation phase for skilled and unskilled jobs, where community members have the prerequisite skills and qualities for the job. Recruitment will be undertaken in accordance with the Jordanian law, on fair assessment of skills and qualities for the job. All employees will be subject to normal human resource practices, and will have to conduct themselves in accordance with the Developer's disciplinary code. No discrimination, on ethnic, gender, race or other such demographic factor will be allowed during recruitment. The only preferential factor shall be whether a candidate is directly affected by the Project, subject to meeting all prerequisites for the specific job.

6. ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE

6.1 Air Quality and Noise

This section provides an assessment of baseline conditions within the Project site and its surroundings in relation to air quality and noise.

6.1.1 Methodology for Baseline Assessment – Air Quality

The baseline assessment was mainly based on a primary baseline monitoring campaign for the Project area. Additional details on this are provided below.

6.1.1.1 Selection of Parameters

Monitoring was undertaken for the following parameters: (i) gases to include Carbon Monoxide (CO), Sulfur Dioxide (SO2), Nitrogen Oxides (NO_x), and Ozone (O_3); (ii) Suspended Particulate Matter to include Particulate Matter smaller than 10.0 microns (PM10) and 2.5 microns (PM2.5) in diameter; and (iii) Noise Pressure Levels (NPL).

These parameters were selected based on the following rationale:

- Such parameters are likely to be present within the Project site given its characteristics and attributes. Suspended particulate matter is expected given the nature of the site. On the other hand, pollutants (such as SO2 and NO2) are expected onsite but rather at minimal concentrations as the site is in a remote area; nevertheless, motor emissions particularly from vehicles passing casually through the site (or from the main road) could be a source of such pollutants as well as the existing gas compression station located just west of the site. Finally, in terms of noise, the Project area is already subject to background noise from the windy nature of the site as well as casual vehicular movement from the nearby road.
- Such parameters are likely to be affected during the Project's construction and operation activities. All air pollutant parameters selected as well as noise are expected to be slightly impacted and increase specifically during the Project's construction activities. This will include dust from land leveling activities and excavations, emissions from vehicles and machinery used onsite.

  More importantly, all air pollutant parameters selected are expected to be impacted during the operation phase. Such parameters are associated with the combustion of natural gas as well as diesel (used as backup fuel source only). Although the Project is not expected to impact Ozone levels, this parameter was specifically required to be captured by the MoEnv. Similarly, the generators used are mainly expected to be a permanent source of noise during operation.
- Meteorological data was collected to support the assessment, including wind speed, wind direction, temperature and atmospheric pressure. Additional parameters such as relative humidity, solar radiation and precipitation will be reviewed where available.

6.1.1.2 National Standards and Limits

Jordanian Ambient Air Quality Standards

Jordan's Ministry of Environment has adopted ambient air quality limits under the Jordanian Ambient Air Quality Standards (JS 1140/2024). This is the primary regulatory framework governing air quality in the country. The Jordanian AAQS are presented in the table below.

Table 14: Ambient Air Quality Standards as per JS 1140:2024

Pollutant	Averaging Period	Maximum Permissible Limit	Number of Permitted Exceedances
SO_2	1 hour	350 µg/m³ (134 ppb)	—
	24 hours	125 µg/m³ (48 ppb)	3 times within 12 months
CO	1 hour	30 mg/m³ (26 ppm)	—
	8 hours	10 mg/m³ (9 ppm)	—
NO_2	1 hour	200 µg/m³ (107 ppb)	—
	24 hours	120 µg/m³ (64 ppb)	3 times within 12 months
	Annual	40 µg/m³ (21 ppb)	—
O_3	1 hour	165 µg/m³ (84 ppb)	—
	8 hours	120 µg/m³ (61 ppb)	3 times within 12 months
PM_{10}	24 hours	120 µg/m³	3 times within 12 months
	Annual	70 µg/m³	—
$PM_{2.5}$	24 hours	50 µg/m³	3 times within 12 months
	Annual	15 µg/m³	—

6.1.1.3 Jordanian Emission Limits

Jordan's Ministry of Environment also regulates emissions in the form of emission limits for various sources and industries. Emission limits are the maximum pollutant concentration at the outlet / exhaust that sources are allowed to reach. The emission limits adopted by the MoEnv are set forth in Maximum Allowable Limits of Air Pollutants Emitted from the Stationary Sources (JS: 1189/2006). The relevant emission limits are presented in the table below.

Table 15: Maximum Permissible Emission Levels and Limits

Pollutant and Condition	Maximum Allowable Limits of Emission (mg/Nm³)
SO_2 (Burning of fuel) [a]	6,500
NOx calculated as NO_2 Combustion at a temperature less than 1200 °C Combustion at temperatures above 1200 °C	 200 1,500
PM / dust	50
[a] Until another petrol source is found that will contain a lower concentration of sulfur than the current sources	

6.1.1.4 International Finance Corporation Guidelines

World Health Organization (WHO) Ambient Air Quality Standards

The IFC General EHS Guidelines requires that emissions do not result in pollutant concentrations that reach or exceed relevant AAQS, or in their absence, other internationally recognized standards such as the WHO (World Health Organisation, 2021). The IFC specifies a clear hierarchy for the application of these standards: national ambient air quality standards (AAQS) take precedence, and in their absence, the current WHO Air Quality Guidelines or other internationally recognized benchmarks may be applied.

In the context of this assessment, Jordanian standards are established and applicable. Therefore, the WHO guidelines have been referenced for comparative purposes only. The air quality assessment has been carried out in accordance with the Jordanian AAQS, as required under IFC guidance prioritizing national standards where available. The relevant WHO standards are provided in the table below.

Table 16: WHO Air Quality Guideline Levels

Pollutant	Averaging Period	IFC EHS guidelines (WHO Ambient Air Quality Guidelines)				
		Interim target 1 (µg/m³)	Interim target 2 (µg/m³)	Interim target 3 (µg/m³)	Interim target 4 (µg/m³)	Guideline value (µg/m³)
SO_2	24 hours	125	50	-	-	40
CO	1 hour	-	-	-	-	35,000
	8 hours [a]	-	-	-	-	10,000
	24 hours [a]	7,000	-	-	-	4,000
NO_2	1 hour	-	-	-	-	200
	24 hours [a]	120	50	-	--	25
	Annual	40	30	20	-	10
PM_{10}	24-hour [a]	150	100	75	50	45
	Annual	70	50	30	20	15
$PM_{2.5}$	24-hour [a]	75	50	37.5	25	15
	Annual	35	25	15	10	5
[a] 99th percentile (i.e. 3 - 4 exceedance days per year).						

6.1.1.5 IFC Emissions Limits

The IFC General EHS Guidelines stipulate emission limits for combustion facilities based on the source type, size, and fuel type. The relevant emission limits applicable to the operations of turbines are summarized in the table below.

Table 17: IFC Emission Limits for Gas Turbines > 50 MW

Source	Pollutant	Emission Limit
Combustion Turbine – Natural Gas (Unit > 50 MWth) [a]	NOx	51 mg/Nm³ (25ppm)
	PM	N/A [b]
	SO_2	N/A [b]
Combustion Turbine – Fuels other than Natural Gas (Unit > 50 MWth) [a]	NOx	152 mg/Nm³ (74ppm)
	PM	50 mg/Nm³ (NDA) 30 mg/Nm³ (DA) [c, e]
	SO_2	1% or less of S fuel (NDA) 0.5% or less of S fuel (DA) [c, e]

[a] Megawatt thermal input on HHV basis;
[b] N/A = not applicable;
[c] NDA = non-degraded airshed; DA = Degraded airshed (poor air quality); Airshed should be considered as being degraded if nationally legislated air quality standards are exceeded or, in their absence, if WHO Air Quality Guidelines are exceeded significantly;
[e] S is sulphur content (expressed as a percent by mass);
[f] Nm³ is at one atmospheric pressure, 0 degree Celsius;
[g] MWth category is to apply to single units. Guideline limits apply to facilities operating more than 500 hours per year.

6.1.1.6 Background Ambient Air Quality

Baseline Ambient air quality monitoring was undertaken at the Project site between the 5th of May 2026 and the 9th of June 2026, covering a total survey duration of approximately one (1) month. The ambient air quality monitoring was undertaken in order to establish representative long-term and short-term ambient air quality in and around the Project site.

Relevant to the air dispersion modeling and air quality assessment, as part of the monitoring program, SO_2, NO_2, CO, PM_{10} and $PM_{2.5}$ were monitored at two (2) ambient air quality monitoring locations.

A summary of the survey methodology, monitoring locations, and an analysis of the baseline survey results, benchmarked against long-term regional baseline data is provided below.

The coordinates of the air quality monitoring stations (AQMS) are provided in the table below and the monitoring location is shown in the figure that follows. The sites were selected to be representative of the nearest communities within the Project airshed.

Table 18: Ambient Air Quality Monitoring Stations Locations Summary

AQMS	Universal Transverse Mercator (UTM Coordinates)	
	m N	m E
AQ1	222,614.8	3,591,133.0
AQ2	224,953.8	3,590,808.8

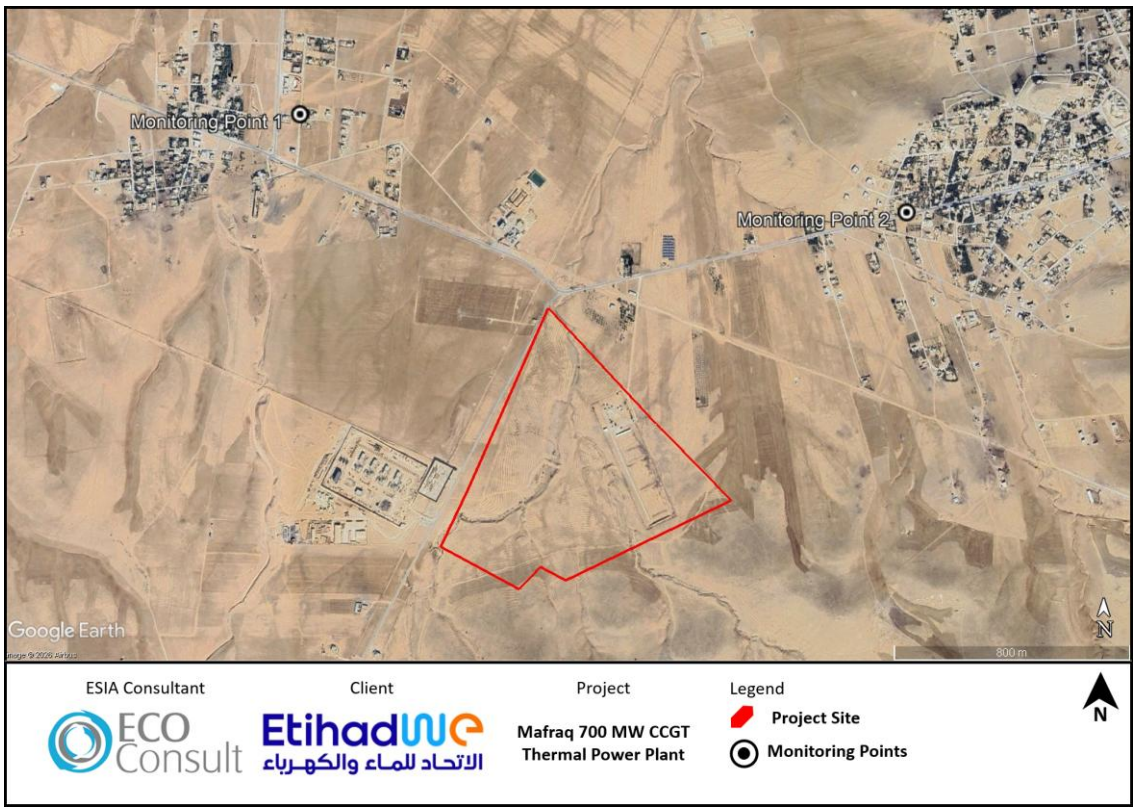


Figure 17: Ambient Air Quality Monitoring Locations

6.1.2 Baseline Characterization – Air Quality

In order to establish and assess the short-term and long-term baseline ambient air quality within and around the Project area, the hourly baseline concentrations were analyzed to determine the maximum, minimum, and average pollutant concentrations across the applicable averaging periods for each pollutant. These averaging periods included 1-hour, 8-hour (applicable to CO only), 24-hour, and full data-set averages. The results of the analysis are summarized in the table below.

Table 19: Baseline Ambient Air Quality at AQ1 and AQM2

Pollutants	Ambient Air Quality Standard		Overall Average Baseline Level (µg/m³)		
	Averaging Period	Jordanian AAQS (µg/m³)	Maximum (µg/m³)	Minimum (µg/m³)	Overall Average
AQM1					
SO_2	1-hour	786.0	54.1	7.2	23.1
	24-hour	366.8	37.4	16.8	
	Annual	104.8	-	-	
NO_2	1-hour	394.8	95.1	5.6	27.6

	24-hour	150.4	40.5	14.6	
	Annual	94.0	-	-	
CO	1-hour	29,900	4,573.2	1,537.4	2,544.1
	8-hour	10,350	3,687.1	2,007.4	
PM_{10}	24-hour	120	55.6	33.4	49.1
	Annual	70	-	-	
$PM_{2.5}$	24-hour	65	13.9	8.8	12.4
	Annual	15	-	-	
AQM2					
SO_2	1-hour	786.0	44.0	6.8	18.2
	24-hour	366.8	22.3	14.1	
	Annual	104.8	-	-	
NO_2	1-hour	394.8	72.3	8.7	25.5
	24-hour	150.4	30.1	17.3	
	Annual	94.0	-	-	
CO	1-hour	29,900	4,616.8	1,292.2	2,595.8
	8-hour	10,350	3,620.2	1,772.7	
PM_{10}	24-hour	120	48.2	37.4	43.1
	Annual	70	-	-	
$PM_{2.5}$	24-hour	65	19.0	10.8	13.6
	Annual	15	-	-	

Based on a review of the baseline air quality survey data and analyzed results, all pollutants remained within the Jordanian AAQS across all averaging periods, with no exceedances recorded, indicating a baseline airshed that is broadly in good condition relative to regulatory standards.

Gaseous pollutants showed the widest margin from their respective standards. Annual SO_2 reached 22.0% of the standard at AQM1 and 17.4% at AQM2. CO 8-hour averages sat at roughly a quarter of the standard at both stations (24.6% at AQM1, 25.1% at AQM2). NO_2 levels were somewhat higher, with annual averages reaching 29.4% of the standard at AQM1 and 27.1% at AQM2.

PM showed the highest relative levels of all pollutants monitored. PM_{10} annual averages reached 70.1% of the standard at AQM1 and 61.6% at AQM2, while $PM_{2.5}$ annual averages reached 82.7% at AQM1 and 90.7% at AQM2, the highest relative concentration recorded across the dataset.

It should be noted that the survey averages are compared against annual AAQS thresholds as a conservative and useful indicator only; the monitoring period of 2–4 weeks does not constitute a full annual dataset, and the comparison should not be read as a direct annual compliance assessment.

In addition to the site-specific baseline survey undertaken, the MoEnv provided ambient air quality data for the air quality monitoring station located in Al Mafraq / Al Khalediah. The AQM data included daily averages for PM_{10}, NO_2 and SO_2 for the years 2024 and 2025. The daily averages were analyzed to extract the maximum, minimum, and annual average concentrations for the monitored pollutants. The results of the analysis are presented in the table below.

Table 20: Baseline Ambient Air Quality in Al Mafraq (2024 and 2025)

Pollutants	Ambient Air Quality Standard		Overall Average Baseline Level (µg/m³)		
	Averaging Period	Jordanian AAQS (µg/m³)	Maximum (µg/m³)	Minimum (µg/m³)	Overall Average
2024					
SO_2	24-hour	366.8	12.6	0.0	4.2
	Annual	104.8	-	-	
NO_2	24-hour	150.4	59.2	13.3	34.0
	Annual	94.0			
PM_{10}	24-hour	120	306.1 [a]	7.6	82.5

Pollutants	Ambient Air Quality Standard		Overall Average Baseline Level (µg/m³)		
	Averaging Period	Jordanian AAQS (µg/m³)	Maximum (µg/m³)	Minimum (µg/m³)	Overall Average
	Annual	70	-	-	
2025					
SO_2	24-hour	366.8	16.2	0.0	4.5
	Annual	104.8	-	-	
NO_2	24-hour	150.4	144.8	12.4	56.2
	Annual	94.0	-	-	
PM_{10}	24-hour	120	510.3 [b]	11.7	92.8 [b]
	Annual	70	-	-	

[a] 31 exceedances of the 24-hour standard in 2024. Three allowed per year as per the Jordanian AAQS.
[b] 60 exceedances of the 24-hour standard in 2025. Three allowed per year as per the Jordanian AAQS.

The MoEnv data shows a similar overall pattern to the site-specific baseline survey, with SO_2 and NO_2 remaining well within the Jordanian AAQS in both 2024 and 2025, while PM_{10} stands out as the pollutant with significantly higher concentrations relative to the AAQS.

SO_2 levels were low across both years, with annual averages reaching only 4.2% of the standard in 2024 and 4.5% in 2025, broadly consistent with the wide compliance margin observed in the site survey data. NO_2 annual averages were moderate, at 36.2% of the standard in 2024 and 59.8% in 2025, the latter representing a notable year-on-year increase, though still well below the limit. Daily NO_2 maxima also rose substantially between the two years, from 59.2 µg/m³ in 2024 to 144.8 µg/m³ in 2025, approaching the 150.4 µg/m³ 24-hour standard.

In terms of PM_{10}, annual averages exceeded the standard in both years, reaching 117.9% of the limit in 2024 and 132.6% in 2025, with daily maxima of 306.1 µg/m³ and 510.3 µg/m³ respectively, more than two and four times the 120 µg/m³ 24-hour threshold. The dataset also recorded 31 exceedances of the 24-hour standard in 2024 and 60 in 2025, both well above the three exceedances permitted per year under the Jordanian AAQS.

This contrasts with the site-specific baseline survey, where PM_{10} remained compliant at both AQM1 and AQM2 (70.1% and 61.6% of the annual standard, respectively). The divergence is likely attributable to the longer monitoring duration of the Ministry dataset, which captures a full annual cycle rather than the 2–4 week survey window, and is therefore more likely to capture periodic dust events characteristic of the region. Al Mafraq sits within an arid desert environment, where wind-blown dust, sandstorms, and naturally elevated background particulate levels are common and can drive short-term PM_{10} spikes well beyond standards that are typically calibrated for less dust-prone regions. The scale of the daily maxima recorded in both years, particularly in 2025, is consistent with episodic dust events overlaying an already elevated coarse particulate background, rather than a sustained anthropogenic source.

Taken together, the two datasets present a consistent picture: gaseous pollutants (SO_2, NO_2) are not a significant concern at this airshed, while PM levels are relatively high with respect to the national AAQS, leading to a high potential for cumulative exceedances of the PM AAQS.

6.1.3 Methodology for Baseline Assessment – Noise

6.1.3.1 Jordanian Regulations

Environmental noise requirements in Jordan are set out in Article 6 of the Instructions for Reduction and Prevention of Noise (2003), which establishes maximum permissible environmental noise levels for different land-use categories. The surrounding sensitive receptors can be characterized as

"Residential areas in the suburbs" and are therefore assessed against the residential noise limits of 55 dB(A) during the daytime and 45 dB(A) during the night-time.

Table 21: Jordanian Noise Limits

Receptor	Allowable Limits for Noise Levels dB(A)	
	Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Residential areas in cities.	60	50
Residential areas in the suburbs.	**55**	**45**
Residential areas in (rural) villages.	50	40
Residential areas with some workshops, simple crafts or business areas, commercial areas, administrative centers, and city centers.	65	55
Industrial zones (heavy industries).	75	65
Places of worship or education and medical treatment centers or hospitals.	45	35

6.1.3.2 International Guidelines

International Finance Corporation

The international standards / guidelines that have been applied to the Project in this Noise Modeling Report are the IFC General Environmental, Health and Safety (EHS) Guidelines (2007). The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice. General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors.

IFC refers to guidance from the World Health Organization (WHO) on establishing community noise levels. The guidance indicates that noise levels at receptors should not exceed the levels presented in the table below, or result in a maximum increase in background levels of 3 dB(A) at the nearest receptor location off-site.

Table 22: IFC Noise Level Guidelines

Receptor	Noise Level Guidelines (One Hour L_{Aeq} (dB))	
	Daytime (7 am – 10 pm)	Night-time (10 pm – 7 am)
Residential, Institutional or Educational	55	45
Industrial or Commercial	70	70

The Jordanian residential limits are consistent with the IFC EHS Guidelines and therefore compliance with the IFC criteria is also considered to demonstrate compliance with the applicable Jordanian environmental noise limits.

ISO 1996-1-3 'Description and Measurement of Environmental Noise'

International Organization for Standardization (ISO) 1996-1-3 – 'Description and Measurement of Environmental Noise' defines the basic quantities to be used for the description of noise in community environments and the basic procedures for the determination of these quantities. It also includes the

methods for acquisition of data that enable specific noise situations to be checked for compliance with given noise limits.

ISO 9613 Acoustics – 'Attenuation of Sound during Propagation Outdoors'

ISO 9613-2 Acoustics – 'Attenuation of Sound during Propagation Outdoors' specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (L_{Aeq}) under meteorological conditions favorable to propagation from sources of known sound emission.

6.1.4 Results

The table below presents the analysis results of ambient (24-hour) noise levels for the measurement points, compared with the maximum permissible limits specified in Jordanian law standards.

The table below indicates that the site maintains generally low noise levels in line with both national standards and the IFC guidelines. Noise levels were within the allowable limits during the daytime. While the nighttime results exceeded allowable limits, this is attributed to natural reasons, mainly wind, since no anthropogenic noise sources were identified during the monitoring period.

Table 23: 24-Hour Ambient Noise Level Measurements

Noise Monitoring (24-hours) Results – P1			
Time	**Date**		
	29-30/05/2026	**30-31/05/2026**	**31/05-01/06/2026**
12:00-13:00	42.2	46.3	44.9
13:00-14:00	47.5	44.6	39.5
14:00-15:00	44.4	47.0	45.0
15:00-16:00	48.7	45.2	46.5
16:00 – 17:00	40.5	43.6	41.3
17:00 – 18:00	49.5	49.9	48.3
18:00 – 19:00	47.6	44.3	49.3
19:00 – 20:00	45.6	44.8	43.0
20:00 – 21:00	46.3	44.8	43.6
21:00 – 22:00	46.2	46.5	42.3
22:00 – 23:00	44.9	46.6	41.0
23:00 – 00:00	47.2	52.3	40.5
00:00 – 01:00	62.1	48.8	46.9
01:00 – 02:00	54.7	48.7	45.6
02:00 – 03:00	49.0	50.2	54.1
03:00 – 04:00	46.8	49.3	45.7
04:00 – 05:00	48.6	52.9	49.7
05:00 – 06:00	47.7	53.3	45.8
06:00 – 07:00	53.1	49.3	48.0
07:00 – 08:00	48.5	50.1	49.6
08:00 – 09:00	42.4	44.1	42.8
09:00 – 10:00	47.2	45.3	44.7
10:00 – 11:00	40.3	50.0	42.1
11:00 – 12:00	49.6	42.0	47.3
Average	**51.2**	**48.6**	**46.8**
Daytime Average	**48.1**	**49.4**	**46.7**
Nighttime Average	**53.6**	**48.3**	**47.1**
Time	**Noise Monitoring (24-hours) Results – P2**		
	Date		

Noise Monitoring (24-hours) Results – P1			
Time	Date		
	29-30/05/2026	30-31/05/2026	31/05-01/06/2026
	03-04/06/2026	04-05/06/2026	05-06/06/2026
11:00 – 12:00	47.2	46.3	45.6
12:00 – 13:00	44.1	44.4	42.8
13:00 – 14:00	41.6	41.9	41.3
14:00 – 15:00	56.3	58.4	58.6
15:00 – 16:00	40.0	44.0	42.2
16:00 – 17:00	46.3	50.2	46.0
17:00 – 18:00	48.4	43.5	48.1
18:00 – 19:00	51.7	46.5	50.2
19:00 – 20:00	52.8	45.1	52.8
20:00 – 21:00	52.1	47.5	52.9
21:00 – 22:00	52.1	49.0	52.3
22:00 – 23:00	53.6	52.4	50.7
23:00 – 00:00	56.3	57.3	61.2
00:00 – 01:00	53.8	53.6	49.1
01:00 – 02:00	56.2	51.7	50.6
02:00 – 03:00	55.3	54.4	49.7
03:00 – 04:00	57.1	56.0	57.7
04:00 – 05:00	52.4	52.2	51.0
05:00 – 06:00	51.5	50.9	50.3
06:00 – 07:00	57.8	57.9	57.4
07:00 – 08:00	47.8	50.3	49.1
08:00 – 09:00	59.4	58.6	57.8
09:00 – 10:00	47.2	47.8	48.0
10:00 – 11:00	45.7	48.9	47.8
Average	**53.5**	**53.0**	**53.6**
Daytime Average	**53.8**	**53.9**	**53.7**
Nighttime Average	**53.6**	**52.0**	**53.8**
National Standards	**Daytime Limit: 55 dB(A), Nighttime Limit: 45 dB(A)**		
IFC Limits	**Daytime Limit: 55 dB(A), Nighttime Limit: 45 dB(A)**		

6.2 Climate and Meteorology

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to climate and meteorology.

6.2.1 Assessment of Baseline Conditions

The methodology was based on secondary data available through online resources on key climate and meteorological conditions. This includes temperature, wind speeds, humidity, rainfall, and others as applicable. The assessment provided below is for Mafraq Governorate, which is considered representative of the Project site and the local communities.

6.2.2 Results and Outcomes

6.2.2.1 Temperature

The figure below presents the annual temperature variations in Mafraq Governorate based on historical information throughout the past 30 years. The average daily maximum temperature presents the peak temperature on an average day each month, while the average daily minimum temperature presents the average minimum temperature.

As shown in the figure below, the hottest months are typically July – August, with averages reaching a maximum of 34 °C. The coldest months are typically December – February with averages reaching a minimum of 4 °C.

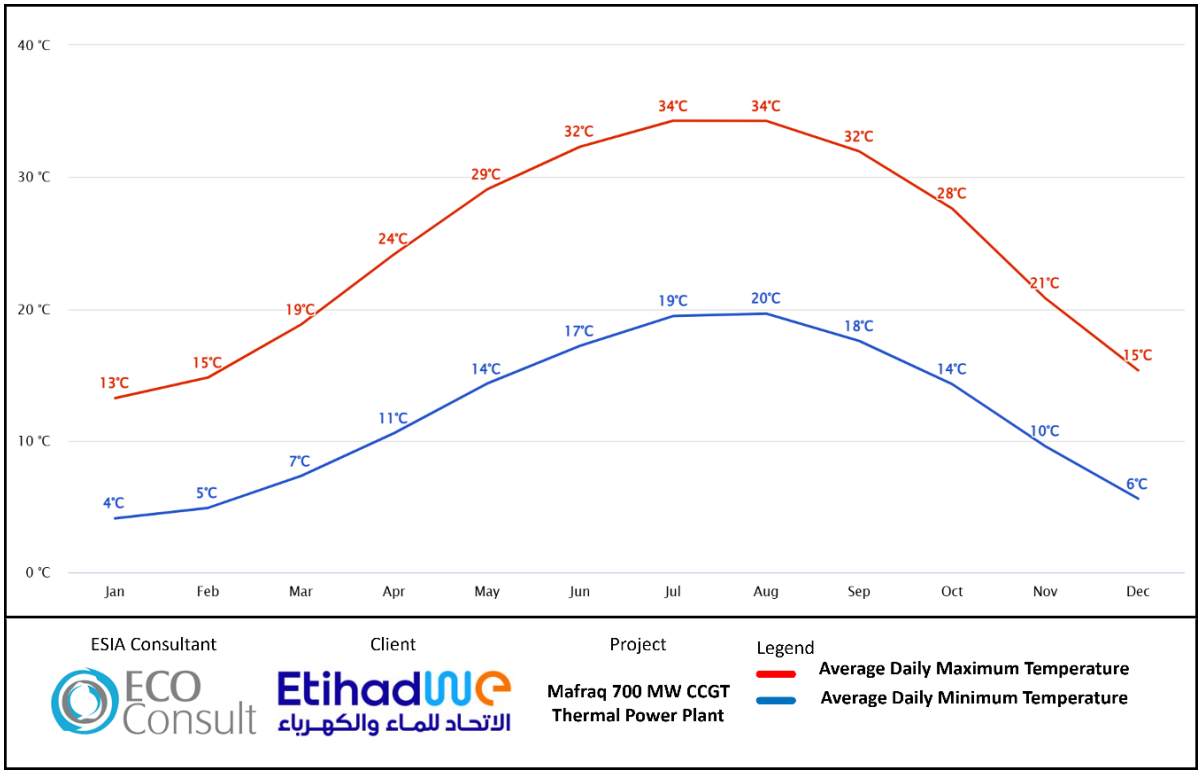


Figure 18: Average Monthly Maximum and Minimum Temperatures for the Past 30 Years

6.2.2.2 Wind Speed and Direction

The figure below presents the windspeed patterns across Mafraq Governorate. As noted below, there is a distinct seasonal variation, with higher wind speeds prevalent during the warmer months. July is the month with the highest wind speeds, ranging from a minimum of 8 km/h to a maximum of 25 km/h, with an average speed of 15 km/h. The lowest wind speeds occur during October, ranging from a minimum of 4 km/h to a maximum of 16 km/h, with an average wind speed of 9 km/h.

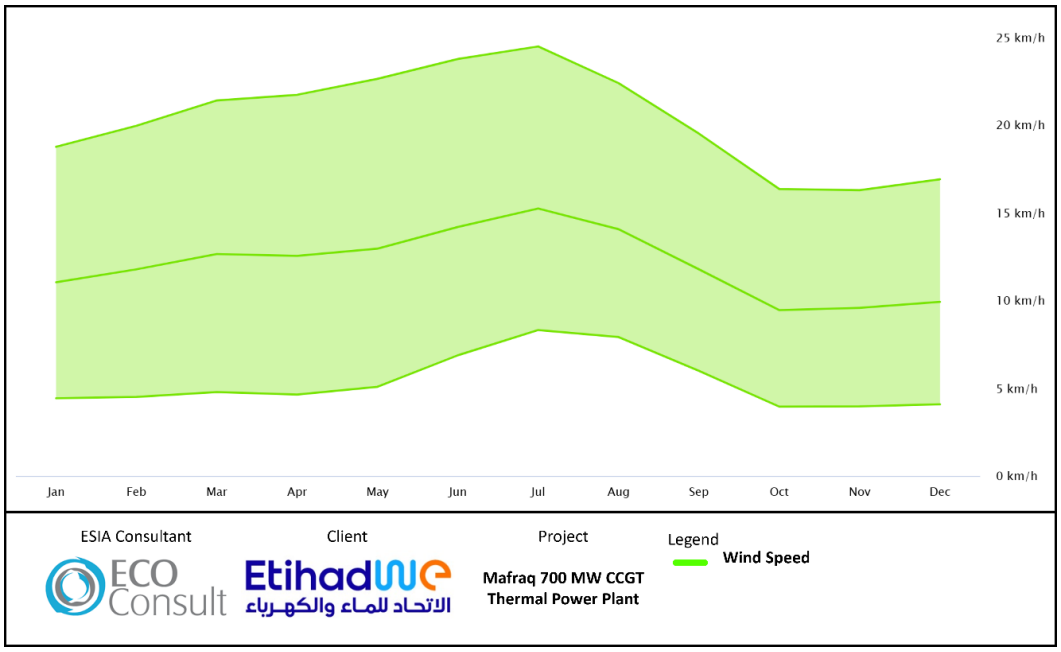


Figure 19: Average Monthly Wind Speeds for the Past 30 Years

The figure below categorizes the months based on the frequency of different wind speeds. The months February – April have the highest speeds exceeding 40 km/h. Generally, wind speeds in Mafraq predominantly fall within the range of 20 km/h to 30 km/h.

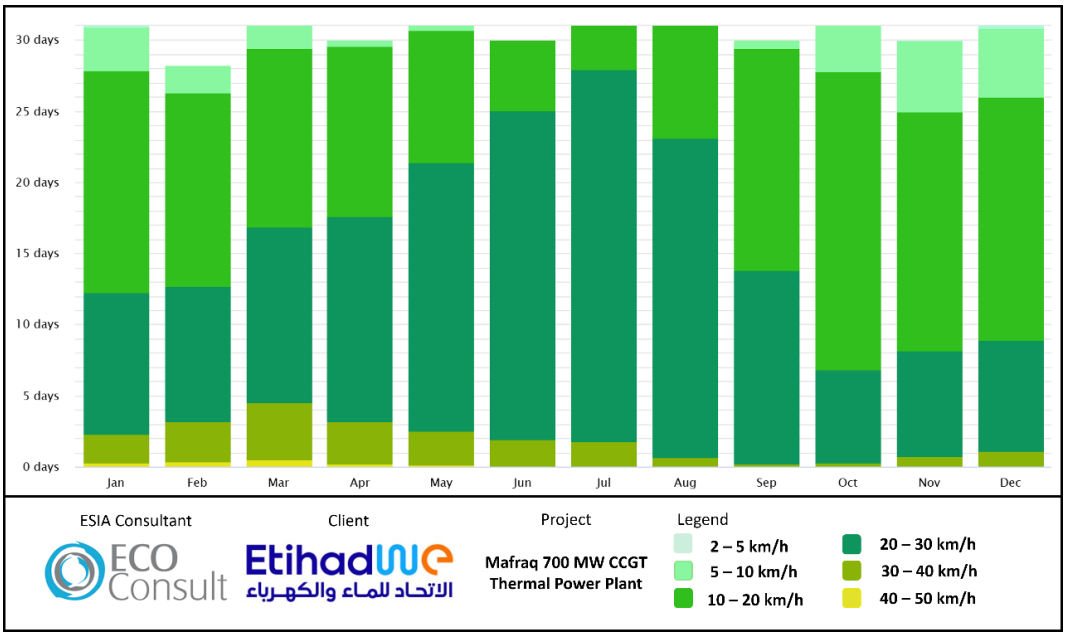


Figure 20: Wind Speed Patterns in Mafraq Governorate Over the Past 30 Years

The figure below presents a wind rose with distinctive patterns in wind direction. The prevailing wind direction is predominantly from the northwest (NW) to the west-northwest (WNW). Conversely, the

sector with the least occurrence of wind direction spans from the northeast (NE) to the southwest (SW).

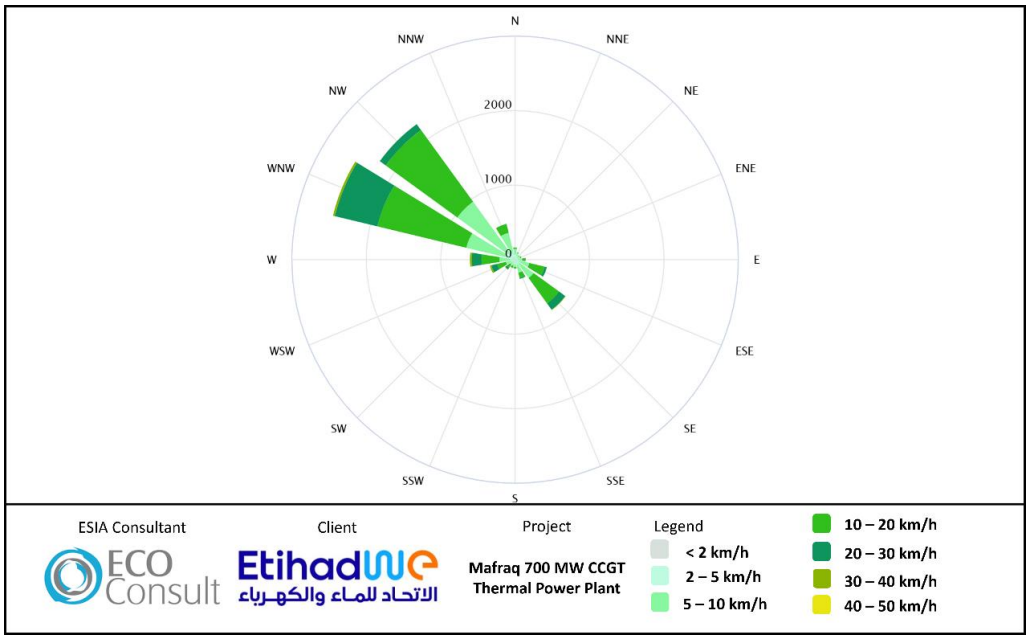


Figure 21: Wind Rose of Mafraq Governorate

6.2.2.3 *Rainfall*

The figure below presents the amount of rainfall and number of rainy days across the years in Mafraq Governorate. As noted, January has the highest number of rainy days (at around 9.4 days). July was the only month noted to have zero (0) rainy days. As noted, rainfall intensity varies but also reaches a maximum in December – January and gradually decreases until May, with a maximum amount of 20–50 mm, while an average is at around 10–20 mm.

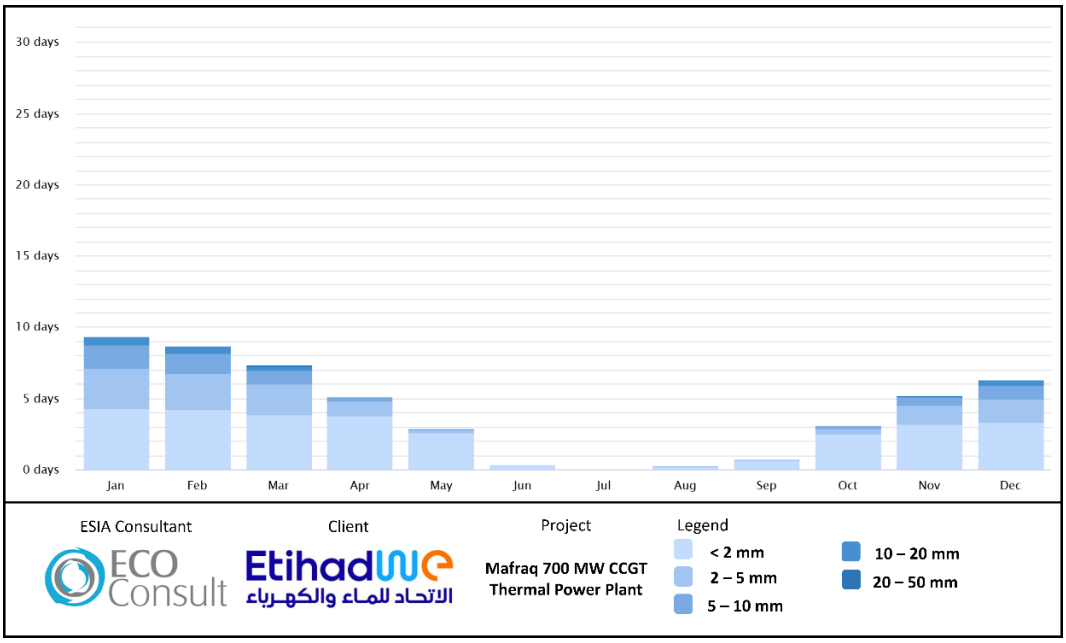


Figure 22: Average Monthly Rainfall Distribution in Mafraq Governorate for the Past 30 Years

6.2.2.4 Humidity

In Mafraq Governorate, there is a seasonal fluctuation in average humidity levels. January registers the highest average relative humidity at 63.4%, highlighting a relatively more humid condition during winter. The lowest average humidity levels in Mafraq Governorate are during the months of late summer and early autumn, ranging between 43.27% and 44.1% in September and October. The data suggests a gradual rise in humidity from August onward, reaching its peak in January, after which it starts to decline. This pattern reflects the distinct humidity variations between the drier summer months and the more humid autumn and winter seasons.

Table 24: Average Humidity Levels

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Humidity (%)	63.4	56.26	51.01	42.98	37.19	38.32	39.6	43.09	43.27	44.1	48.48	57.05

6.3 Biodiversity

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to biodiversity.

6.3.1 Assessment of Baseline Conditions

This section presents the biodiversity baseline conditions within the Project site and associated facilities. The assessment is based on a desktop review, stakeholder consultations and field surveys undertaken to identify habitats, flora, fauna, and biodiversity-sensitive areas within and around the Project site.

A survey for the water pipeline was not undertaken as the route was only recently obtained. However, as discussed in further detail in “Chapter 4.2”, given that the water pipeline runs within the RoW of a formal road within which an existing water pipeline runs as well, there is no risk from excluding the water pipeline from such surveys.

6.3.2 Desktop Review

6.3.2.1 Biogeographical Regions

Regarding the biogeographical affinities of the Project site, it is formally classified within the Mediterranean biogeographical zone. However, observations made during a preliminary site visit indicated that the Project site itself is situated within the arid Mediterranean zone, at the boundary of the Irano-Turanian biogeographical region.

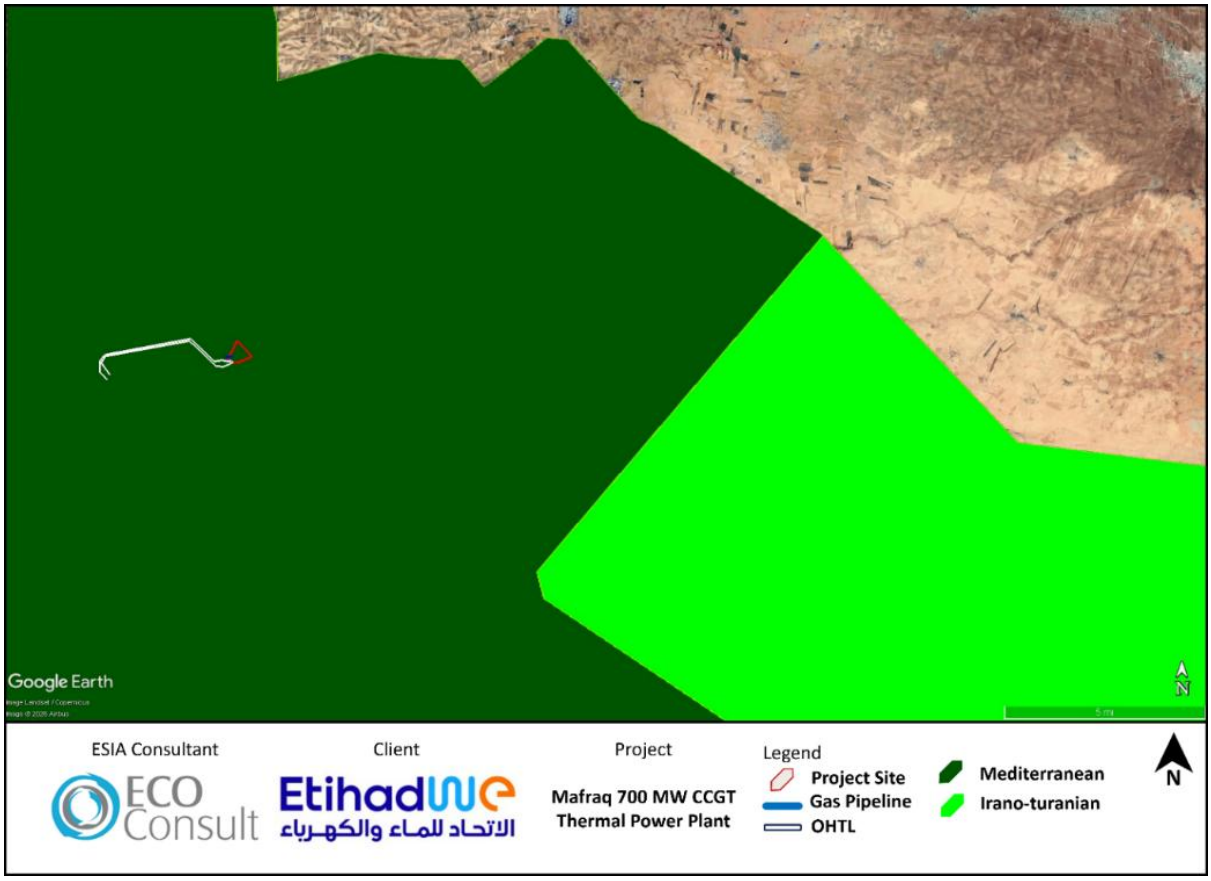


Figure 23: Location of the Project Site in relation to the Biogeographical Regions

6.3.2.2 Vegetation Type

Two (2) forms of vegetation communities occur around the Project site and the associated OHTL which include: (i) Batha steppe, and (ii) Grassland steppe. A Batha steppe is an arid or semi-arid scrubland ecosystem. In Jordan, this specific landscape represents a transitional zone between Mediterranean forests and the Irano-Turanian zone, where *Anabasis syriaca*, *Artemisia sieberi*, and *Noaea mucronata* are the most common species. Meanwhile, the Grassland steppe is primarily concentrated within the Irano-Turanian phytogeographical zone, featuring vegetation characterized by drought-resistant dwarf shrubs and seasonal grasses.

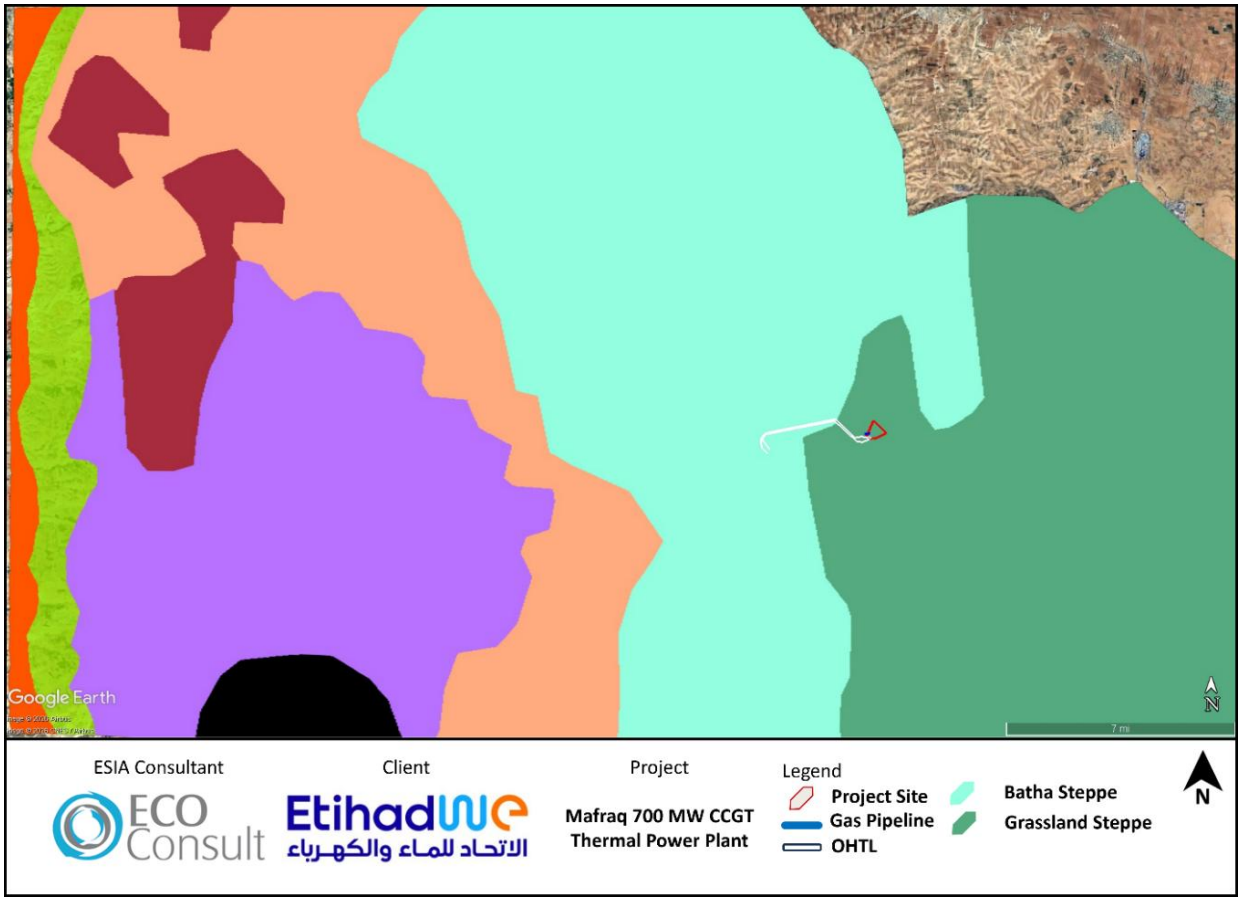


Figure 24: Location of the Project Site in relation to the Vegetation Types in Jordan According to Alberts et al. (2004)

6.3.2.3 Important Bird Areas (IBAs)

A desktop review of the Integrated Biodiversity Assessment Tool (IBAT) identified three (3) Key Biodiversity Areas (KBAs) within the wider vicinity of the Project site. These include the Irbid–Mafraq Plains KBA, identified by IBAT as located around 2 km from the Project site, and the Ajloun and Dibbin KBAs, both located around 20 km from the Project site. These areas were originally identified as Important Bird and Biodiversity Areas (IBAs) based on internationally recognized criteria and thresholds and are currently recognized as KBAs of international biodiversity significance, as shown in Figure 25.

However, as noted within 'Chapter 7' consultation with the RSCN confirmed that the boundaries and designation status of these areas have since been updated (but have not been updated on IBAT yet). This has been provided officially through e-mail communication from RSCN.

Based on the updated RSCN information, the nearest IBA/KBA is the Irbid–Mafraq Plains, located around 10 km from the Project site, as illustrated in Figure 26.

The Irbid–Mafraq Plains serves as an important habitat and breeding ground for raptors, steppe birds, and resident owls. Notably, the region supports several globally threatened, endangered, and restricted-range species, including the Eastern Imperial Eagle (*Aquila heliaca*) and the Sociable Lapwing (*Vanellus gregarius*).

Common residents and breeders in the area include the Crested Lark (*Galerida cristata*), Desert Lark (*Ammomanes deserti*), Temminck's Lark (*Eremophila bilopha*), and the Red-backed Shrike (Lanius collurio) (eBird).

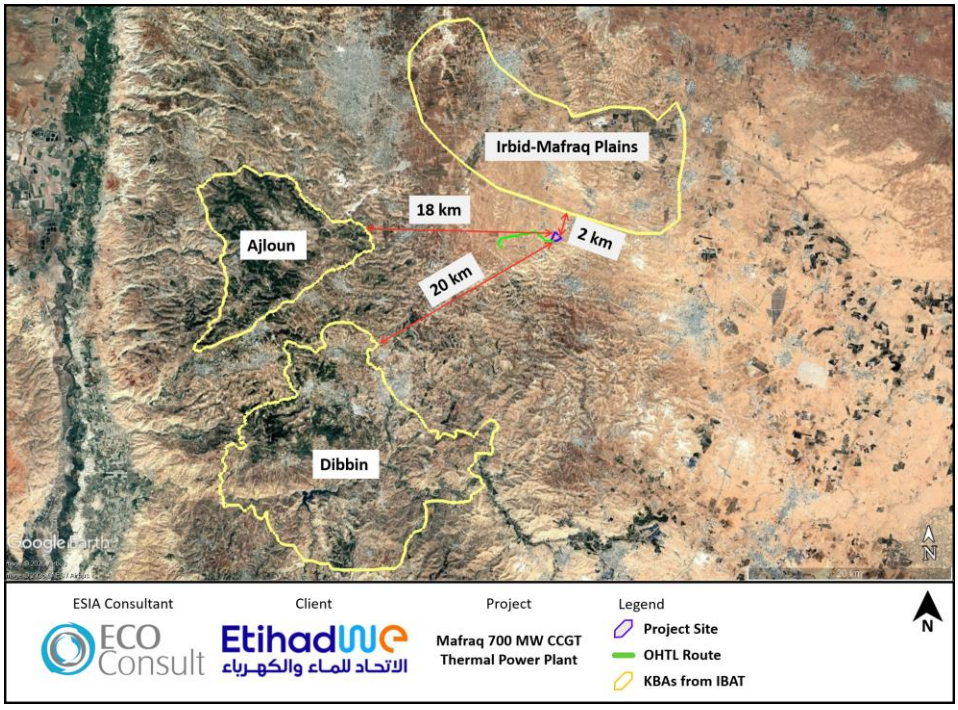


Figure 25: Project Site and Closest IBAs/KBAs from IBAT

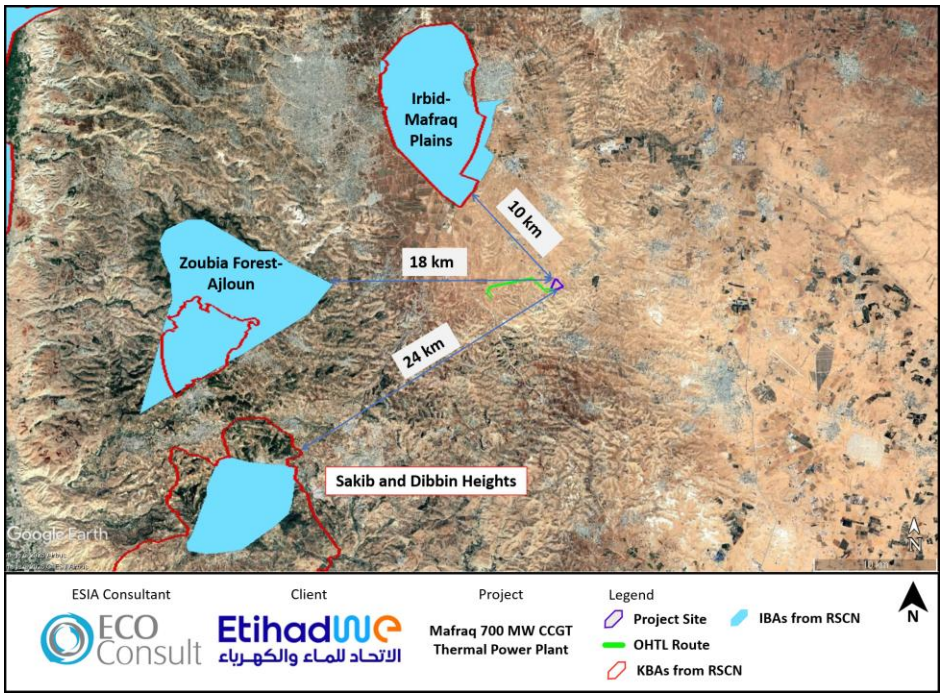


Figure 26: Project Site and Updated Boundaries of Closest IBAs/KBAs from RSCN

6.3.3 Habitat and Flora Survey

6.3.3.1 Habitat and Botanical Assessment

A desk study was conducted to gather information on the potential flora interest within the Project area. The output of this exercise includes a list of species of conservation concern that could potentially be impacted by the Project. Sources of information included the Jordan IUCN Red List, and other relevant publications.

Following the desktop study, a field survey was conducted in June 2026 by a botanical team of three (3) experts. The experts followed standardized methodologies which included a general reconnaissance of the entire study area, during which all identified sites of interest were visited and assessed.

Transect surveys were carried out at the Project areas covering the Project site and the OHTL route. At each stop, plant species were identified and recorded. Minor adjustments to survey locations were made where necessary to account for field conditions, while drawing on the botanical team's local knowledge, expertise, and professional judgment to ensure adequate coverage of representative habitats.

The timing of the survey was considered appropriate for the assessment objectives, as the majority of plant species expected to occur within the study area retain sufficient above-ground vegetation during this period to allow for reliable identification, including any rare or ecologically important species that may be present.

The objectives of the survey are as follows:

- Collect onsite data regarding the flora within the Project area, including general lists of species, habitat identification and distribution, economic evaluation, photographic documentation, and assessment of threats to the floral ecosystem; and
- Identify flora species currently present on site based on local distribution, existing habitats, and historical records.

Finally, consultations undertaken with key stakeholders, including the Birdlife International and RSCN, confirmed that the survey approach and level of effort adopted for the assessment were considered adequate and appropriate for characterizing the flora and habitats within the Project area.

6.3.3.2 Project Site

The Project site has a flat terrain that is arid and characterized by scattered vegetation. The floristic inventory of the study area includes nine (9) plant species identified within the Project site as shown in the table below. The most common species identified included *Anabasis syriaca*, *Atriplex halimus*, and *Avena sterilis*. *Avena sterilis* in particular is generally recognized as a highly invasive and economically damaging weed. All identified species are listed as Least Concern (LC) according to Jordan's Red List.

The majority of the site is barren and highly degraded due to evidence of plowingplowing, with the exception of the shallow wadi that intersects the site, which supports a relatively high concentration of *Retama raetam* shrubs (but is still considered disturbed and degraded).

Table 25: Plant Species Recorded from the Project Site

Species Name	Status
Anabasis syriaca	Common
Atriplex halimus	Common
Carduus australis	Common
Artemisia sieberi	Common
Avena sterilis	Common
Hordeum marinum	Common
Salvia dominica	Common
Peganum harmala	Common
Retama raetam	Common



Figure 27: Landscape of the Natural Terrain of Project Site

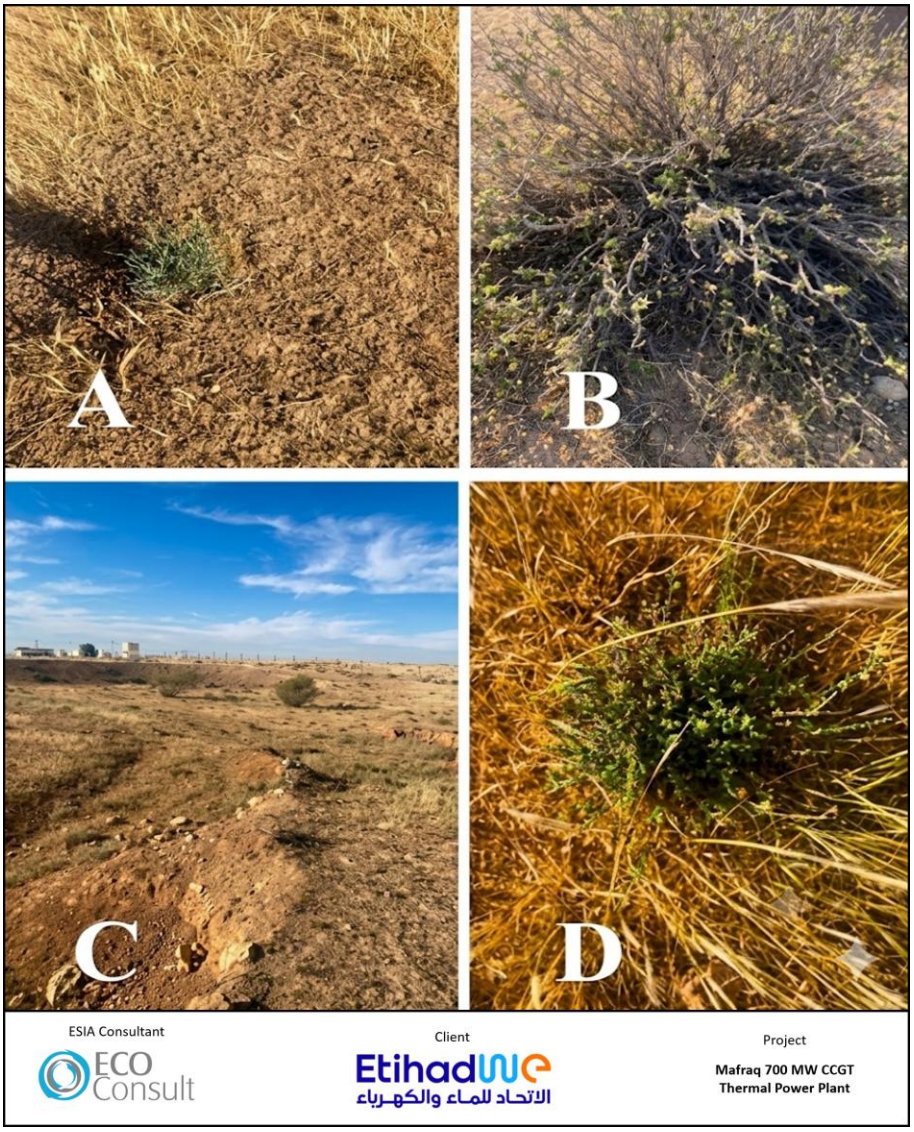


Figure 28: Plant Species Recorded from the Project Site.
A. *Anabasis syriaca*. B. *Salvia dominica*. C. *Retama raetam.* D. *Artemisia sieberi.*

6.3.3.3 OHTL

The floristic inventory of the study area includes seven (7) plant species identified within the associated OHTL route as shown in the table below. The most common species identified included barley (*Hordeum vulgare*) *and Anabasis syriaca*. All identified species are listed as Least Concern (LC) according to Jordan's Red List.

Table 26: Plant Species Recorded from the Associated OHTL Route

Species Name	Status
Anabasis syriaca	Common
Silybum marinum	Common
Avena sterilis	Common
Hordeum marinum	Common
Hordeum vulgare	Cultivated
Centaurea iberica	Common

Carduus australis	Common

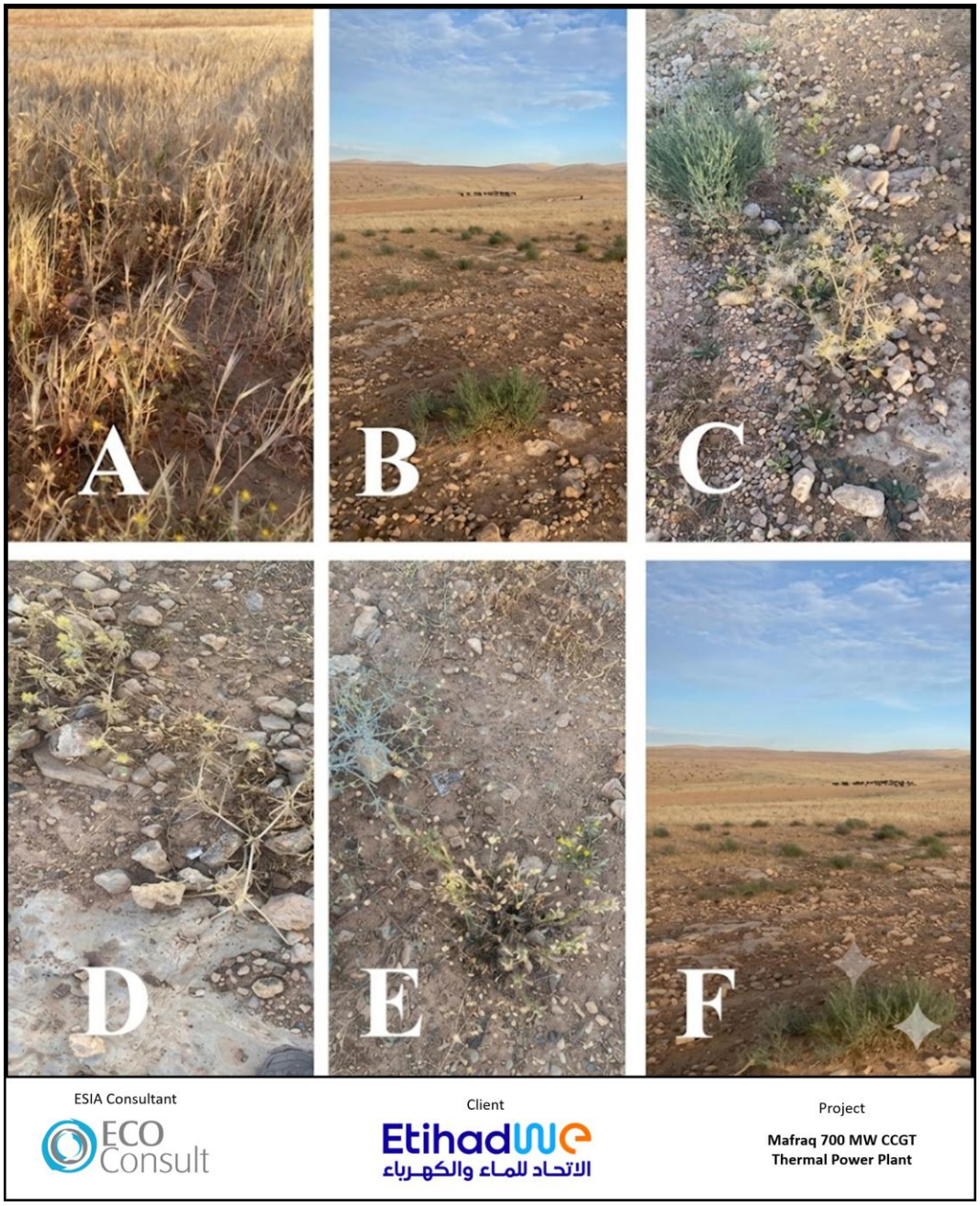


Figure 29: Plant species recorded from the OHTL route.

A. *Hordeum vulgare.* B. *Anabasis syriaca.* C. *Silybum marinum.* D. Centaurea iberica. E. *Carduus australis.* F. *Anabasis syriaca*



Figure 30: Landscape of the Natural Terrain of the OHTL

6.3.3.4 Habitat Mapping

Based on the findings above, the figure below presents the habitat mapping for the Project site. The entire site, including the wadi systems, is classified as modified habitat. Although the wadi systems support relatively higher vegetation cover than the surrounding areas, as expected, they are disturbed and therefore remain classified as modified habitat. Such disturbances mainly include grazing activities and ploughing.

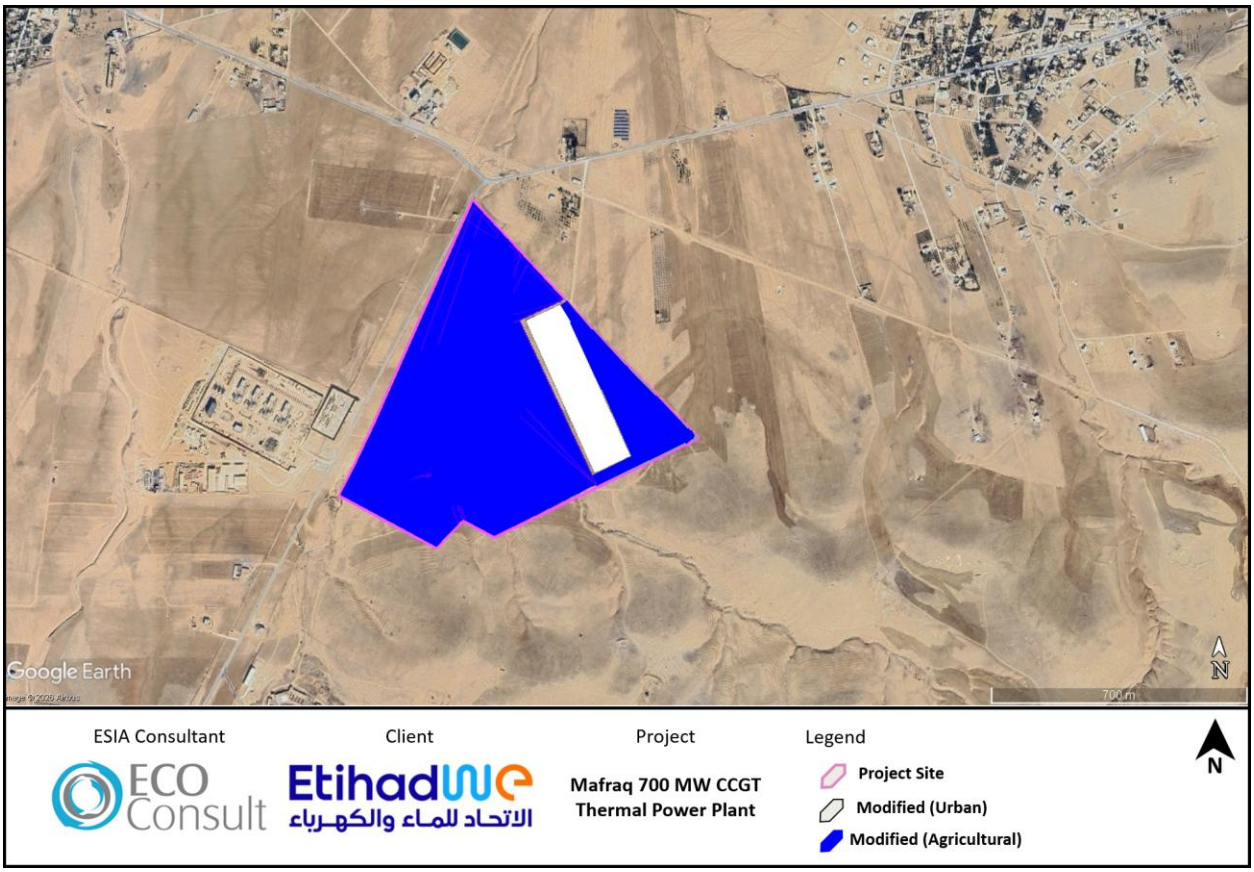


Figure 31: Habitat Mapping

6.3.4 Fauna Survey

This section provides an overview of the fauna survey undertaken within the Project site and its associated facilities. The survey included assessments of mammals through small mammal trapping, camera trapping for medium and large mammals, and acoustic monitoring for bats. In addition, dedicated surveys were undertaken for reptiles and birds to characterize the fauna communities present within the study area and identify any species of conservation importance.

Consultations undertaken with key stakeholders, including the Birdlife International and RSCN, confirmed that the survey approach and level of effort adopted for the assessment, as discussed below, were considered adequate and appropriate for characterizing the fauna including birds within the Project area.



Figure 32: Methods Used for Recording Animals in the Project Site
A. Camera traps. B. Sherman traps for rodents. C. Anabat walkabout for bats

6.3.4.1 Mammals Survey

Trapping Small Mammals

To assess the composition and abundance of the rodent population within the Project site, live-trapping was conducted using standard Sherman traps baited with a mixture of oatmeal and peanut butter. A total sampling effort of thirty (30) trapping nights was employed, with traps strategically deployed in microhabitats showing high potential for rodent activity, including underneath shrubs, near rock piles, and adjacent to active burrows. All traps were inspected daily, checked for captures, and re-baited to ensure continuous sampling efficacy, while the precise geographic coordinates for each of the seven (7) trap stations were logged via GPS.

Although a 30-night trapping effort was successfully executed, zero (0) small mammal captures were recorded throughout the duration of the field survey.

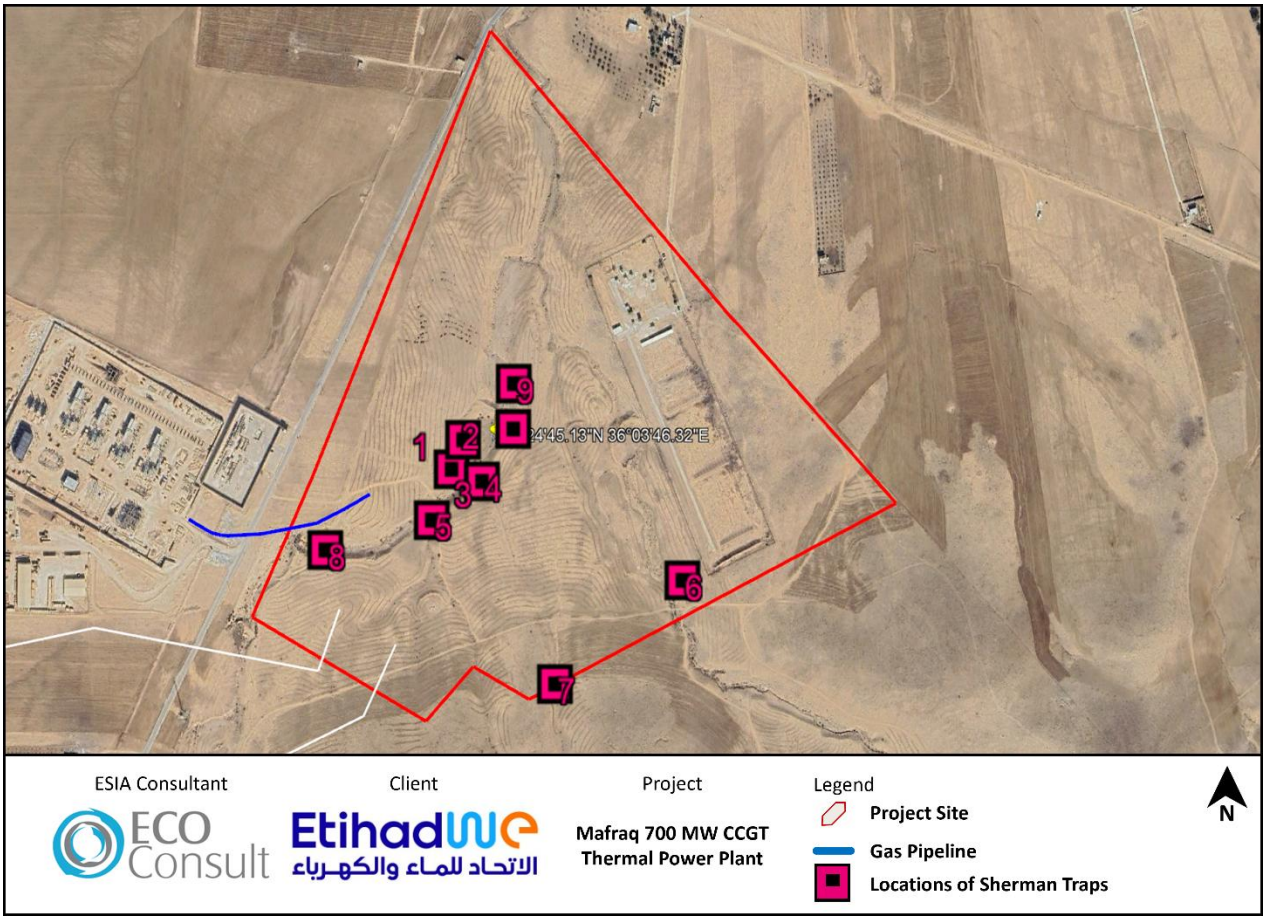


Figure 33: Locations of Sherman Traps Installed Within the Project Site

Table 27: Coordinates for Sherman Traps Installed Within the Project Site

Trap No.	Latitude	Longitude
1	32° 24' 44.77"	36° 03' 44.32"
2	32° 24' 45.13"	36° 03' 46.32"
3	32° 24' 44.95"	36° 03' 44.60"
4	32° 24' 44.91"	36° 03' 44.32"
5	32° 24' 44.91"	36° 03' 44.32"
6	32° 25' 47.83"	36° 05' 39.35"
7	32° 24' 39.01"	36° 03' 57.52"

Camera Trapping for Medium and Large Mammals

To document the presence of medium- to large-sized mammals, particularly carnivores, camera trapping was utilized across the Project site. Three (3) camera traps were installed at distinct locations for three (3) consecutive nights and were baited with sardines to maximize detection probabilities for target carnivore species. The exact geographic location for each camera trap station was logged via GPS to track spatial distribution.

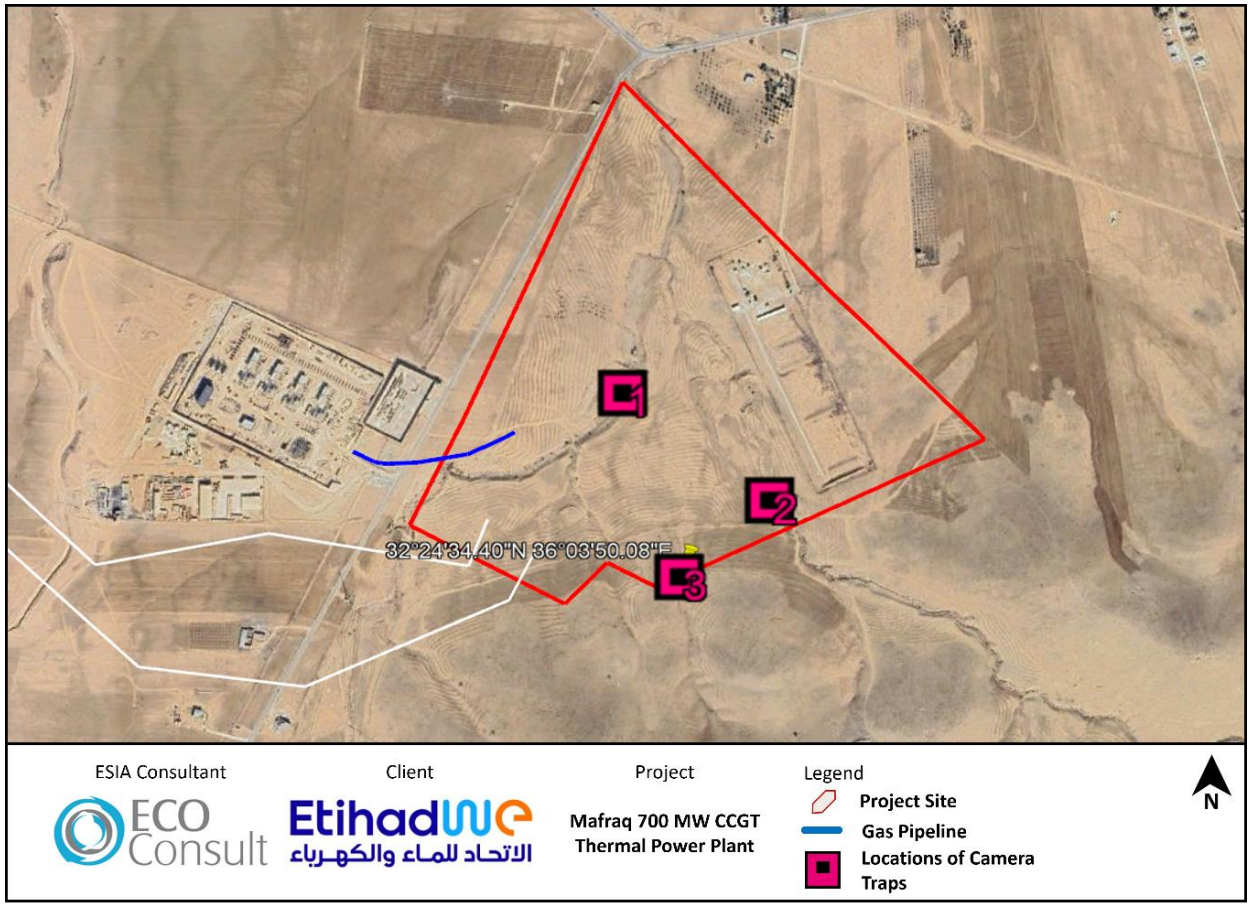


Figure 34: Locations of Camera Traps Installed Within the Project Site

Table 28: Coordinates for Camera Traps Installed Within the Project Site

Camera No.	Latitude	Longitude
1	32° 24' 45.13"	36° 03' 46.32"
2	32° 24' 38.90"	36° 03' 55.98"
3	32° 24' 34.40"	36° 03' 50.08"

The camera traps picked up a variety of domestic animals, including sheep and dogs alongside wild species, specifically the Red Fox (*Vulpes vulpes*). Camera trap 1 recorded the Red Fox at various times of day as portrayed in Figure 35. Camera trap 2 captured a sheep herd and a dog, but also caught several glimpses of the Red Fox (Figure 36). Meanwhile, Camera trap 3 recorded the fox moving around during both day and night (Figure 37).

Evidently, the Red Fox was the only wild carnivore detected in the Project site. They are highly adaptable and known to thrive across all types of habitats throughout Jordan.

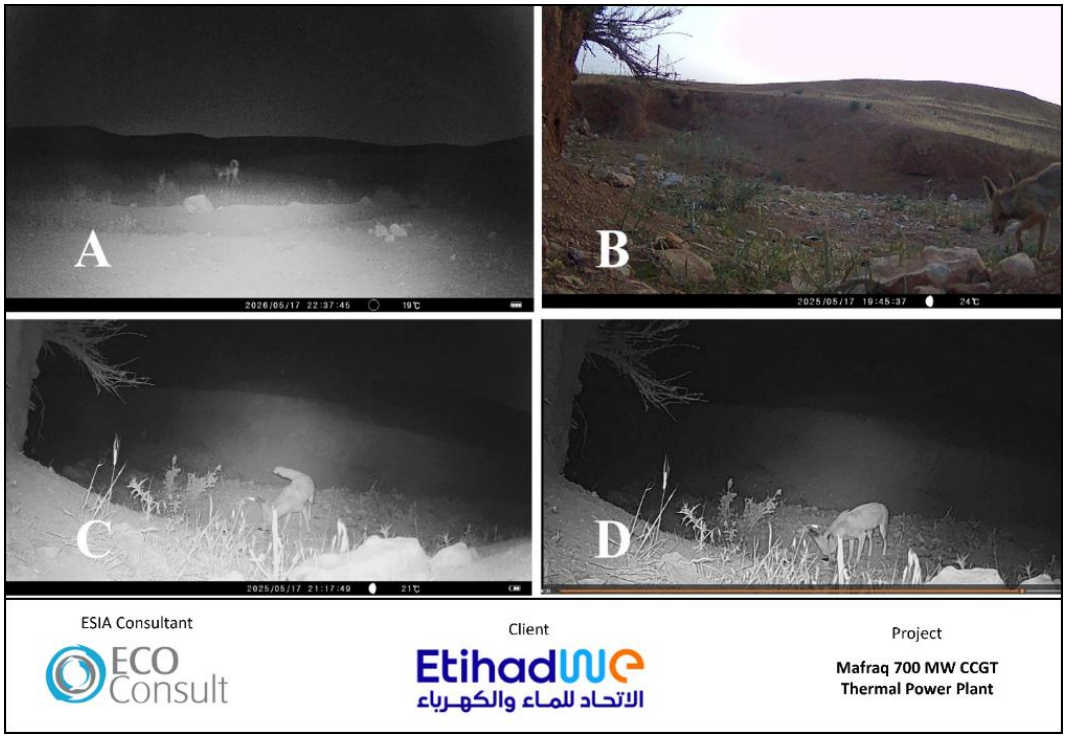


Figure 35: A-D. Red Fox (*Vulpes vulpes*) Captured by Camera Trap 1

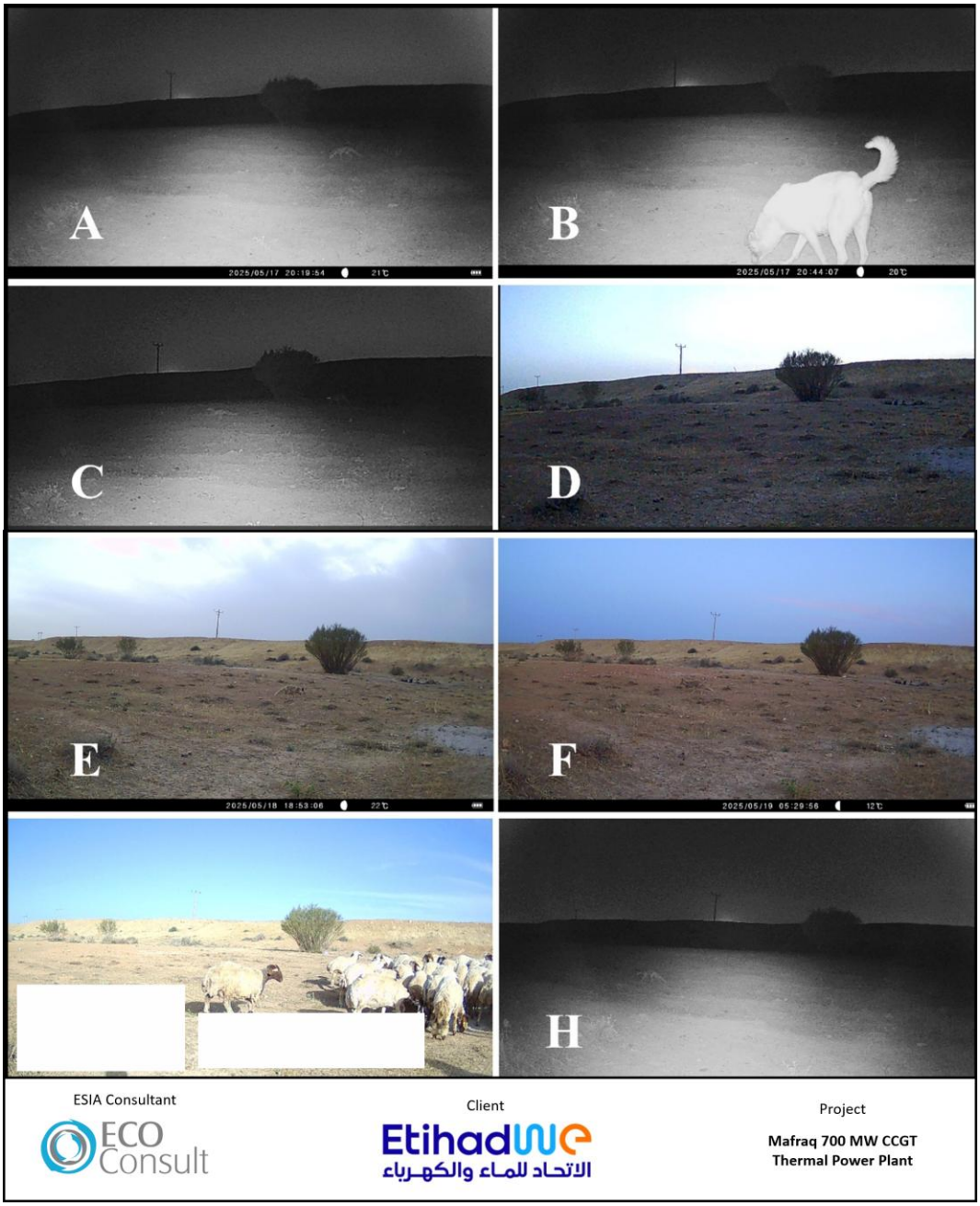


Figure 36: A, C-F, and H. Red Fox (*Vulpes vulpes*), B. Feral Dog. G. Sheep Herd Captured by Camera Trap 2

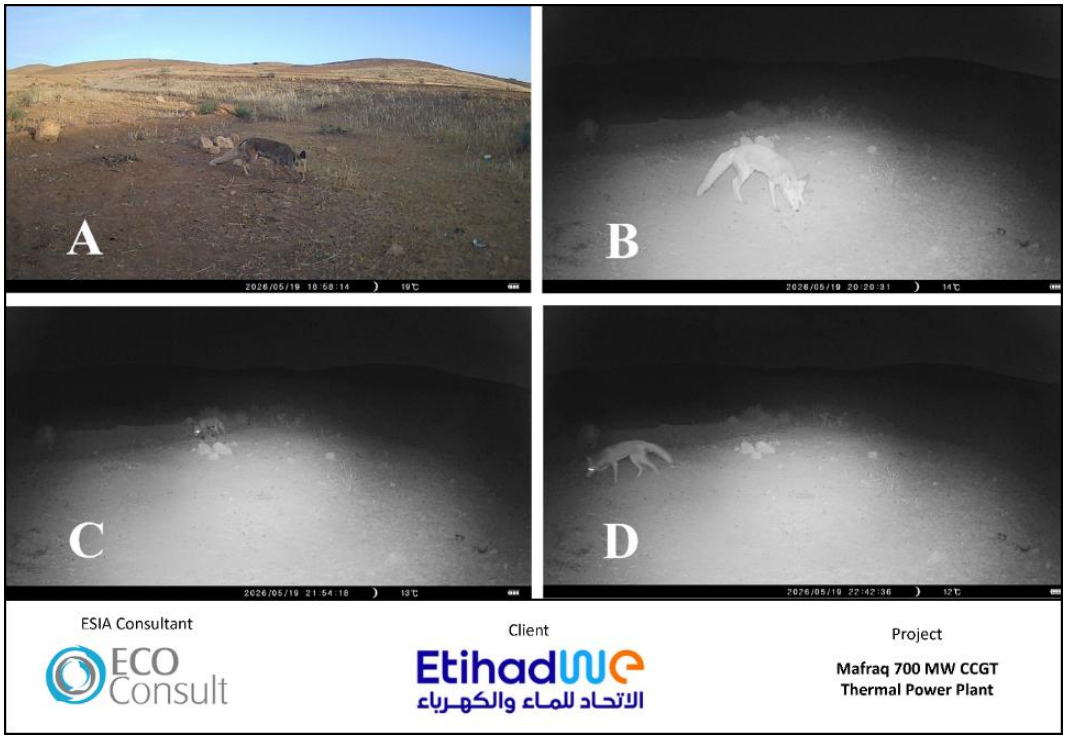


Figure 37: A-D. Red Fox (*Vulpes vulpes*), Captured by Camera Trap 3

The presence of the Long-eared Hedgehog (*Hemiechinus auritus*) was confirmed by a single dead specimen found within the Project site as shown in Figure 38.



Figure 38: Dead Long-eared Hedgehog (*Hemiechinus auritus*)

6.3.4.2 Acoustic Bat Survey

An acoustic survey of local bats was conducted using an Anabat Walkabout active bat detector across various habitat types. Acoustic monitoring was executed over a period of two (2) nights, starting at sunset and continuing for a duration of two (2) hours each evening. The recorded echolocation calls were subsequently processed and analyzed using Anabat Insight software to identify species to the lowest possible taxonomic level.

No bat activity was detected within the Project site and its surroundings.

6.3.4.3 Reptiles Survey

Active search surveys were conducted over a three (3) day period to evaluate the abundance of reptiles within the study area. Visual encounter surveys were carried out along line transects sweeping across the entire site, where two (2) field biologists systematically searched high-probability microhabitats by scanning around and within vegetation, as well as checking underneath rocks and surface debris.

During the reptile survey carried out, only six (6) reptile species were observed. The most common species identified was the Bridled Skink (*Trachylepis vittata*). Both adult and young specimens were observed.

As noted in the table below, all recorded species are considered of Least Concern (LC) with the exception of the Greek Tortoise which is considered Vulnerable (VU).



Figure 39: Reptiles Observed in the Project Site

Table 29: Reptiles Species Observed in the Project Site

Species	Common Name	IUCN Conservation Status
Greek Tortoise	*Testudo graeca*	VU
Jordan Short-fingered Gecko	*Stenodactylus grandiceps*	LC
Bridled Skink	*Heremites vittatus*	LC
Snake-eyed Lizard	*Ophisops elegans*	LC
Egyptian Rock Agama	*Laudakia vulgaris*	LC
Rogers's racer	*Platyceps rogersi*	LC

Three (3) specimens of the Greek Tortoise (also known as the Spur-thighed Tortoise) were recorded within the Project site, and its local distribution is mapped in Figure 41.

Testudo graeca has a broad global distribution extending across southern Europe, North Africa, and the Middle East, represented by several distinct subspecies. The specific subspecies found in Jordan, Palestine, Lebanon, Syria, and southeast Turkey is *Testudo graeca terrestris*. Within Jordan, it primarily inhabits the northern Mediterranean highlands, as well as suburban and agricultural areas (Disi et al. 2001).

According to Disi (1998), the species emerges from hibernation and begins its seasonal activity in March. Its peak activity occurs during April and May, followed by a secondary, lesser peak in September, before it enters hibernation again after November.

Because it is a slow-moving, globally threatened species, it faces high risks from road traffic and heavy machinery. Therefore, the presence of these tortoises must be carefully monitored during the excavation, leveling, and construction phases of the Project.

Globally, the Greek Tortoise is classified as Vulnerable on the IUCN Red List. Nationally, it is protected under Annex 3 of Bylaw No. 43 (2008), issued pursuant to "Agriculture Law No. 13 of 2015".



Figure 40: Greek Tortoise (*Testudo graeca*) Observed in the Project Site

Table 30: Coordinates for the Greek Tortoise (*Testudo graeca*) in the Project Site

Location No.	Latitude	Longitude
1	32° 24' 40.06"	36° 03' 38.47"
2	32° 24' 34.40"	36° 03' 50.08"
3	32° 24' 37.03"	36° 03' 55.47"

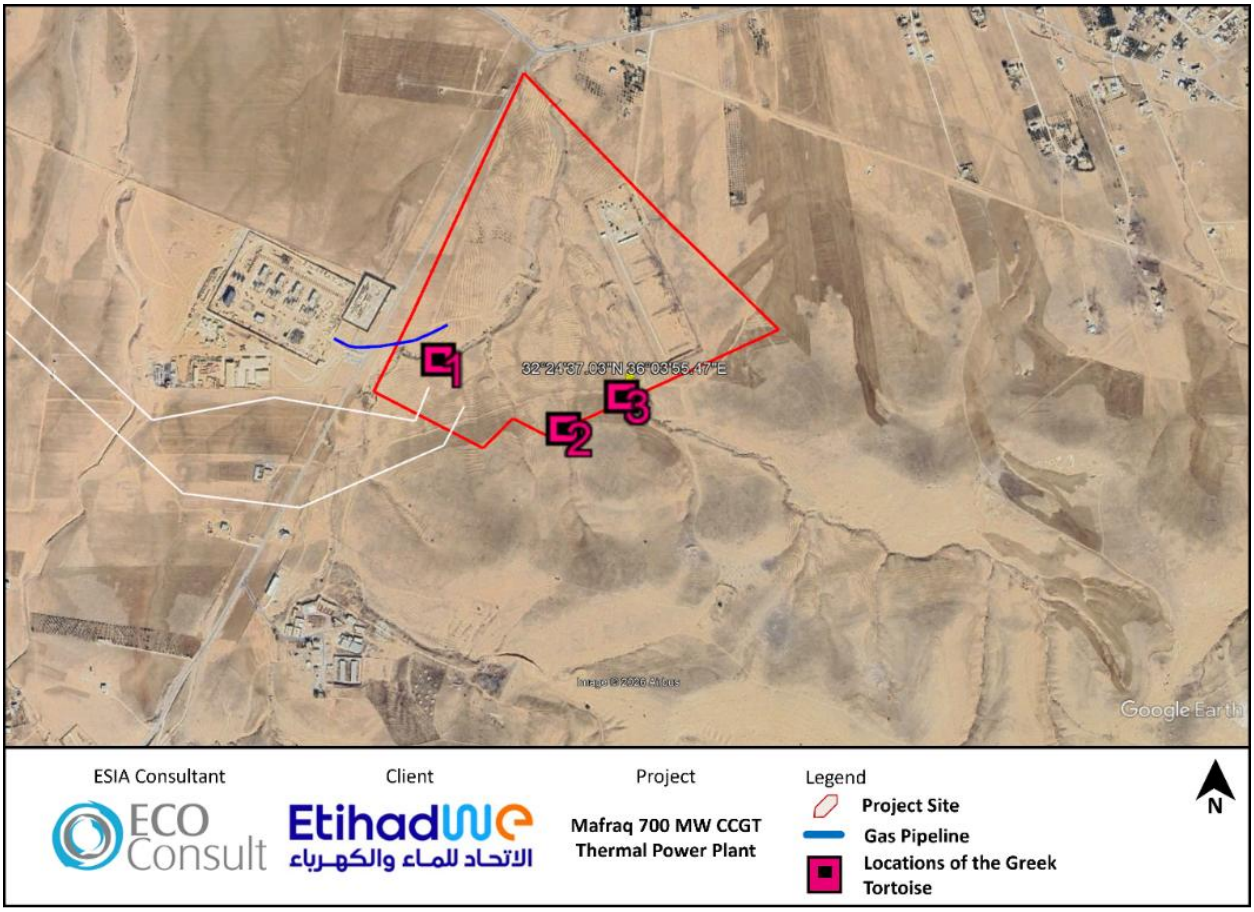


Figure 41: Location of the Greek Tortoise (*Testudo graeca*) in the Project Site

6.3.4.4 Birds Survey

Bird populations were surveyed during a single-day field visit utilizing a standardized point count methodology across five (5) distinct stations distributed throughout the Project site. At each point count station, observers spent a total of 20 minutes, which began with an initial 5-minute acclimation period to allow birds to habituate to the observer's presence while preliminary site notes were taken. This was followed by a strict 15-minute observation period where birds were recorded by both sight and sound, and categorized based on their spatial proximity as being either within a 50-meter radius or beyond the 50-meter boundary.

In addition, the above was supported and supplemented through a detailed desktop review for a Vantage Point (VP) survey undertaken by ECO Consult for an EBRD financed Project as part of the NEPCO North of Jordan Electricity Infrastructure Update Project. The location of the VPs in relation to the Project site is provided in the figure below. The VP survey was completed during spring 2026 with data utilized from April – June. The VP survey is still ongoing for the summer (July – August) and autumn season (September – November).

Approval from EBRD has been obtained to use the data as part of this assessment.

VP surveys are a standard methodology for characterizing avifauna use of an area, recording species identity, numbers, flight heights, directions, and behavioral observations from a fixed observation point over standardized time periods (Langston & Pullan, 2003).

Each VP observation session records the following parameters:

- Date and time of observation;
- Species (scientific and common name);
- Number of individuals;
- Sex/age class where determinable (M, F, Ad, Sub);
- Flight height category (0–20 m, 20–50 m, 50 m+);
- Direction of travel (from/to); and
- Behavioral notes (foraging, perching, transit, circling, etc.).

Of the full VP monitoring network in the Mafraq area, Vantage Point 16 (VP16; coordinates: 32°25'30.91"N, 35°59'26.82"E) was selected as the primary data source for this collision risk assessment for the following reasons:

- VP16 is located within approximately 2 km of the proposed OHTL alignment, making it the closest and most spatially representative monitoring station;
- The land cover at VP16 is consistent with the terrain traversed by the OHTL — flat, open, arid steppe with barley cultivation and sparse shrub cover; and
- VP16 data spans the March–June 2026 survey period, capturing the spring migration peak as well as early summer resident bird activity.

Given the similar nature of the land cover, it is considered that bird flight activity recorded at VP16 is reasonably representative of activity along the 6.8 km OHTL corridor. No significant topographic features, waterbodies, or vegetation structural elements exist between VP16 and the OHTL alignment that would substantially alter bird use patterns.

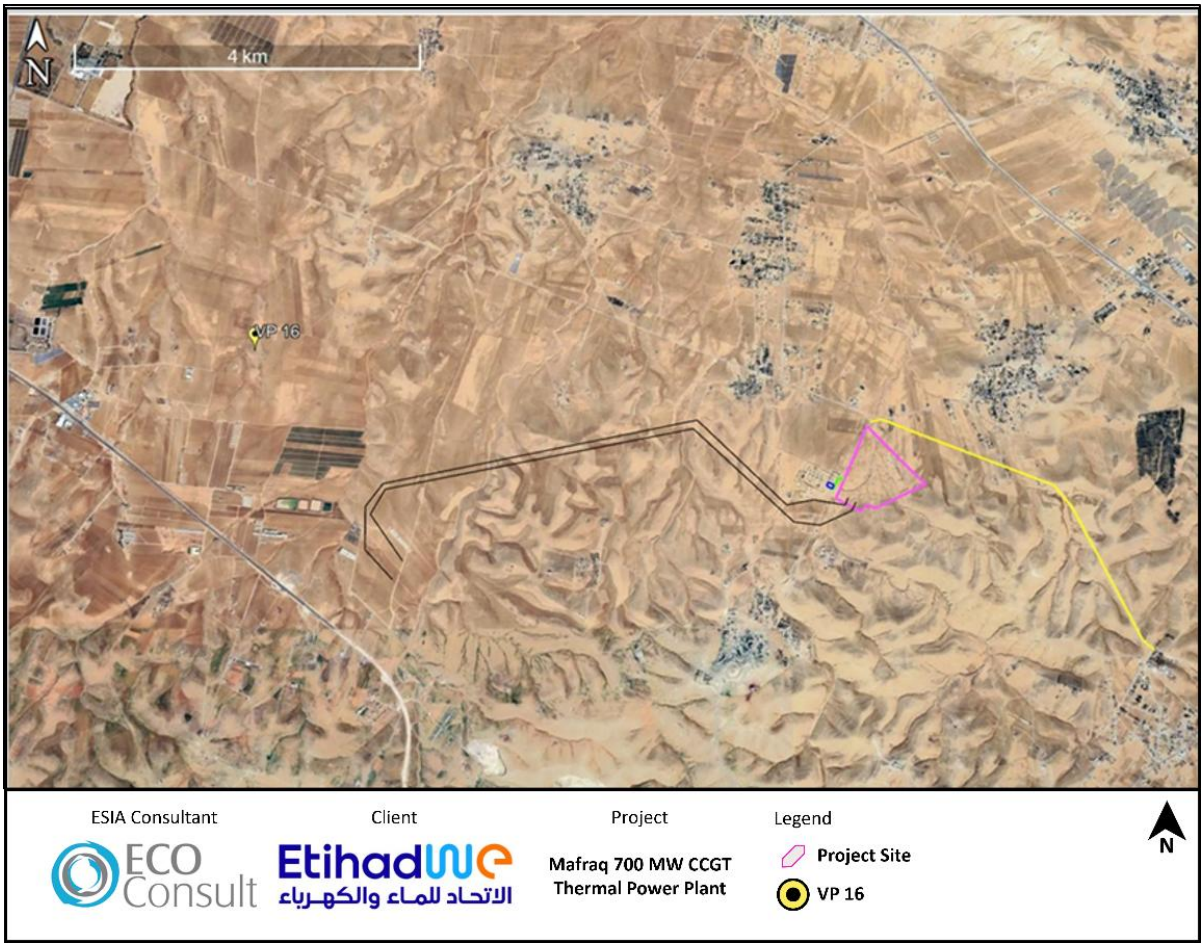


Figure 42: VP 16 Location

Consultations

Consultations with RSCN indicated that based on historical surveys within the area, there are no breeding birds expected and the area and ecological condition of the area has deteriorated between 2000 and 2026, increasing pressure on remaining habitats in the wider Project region. In addition, there are no formal buffer zone provisions required for the Project site or area.

Field Surveys Results

A total of eleven (11) bird species were observed within the Project site. The majority of these are resident species known to breed locally in Jordan. None of the recorded species currently hold any special conservation status, with all of them listed as Least Concern (LC) on the IUCN Red List.

Table 31: Bird Species Observed in the Project Site

Name	Scientific Name	Status in Jordan	IUCN Conservation Status
Long-legged Buzzard	*Buteo rufinus*	R	LC
Little Owl	*Athene noctua*	R	LC
Collared Dove	*Streptopelia decaocto*	R	LC
Common Swift	*Apus apus*	PM	LC
Common Hoopoe	*Upupa epops*	R, SB, PM	LC
Crested Lark	*Galerida cristata*	R	LC
White-spectacled Bulbul	*Pycnonotus xanthopygos*	R	LC

Blackbird	*Turdus merula*	R	LC
Graceful Prinia	*Prinia gracilis*	R	LC
House Sparrow	*Passer domesticus*	R	LC
Common Myna	*Acridotheres tristis*	R	LC

R: Resident with definite breeding records. SB: Breeding summer visitor. PM: Passage migrant.



Figure 43: Left. Common Hoopoe (Upupa epops), Right. Little Owl (Athene Noctua)

EBRD VP Survey Results

Jordan lies along one of the world's most significant soaring bird migration routes, the African Eurasian flyway. Millions of birds, including large raptors, storks, and harriers, pass through Jordan each spring (March–May) and autumn (August–October), traveling between wintering grounds in Africa and breeding grounds in Europe and Central Asia (BirdLife International, 2021; GEF, 2022). The Mafraq region, situated at the transition between the Mediterranean and Irano-Turanian biogeographical zones, forms part of the northern Jordanian migration bottleneck (Zoothere Birding, 2022).

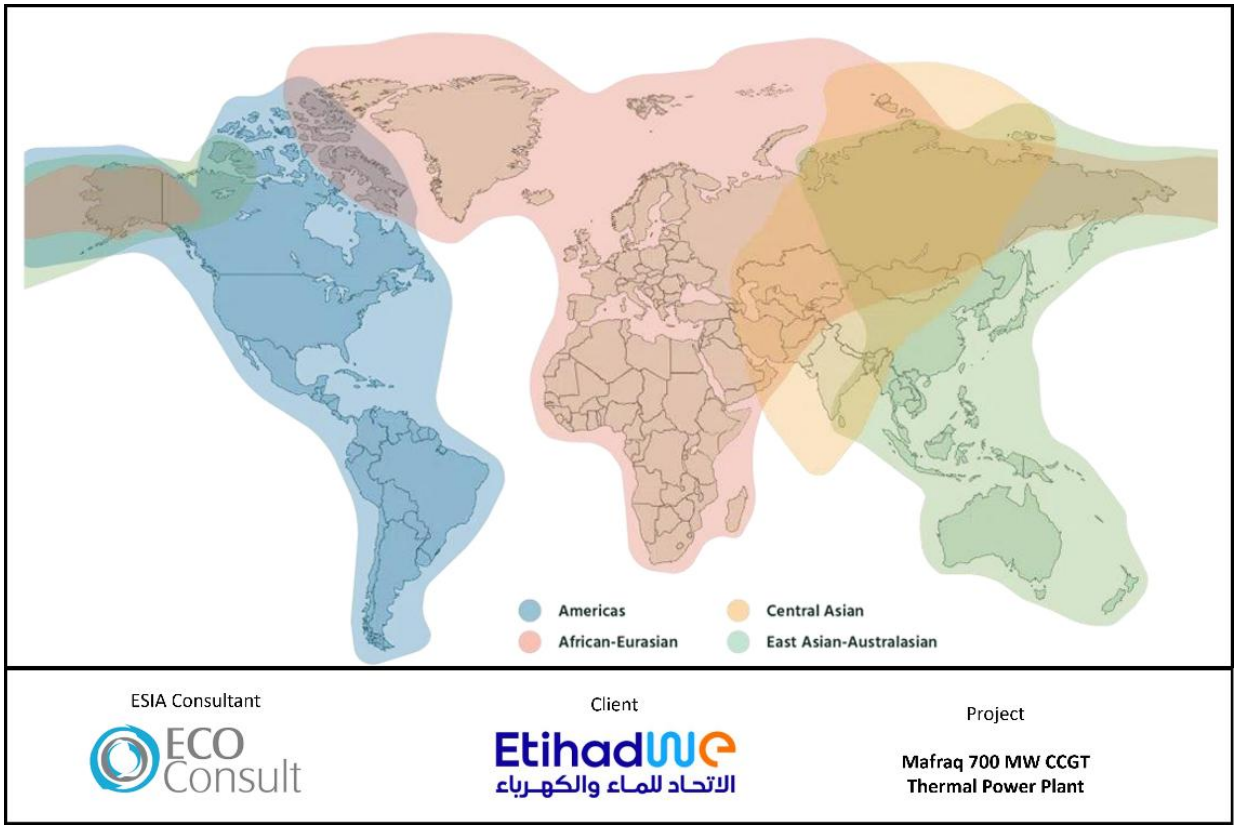


Figure 44: Global Migratory Bird Flyways

VP16 survey data (March–June 2026) confirms this context, with the highest species diversity and individual counts recorded in March and April, coinciding with the northern spring migration passage. Species such as the Black Kite (*Milvus migrans*), Western Marsh Harrier (*Circus aeruginosus*), Eurasian Steppe Buzzard (*Buteo buteo vulpinus*), and Booted Eagle (*Hieraaetus pennatus*) are all long distance migrants known to concentrate along Jordanian flyways during this period.

A total of 31 individual bird detections were recorded across 12 survey sessions at VP16 between 29 March 2026 and 21 June 2026. Seven (7) species were recorded. The complete dataset is presented in the table below.

Table 32: VP16 Avifauna Survey Observations (March–June 2026)

Date	Scientific Name	Common Name	No.	Height (m)	Dir. From	Dir. To	Notes
29-Mar-26	*Corvus cornix*	Hooded Crow	1	25	S	NE	Transit flight
29-Mar-26	*Milvus migrans*	Black Kite	2	50+	SE	N	Transit; pair
29-Mar-26	*Milvus migrans*	Black Kite	1	50+	SE	N	Transit
29-Mar-26	*Buteo buteo vulpinus*	Eurasian Steppe Buzzard	1	50	—	—	Transit
29-Mar-26	*Buteo buteo vulpinus*	Eurasian Steppe Buzzard	1	50	S	NE	Transit
29-Mar-26	*Circus aeruginosus*	Western Marsh Harrier	1	20	SW	—	Transit

05-Apr-26	*Circus aeruginosus*	Western Marsh Harrier	1	2	E	W	Low flight over terrain
05-Apr-26	*Circus aeruginosus*	Western Marsh Harrier	1	3	S	N	Low flight over terrain
05-Apr-26	*Circus pygargus*	Montagu's Harrier	1	5	S	NW	Low transit
13-Apr-26	*Falco tinnunculus*	Common Kestrel	1	n/r	—	—	Actively flying around
13-Apr-26	*Falco tinnunculus*	Common Kestrel	1	n/r	—	—	Actively flying around
13-Apr-26	*Milvus migrans*	Black Kite	2	50	S	N	Male & female pair
13-Apr-26	*Hieraaetus pennatus*	Booted Eagle	1	50	SE	NW	Transit
13-Apr-26	*Circus aeruginosus*	Western Marsh Harrier	1	25	SE	N	Transit
13-Apr-26	*Milvus migrans*	Black Kite	2	50	E	NW	Male & female pair
21-Apr-26	*Circus aeruginosus*	Western Marsh Harrier	1	2	N	S	Low foraging flight
21-Apr-26	*Corvus cornix*	Hooded Crow	1	15	W	E	Transit
21-Apr-26	*Circus aeruginosus*	Western Marsh Harrier	1	3	N	NW	Low foraging flight
28-Apr-26	*Circus aeruginosus*	Western Marsh Harrier	1	10	S	NE	Transit
28-Apr-26	*Corvus cornix*	Hooded Crow	2	20	S	N	Transit
06-May-26	*Falco tinnunculus*	Common Kestrel	1	n/r	—	—	Active all day; resident behavior
06-May-26	*Corvus cornix*	Hooded Crow	1	n/r	—	—	Resident
13-May-26	*Corvus cornix*	Hooded Crow	1	20	—	—	Transit/resident
13-May-26	*Falco tinnunculus*	Common Kestrel	2	15	—	—	Resident + passage migrant
13-May-26	*Corvus cornix*	Hooded Crow	1	25	—	—	Transit/resident
13-May-26	*Falco tinnunculus*	Common Kestrel	1	10	—	—	Resident + passage migrant
21-May-26	*Falco tinnunculus*	Common Kestrel	1	25	SE	NW	Foraging; extended stay
21-May-26	*Corvus cornix*	Hooded Crow	1	10	E	W	Transit
31-May-26	–	–	–	–	—	—	No birds recorded
08-Jun-26	–	–	–	–	—	—	No birds recorded
14-Jun-26	*Falco tinnunculus*	Common Kestrel	1	15	E	W	Transit

21-Jun-26	–	–	–	–	—	—	No birds recorded

The table below summarizes the total detections per species by month and primary behavioral category observed at VP16.

Table 33: VP16 Species Summary by Month (March–June 2026)

Species	IUCN	Mar	Apr	May	Jun	Total Observations	Primary Activity
Milvus migrans (Black Kite)	LC	3	4	0	0	7	Migratory transit
Circus aeruginosus (W. Marsh Harrier)	LC	1	5	0	0	6	Low transit / foraging
Falco tinnunculus (Common Kestrel)	LC	0	2	4	1	7	Resident foraging
Corvus cornix (Hooded Crow)	LC	1	2	4	0	7	Resident transit
Buteo buteo vulpinus (Steppe Buzzard)	LC	2	0	0	0	2	Migratory transit
Hieraaetus pennatus (Booted Eagle)	LC	0	1	0	0	1	Migratory transit
Circus pygargus (Montagu's Harrier)	LC	0	1	0	0	1	Migratory transit
Total		**7**	**15**	**8**	**1**	**31**	

The VP16 dataset reveals a pattern of seasonal use of the OHTL corridor dominated by spring migratory raptors (March–April) transitioning to low-level resident species activity (May–June). Key observations are as follows:

- Species richness and detection rates were highest in March (7 detections, 4 species) and April (15 detections, 6 species), coinciding with the peak northward spring migration through Jordan. The marked decline in species diversity and abundance from May onward is consistent with the post-migration period, when the area transitions to a largely resident, non-migratory bird community.
- The Western Marsh Harrier (*Circus aeruginosus*) was the most frequently recorded raptor species in April (5 observations), consistently flying at very low altitudes (2–25 m above ground), which directly corresponds to the height range of the lower phase conductors of a typical 400 kV OHTL. This species is a well-documented collision casualty on transmission lines (Bevanger, 1998).
- The Black Kite (*Milvus migrans*) was recorded on multiple occasions in March and April at heights exceeding 50 m, placing it in the zone of the highest conductors and, critically, the earth wire of the transmission line. Black Kites are considered moderately to highly vulnerable to power line collision due to their active soaring behavior and tendency to migrate in loose groups (Bevanger, 1998; Hull & Muir, 2010).
- The Eurasian Steppe Buzzard (*Buteo buteo vulpinus*) was observed in March at 50 m, again placing it within the critical wire zone of a 400 kV OHTL. Steppe Buzzards are common and abundant spring migrants through Jordan and are frequently recorded as power line collision casualties across their range (Janss, 2000).
- The Booted Eagle (*Hieraaetus pennatus*) and Montagu's Harrier (*Circus pygargus*) were each recorded

once, during the April migration peak, at heights of 50 m and 5 m, respectively. While the sample sizes are too small to derive species-specific collision probabilities, both species are documented collision victims in published literature (Bevanger, 1998).

- The Common Kestrel (*Falco tinnunculus*) was the dominant species in May and June, recorded as both a resident breeder and a passage migrant. Observed at heights of 10–25 m while foraging in the area. The extended active presence of kestrels, including hovering behavior, suggests that this species actively uses the OHTL corridor as hunting habitat, increasing its cumulative exposure to collision risk.
- Three survey sessions (31 May, 8 June, 21 June 2026) recorded no birds, reflecting the reduced avifauna activity typical of the post-migration summer period in this arid steppe environment.

In summary, the OHTL corridor is used by a moderate diversity of raptors and corvids, with the highest collision risk concentrated in the spring migration window (March–April). The area is not a recognized high-density migration bottleneck such as the Bosporus or Eilat, and absolute counts are low, consistent with the limited carrying capacity of this arid, semi-disturbed steppe landscape. Notwithstanding, the presence of species with documented high collision vulnerability at flight heights coinciding with wire zones warrants targeted mitigation measures.

6.3.5 Critical Habitat Screening

A Critical Habitat (CH) screening has been undertaken for the Project. The CH screening is presented in Annex V. The screening concludes that based on the limited ecological value of the Project footprint and limited bird activity found to date, all features have been screened out. The Project site does not lie in/provide critical habitat for any species. No further Critical Habitat Assessment (CHA) is required.

6.4 Physical Terrestrial Environment

6.4.1 Geology

6.4.1.1 Geological Setting

The geological map shows that the study area is underlain by a sequence of sedimentary rock formations, together with localized areas of soil cover over bedrock. The mapped geological units include Wadi as Sir Limestone, Umm Rijam Chert Limestone, Wadi Umm Ghudran, Muwaqqar Chalk Marl, Fuhays/Hummar/Shu'ayb formations, Amman Silicified Limestone, Al Hisa Phosphorite/Amman Silicified units and surface areas classified as soil over bedrock.

The overall geological pattern shows a clear spatial variation across the watershed. The southern and central-southern parts are dominated by the Wadi as Sir Limestone formation, which occupies a wide continuous zone extending across much of the lower and central catchment. This limestone-dominated area is bordered in several locations by Umm Rijam Chert Limestone, particularly along geological transition belts. Small isolated occurrences of other formations are also visible within the limestone-dominated area, including localized lenses of Muwaqqar Chalk Marl and Amman Silicified Limestone.

The central and northern parts of the study area are characterized mainly by areas mapped as soil over bedrock. These zones extend across the upper watershed and cover a large part of the terrain around Buraiqa and the northern drainage system. The soil-over-bedrock classification indicates that the surface expression of the area is controlled by a weathered or soil-covered geological profile, while the underlying bedrock remains relatively close to the ground surface in many locations.

A broad band of Al Hisa Phosphorite/Amman Silicified material is mapped across the central-western part of the catchment. This geological unit extends from the western sector toward the center of the study area and forms a transitional zone between the northern soil-over-bedrock area and the more extensive limestone formations farther south. The black power transmission corridor crosses this central geological transition, moving from soil-over-bedrock terrain into the Al Hisa Phosphorite/Amman Silicified zone before approaching the project area.

The Project Site, represented by the pink polygon, is located within the northern-central geological setting dominated by soil over bedrock. The site is positioned close to the boundary with the Al Hisa Phosphorite/Amman Silicified unit to the south and west. This places the project footprint within a geological transition area where surface conditions and shallow subsurface characteristics may vary over relatively short distances.

The groundwater abstraction point, shown by the green circular marker, is also located within the soil-over-bedrock zone and lies very close to the contact with the Al Hisa Phosphorite/Amman Silicified formation. The proposed water pipeline alignment extends eastward from this area and remains largely within the soil-over-bedrock geological setting before approaching the eastern side of the catchment.

The power transmission line corridor follows a longer route through several geological settings. Its western and central sections pass across soil-over-bedrock terrain and then intersect the broad Al Hisa Phosphorite/Amman Silicified belt. The eastern section approaches the Project Site within the same general transition zone. The corridor therefore spans more than one geological environment, unlike the project site and the immediate water pipeline area, which are concentrated mainly within the soil-over-bedrock terrain.

The geological distribution also corresponds broadly with the mapped drainage pattern. Drainage channels are visible across all geological units, but the density and orientation of channels vary with the underlying rock type, surface cover and topography. The northern soil-over-bedrock areas contain a relatively dense drainage network, while the southern limestone-dominated area is associated with broader terrain units and more widely spaced drainage features.

The geological setting provides the basis for understanding the relationship between bedrock conditions, surface materials, terrain development and groundwater occurrence across the catchment. It will also form an essential input to the later groundwater and DRASTIC sensitivity assessment, particularly for the interpretation of aquifer media and vadose-zone conditions.

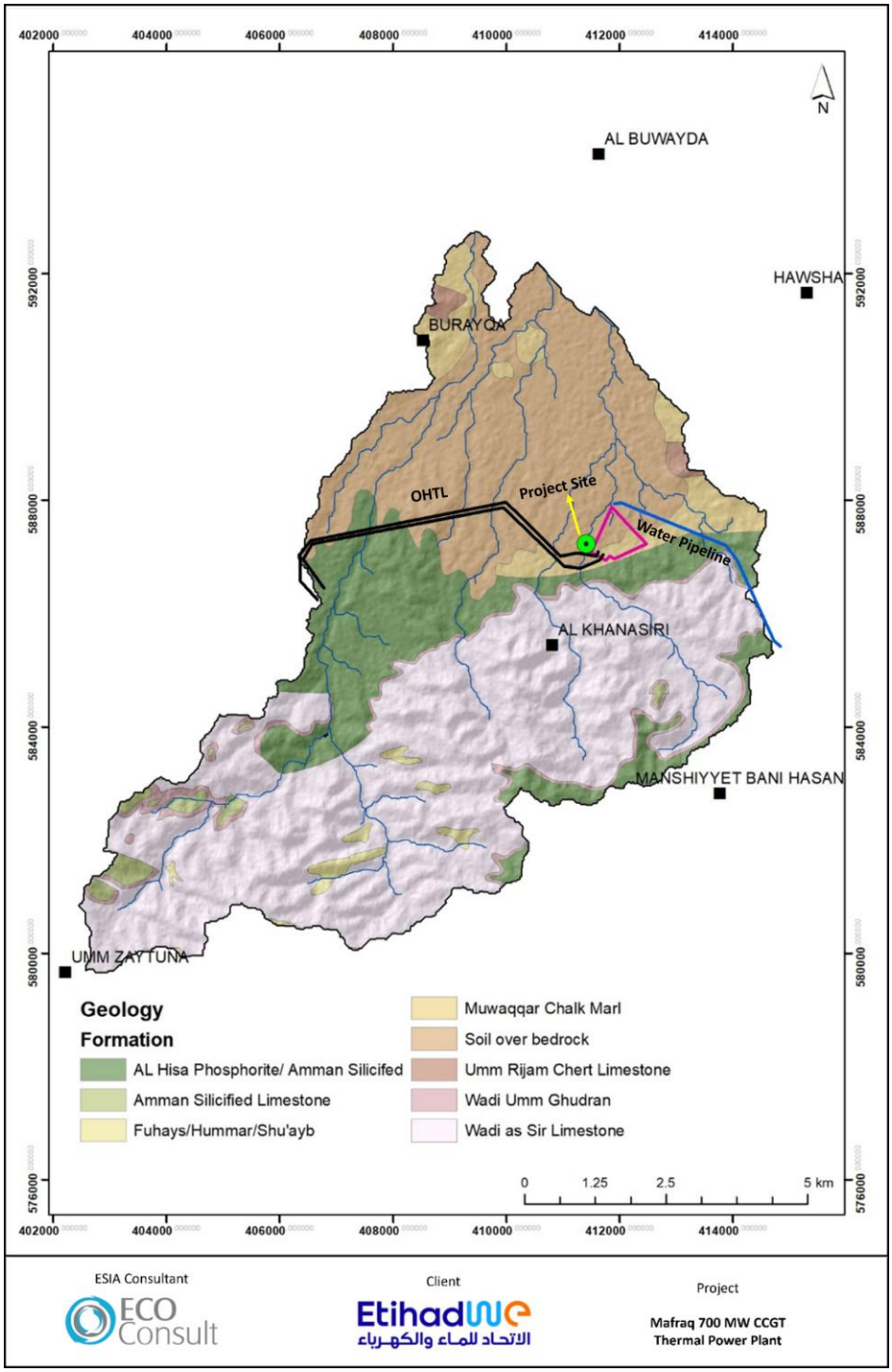


Figure 45: Geological Formations Map of the Project Area

6.4.1.2 Soil Units, Texture, and Soil-Depth Distribution

The soil map identifies six principal soil units across the study area: BUR, ALI, AYD, BUQ, HAB and JER. These units reflect the combined influence of topography, parent material, surface weathering, drainage pattern and landscape position. Across the mapped catchment, soil textures generally range from loamy

silt to loamy soils, with local differences in stone content, profile development and depth to weathered bedrock.

The most important characteristic of the soil setting is the clear relationship between soil depth and terrain position. In sloping terrain, particularly across dissected hillsides and drainage margins, soils are generally shallow and commonly less than 30 cm thick before reaching weathered rock, rocky material or bedrock. These shallow profiles are associated with the more elevated and inclined parts of the landscape, where long-term erosion and limited soil accumulation have restricted profile development.

In contrast, flatter terrain, especially in the northern parts of the catchment, contains deeper and more developed soil profiles. In these relatively level areas, soil thickness may exceed 1 m, reflecting the accumulation of finer materials, reduced erosion and long-term deposition from surrounding higher terrain. These deeper soils form a distinct contrast with the shallow loamy and silty-loamy soils found on slopes and along more exposed terrain.

The BUQ soil unit is the dominant soil class in the northern and north-central part of the study area. It extends across much of the area surrounding Buraiqa and continues southward toward the Project Site. The Project Site, represented by the pink polygon, is located mainly within the BUQ soil setting. The groundwater abstraction point is also located within this same general soil unit. The BUQ area includes both gently inclined and relatively flat terrain, resulting in variation in soil-profile thickness between local slopes and flatter land surfaces.

The proposed water pipeline alignment begins near the groundwater abstraction point and extends eastward from the Project Site. The alignment is largely associated with the BUQ soil environment near the project area before approaching the eastern sector where the BUR soil unit becomes more dominant. The BUR unit extends across much of the eastern and north-eastern part of the catchment, including areas toward Hosha and the eastern drainage system.

The ALI soil unit occupies a broad zone across the central, southern and south-western parts of the study area. It is particularly widespread around the Al Khanasri area and across the lower southern terrain. This unit also forms part of the setting crossed by the western and central sections of the power transmission line corridor. The soil environment in these areas is associated with the more variable southern terrain and includes both shallower soils on slopes and deeper local accumulations in gentler terrain.

The HAB soil unit is concentrated mainly along the western and south-western margins of the mapped catchment. It forms a broad peripheral band around parts of the lower western landscape, including areas closer to Umm Zaytuna. Smaller HAB occurrences also appear along transitional areas between the western and central catchment.

The AYD soil unit occurs as smaller and more localized patches within the wider southern and central soil environment. These patches are mainly associated with the ALI-dominated terrain and do not form one continuous zone. The JER soil unit is limited in extent and appears as isolated areas within the broader soil pattern of the catchment.

The black power transmission line corridor crosses several soil environments along its west-to-east route. The western part of the corridor passes through areas associated mainly with ALI and HAB soils. It then enters the BUQ-dominated central-northern terrain before reaching the Project Site. The corridor therefore crosses a wider sequence of soil units than the water pipeline alignment, which is concentrated mainly within the BUQ and BUR soil settings.

The soil-depth pattern is closely related to the slope and drainage configuration of the study area. Shallow loamy and silty-loamy soils occur predominantly on sloping surfaces, where bedrock or weathered material is closer to the ground surface. In flatter northern terrain, deeper loamy soil profiles develop and may exceed one meter in thickness. This variation forms part of the wider physical setting of the catchment and will be considered together with geology, slope, land cover, groundwater recharge and groundwater sensitivity in the later chapters of the report.

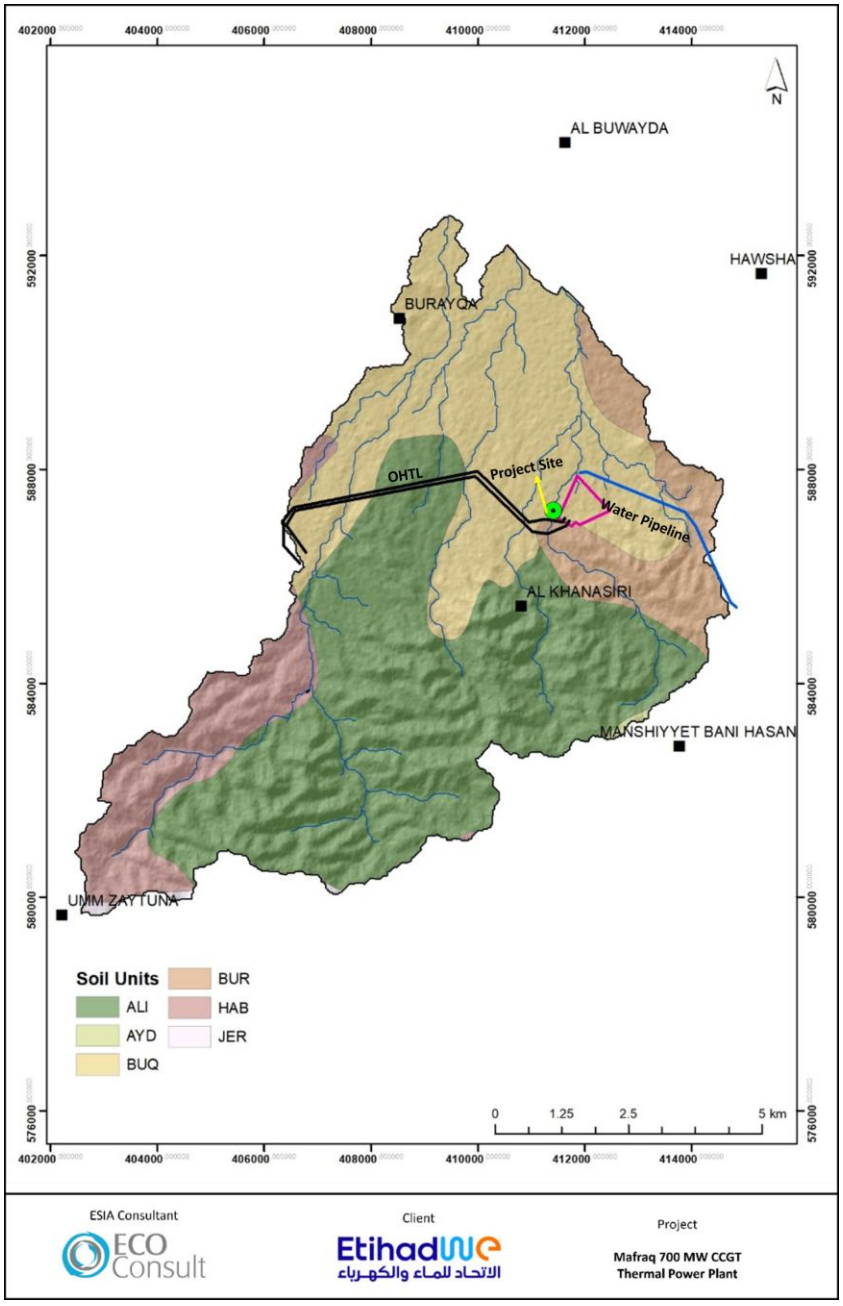


Figure 46: Soil Units Map of the Project Area

6.4.2 Hydrology

The study area forms a single wider catchment subdivided into five hydrological units: Sub-Basin 1, Sub-Basin 2, Sub-Basin 3, Sub-Basin 4 and Sub-Basin 5. The boundaries of these units are defined by the

surrounding ridgelines, terrain breaks and natural drainage divides. Within each sub-basin, surface runoff is collected through a network of ephemeral drainage lines and conveyed toward lower parts of the watershed.

The drainage network is relatively well developed across the mapped area. Numerous first-order and secondary channels originate from the upper terrain and merge progressively into broader drainage pathways. These channels are typical of a semi-arid landscape, where runoff is generated mainly during seasonal or high-intensity storm events rather than through continuous perennial flow. The mapped channels define the main natural pathways through which water, sediment and locally concentrated runoff move across the catchment.

The wider topographic setting shows that the southern and south-western parts of the study area form the higher headwater environment, while lower terrain occurs toward the northern and north-eastern sectors. The sub-basins therefore represent connected runoff-contribution areas, with each unit receiving rainfall over its own surface area and routing runoff through its internal drainage system toward downstream channels and lower landscape positions.

- Sub-Basin 1

Sub-Basin 1 occupies the south-western part of the catchment and includes the area surrounding Umm Zaytuna. It is one of the larger mapped units and contains a dense network of short drainage lines that originate across the elevated southern and western terrain. The sub-basin is characterized by a combination of agricultural, vegetated and open-land surfaces, corresponding with the more developed soil and land-cover pattern in this part of the catchment.

The drainage lines in Sub-Basin 1 generally converge toward the north-eastern and central parts of the watershed, linking this unit hydraulically with the neighboring sub-basins. The western section of the power transmission line corridor is located north of this unit and follows the transition between the upper drainage environment and the central catchment.

- Sub-Basin 2

Sub-Basin 2 is located in the south-central part of the study area. It forms a relatively compact hydrological unit between Sub-Basin 1 to the west and Sub-Basin 3 to the east. The sub-basin contains several local drainage channels that originate from the higher southern terrain and converge toward the central and northern drainage system.

The unit lies within an area characterized by mixed slope conditions, agricultural land-use patches and variable soil depth. Its drainage pattern provides an important connection between the southern headwater landscape and the central part of the catchment. Although the Project Site is outside Sub-Basin 2, the sub-basin forms part of the wider hydrological system influencing downstream runoff routing.

- Sub-Basin 3

Sub-Basin 3 occupies the central-eastern part of the study area and is the hydrological unit most directly associated with the Project Site. The pink project polygon is located within the northern part of Sub-Basin 3, close to the boundary with Sub-Basin 4. The groundwater abstraction point is also located within the same general hydrological setting.

The proposed water pipeline alignment extends eastward from the project-area setting through Sub-Basin 3. It follows a corridor that is crossed by, or located near, several local drainage lines descending from the

upper and central terrain. The drainage network within Sub-Basin 3 is composed of several small to medium ephemeral channels that converge toward the eastern and north-eastern sides of the basin.

Sub-Basin 3 is also characterized by a central drainage pathway extending toward the eastern side of the mapped catchment. This hydrological setting is important because the Project Site is located within a landscape where local drainage lines from surrounding terrain remain visible and connected to the wider sub-basin network.

- Sub-Basin 4

Sub-Basin 4 occupies the north-central part of the study area and forms a long north–south hydrological unit extending from the upper northern terrain toward the central catchment. It is bordered by Sub-Basin 5 to the west and Sub-Basin 3 to the east and south-east.

The drainage network in Sub-Basin 4 consists of several elongated channels that follow the terrain gradient and converge toward the central and northern landscape. The sub-basin includes part of the terrain surrounding Buraiqa and extends across an area dominated by open land, soil-over-bedrock conditions and relatively shallow groundwater-depth classes.

The Project Site is located close to the southern boundary of Sub-Basin 4, although the project footprint itself is associated primarily with Sub-Basin 3. The black power transmission line corridor crosses the southern part of Sub-Basin 4 before approaching the project area. This establishes a direct physical connection between the power-line route and the drainage system of both Sub-Basins 4 and 3.

- Sub-Basin 5

Sub-Basin 5 occupies the central-western part of the catchment. It is located between Sub-Basin 1 in the south-west, Sub-Basin 2 in the south-east and Sub-Basin 4 in the north-east. The sub-basin contains a branching drainage network that collects runoff from the western and central slopes and directs it toward the broader central drainage environment.

The power transmission line corridor passes through the northern part of Sub-Basin 5. This section of the alignment follows a route close to several local drainage pathways and terrain transitions. Sub-Basin 5 therefore forms an important intermediate unit between the western parts of the catchment and the central project-area setting.

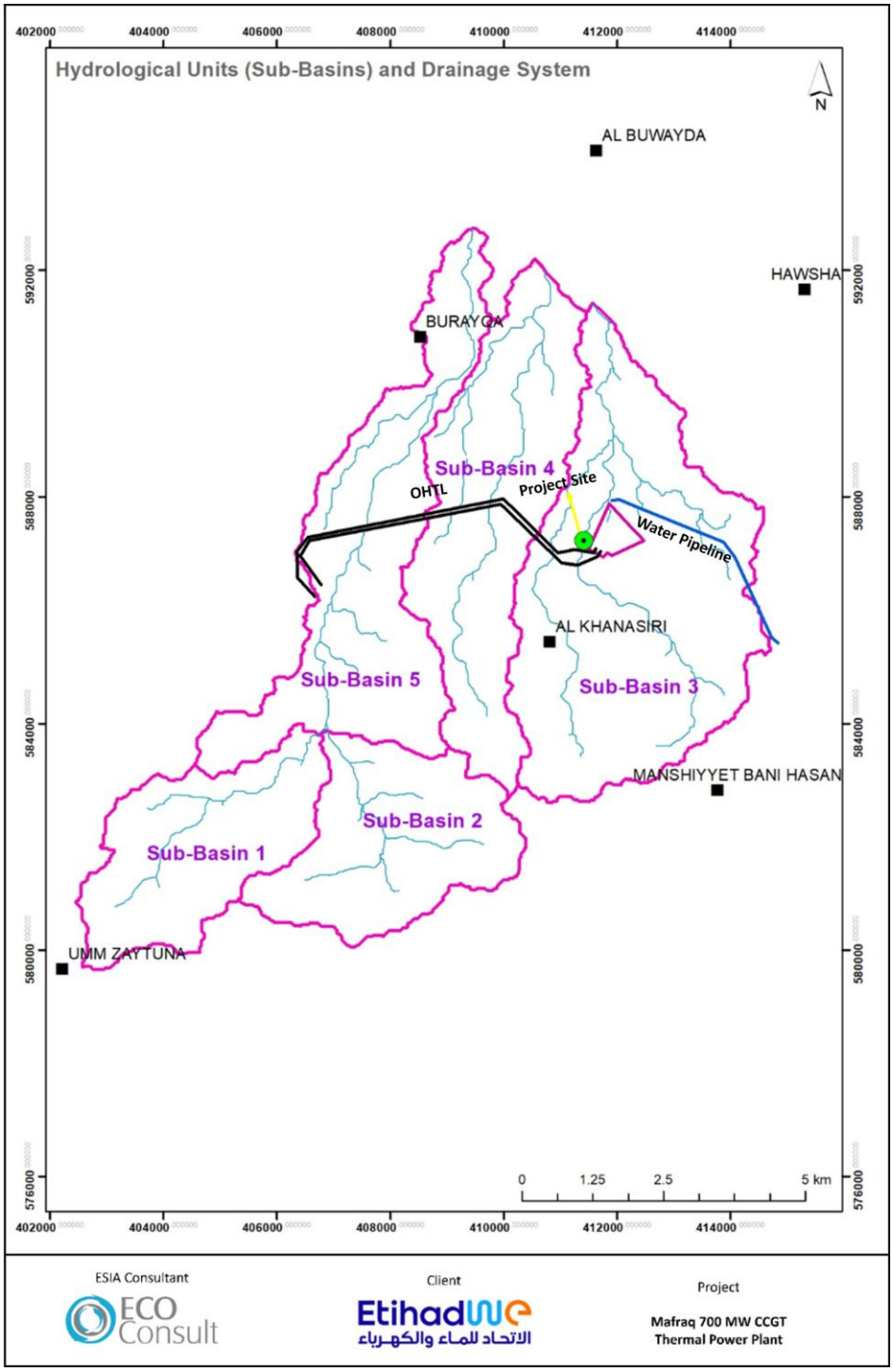


Figure 47: Hydrological Units and Drainage System within Project Area

6.4.3 Hydrology and Flood Risk Assessment

The hydrological and flood assessment defines the way rainfall runoff is generated, concentrated and conveyed through the study area. It is based on the long-term daily rainfall record, satellite-derived terrain

and drainage analysis, land-cover and soil information, the delineated hydrological sub-basins, and a two-dimensional HEC-RAS hydraulic model.

The assessment covers the Project Site, the groundwater abstraction point, the proposed water pipeline alignment and the power transmission line corridor. It also considers the wider runoff system that connects the five mapped hydrological sub-basins.

A key distinction is required in interpreting the results:

The sub-basins are hydrological contribution areas; they are not flood-risk zones by themselves. The moderate flood-risk classification is confined mainly to the active drainage lines and their immediate flow corridors, rather than extending across the entire area of Sub-Basin 3 or Sub-Basin 4.

Outside the principal drainage lines, the wider land surface is generally classified as very low to low flood risk. The flood-risk corridors are narrow in most locations, varying from a few meters along smaller drainage lines to approximately 20 m in width within the more developed northern drainage channels.

6.4.3.1 Long-Term Rainfall Regime

The assessment used the available daily rainfall record for the period 1968–2024 (figure below). This long-term series provides a representative basis for understanding the rainfall regime, extreme-event occurrence and runoff-generating conditions of the study area.

The record shows a highly variable rainfall pattern. Most rainfall events are of low to moderate daily magnitude, while occasional intense storm events generate substantially higher rainfall totals. Several events exceed approximately 30 mm/day, and a number of daily events reach approximately 45–53 mm/day.

This rainfall behavior is characteristic of semi-arid environments. Rainfall is not continuous throughout the year; instead, runoff is generated mainly during limited, high-intensity storm events. During such events, water is rapidly collected from the upper terrain, shallow soils, exposed rock surfaces and agricultural slopes, then routed through the local drainage network.

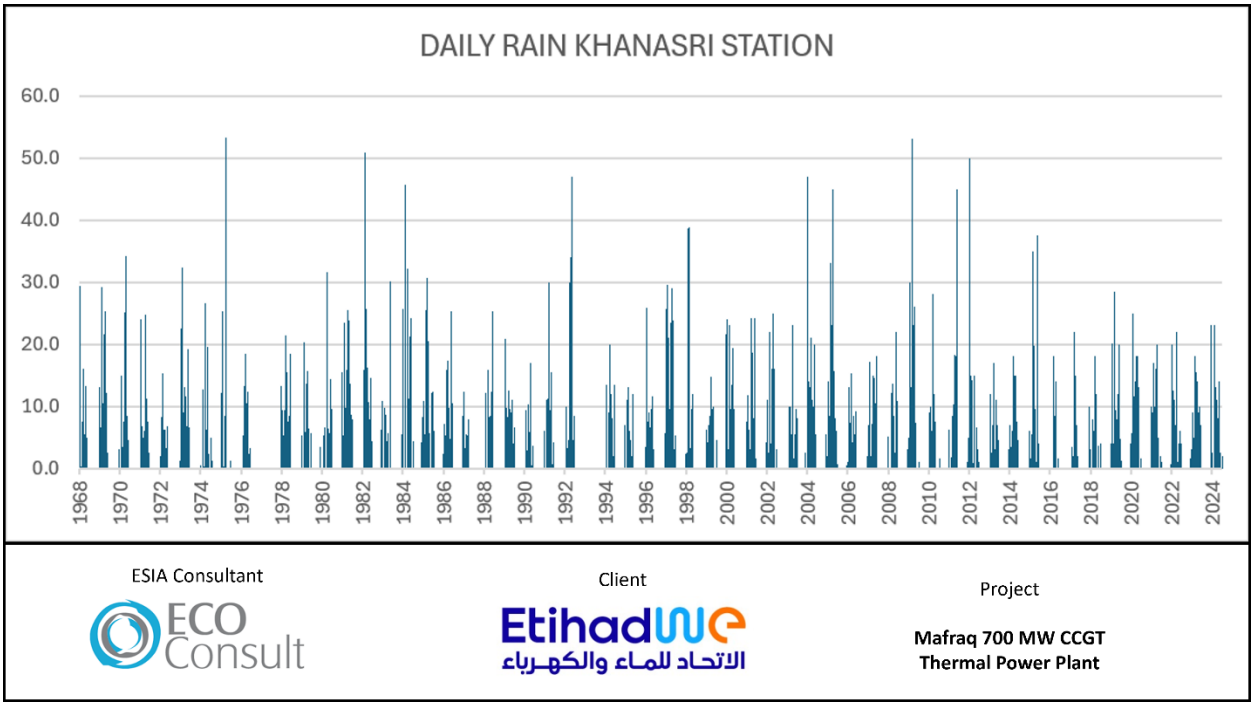


Figure 48: Daily Rainfall Record at Khanasri Station (1968–2024)

Table 34: Rainfall Characteristic at Khanasri Station

Rainfall Characteristic	Interpretation
Data Period	1968–2024
Rainfall Behavior	Seasonal, irregular and event driven
Typical daily events	Low to moderate rainfall totals
Significant events	Several daily events greater than 30 mm
Extreme daily rainfall	Approximately 45–53 mm/day
Hydrological relevance	Intense events generate concentrated runoff in wadis and local drainage lines

The long-term rainfall record was used to identify representative high-rainfall conditions and to support the definition of design storm inputs for the hydrological and HEC-RAS modeling process.

6.4.3.2 Catchment Structure and Surface-Runoff Setting

The study area is divided into five hydrological units: Sub-Basin 1, Sub-Basin 2, Sub-Basin 3, Sub-Basin 4 and Sub-Basin 5. These units define the principal areas from which rainfall runoff is collected and conveyed toward the local drainage network.

The terrain ranges from approximately 583 to 1,050 m above sea level. The southern and south-western parts of the study area form relatively elevated terrain, while lower elevations occur toward the northern and north-eastern areas. This gradient controls the overall direction of surface runoff and the formation of the mapped drainage system.

The drainage network consists of ephemeral wadis, minor channels and local runoff pathways. These features remain dry for much of the year but become active during major rainfall events. Smaller drainage lines begin on slopes and upper terrain, then merge into wider and more defined channels as they move through the catchment.

The runoff behavior is influenced by the combined effect of:

- Elevation and terrain gradient;
- Slope distribution;
- Soil texture and soil depth;
- Geology and surface rock exposure;
- Land-cover conditions;
- Drainage density and channel connectivity;
- Rainfall magnitude and duration.

The soil setting ranges mainly from loamy silt to loamy soils. On slopes, soil profiles are generally shallow and may be less than 30 cm thick before weathered rock or bedrock is reached. In flatter northern terrain, soil thickness can exceed one meter. This contrast contributes to variations in surface runoff and infiltration across the catchment.

Satellite-derived terrain analysis was used to confirm drainage lines, flow direction, catchment boundaries, local depressions and runoff-concentration zones. Sentinel and Landsat imagery were also used to verify visible wadis, surface-flow signatures, channel alignment and land-cover conditions.

6.4.3.3 HEC-RAS Two-Dimensional Flood Model

A two-dimensional HEC-RAS model was developed to represent floodwater movement across the drainage system and adjacent land surface. The model was used because the catchment contains multiple small and medium drainage lines, shallow flood corridors and local flow paths rather than one single confined river channel. The model integrated the following datasets:

Table 35: HEC-RAS Model Data Sets

Model input	Role in the analysis
Digital elevation model	Defines terrain, drainage pathways and floodplain surface
Satellite imagery	Verifies drainage lines, land cover and runoff pathways
Long-term rainfall record	Defines storm-event and runoff inputs
Hydrological sub-basins	Defines runoff-contribution areas
Slope map	Supports flow-direction and runoff-concentration analysis
Soil map	Supports infiltration and runoff-response interpretation
Land-cover map	Defines surface roughness conditions
Geological map	Supports interpretation of surface and subsurface conditions
Drainage network	Defines active flow paths and HEC-RAS routing corridors

The HEC-RAS model was structured to route runoff from the upper catchment through the main wadis and secondary channels. The model included the mapped drainage network, local terrain depressions, channel boundaries and surrounding open land. Rainfall-generated runoff was introduced through the contributing sub-basins and routed through the terrain surface.

The Project Site, water pipeline alignment, power transmission line corridor and groundwater abstraction point were included as reference features in the model environment. Their location relative to the simulated flow paths formed the basis for the flood-setting interpretation.

6.4.3.4 Flood-Risk Results

The model results show that floodwater is concentrated mainly within the natural drainage lines and their immediate flow corridors. Flood risk is therefore spatially limited and follows the drainage network rather than extending uniformly across the sub-basins. The mapped flood-risk classes are:

Table 36: Flood Risk Classes

Flood-risk class	Spatial interpretation
Very Low	Areas outside the main drainage pathways with limited runoff concentration
Low	Areas near local drainage features or within broad runoff-contribution terrain
Moderate	Active drainage lines and immediate flood-routing corridors

The moderate flood-risk class is concentrated along the main wadis and interconnected drainage lines. In smaller and upper drainage features, these flow corridors are narrow and may extend only a few meters from the channel centerlinecenterline. In the northern part of the catchment, where drainage pathways become more developed and runoff from upstream areas converges, the moderate flood corridor becomes wider and may reach approximately 20 m.

This interpretation applies particularly to the drainage lines associated with Sub-Basins 3 and 4. These sub-basins contain an active and connected drainage network, but the moderate-risk classification does not apply to their full geographic extent. Most of the land between drainage channels remains within the very low or low flood-risk classes.

The HEC-RAS results therefore distinguish between:

- The wider sub-basin area, which contributes rainfall runoff; and
- The active drainage corridor, where runoff becomes concentrated and floodwater is routed during significant storm events.

This distinction is important for interpreting the flood-risk map. A sub-basin may be hydrologically important because it contributes runoff, while only a small part of its surface area, mainly along drainage lines, is classified as moderate flood risk.

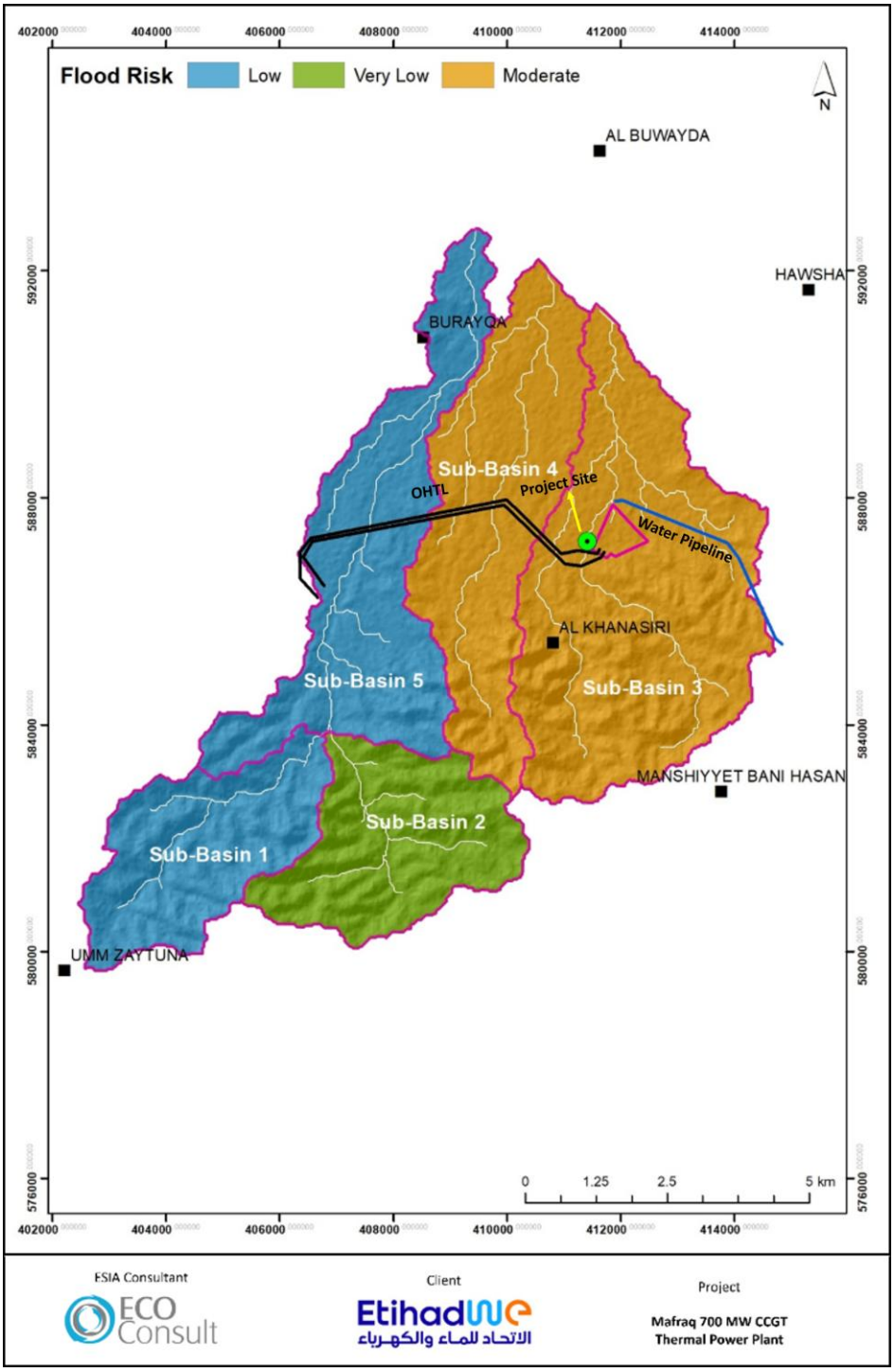


Figure 49: Flood Risk Map of the Project Area

6.4.3.5 Flood Setting of the Project Components

The Project Site is located within Sub-Basin 3, close to the boundary with Sub-Basin 4. The site is situated near local drainage features but is not equivalent to the full moderate flood corridor. The flood setting is

controlled by the proximity of the site to nearby drainage lines and by the direction of local runoff movement across the terrain.

The water pipeline alignment extends eastward from the groundwater abstraction point and the Project Site. Along the route, the alignment intersects or approaches several local drainage lines. The flood setting of the pipeline therefore varies by location: most sections lie outside the active drainage corridors, while localized sections coincide with or cross the modeled runoff pathways.

The power transmission line corridor crosses a wider range of catchment conditions. Its western section passes through the Sub-Basin 5 environment, where drainage pathways are relatively dispersed. The central and eastern portions cross the drainage systems associated with Sub-Basins 4 and 3. Similar to the water pipeline, flood relevance is concentrated at individual drainage crossings rather than continuously along the full alignment.

Table 37: Flood-Setting Interpretation for Project Infrastructure Components

Infrastructure element	Flood-setting interpretation
Main Project Site	Located in Sub-Basin 3, near localized drainage and runoff-routing features
Groundwater abstraction point	Located within the eastern drainage environment of Sub-Basin 3
Water pipeline alignment	Mostly outside active drainage corridors, with localized crossings of drainage lines
Power transmission corridor	Crosses several sub-basins; flood relevance is concentrated at individual wadi crossings

6.4.3.6 Interpretation of the Flood-Risk Map

The Flood Risk Map should be read as a map of drainage-line flood corridors, not as a blanket classification of entire sub-basins.

The active flood pathways are represented by the drainage network extending through the study area. These pathways are narrow in the upper and smaller tributaries and expand gradually as runoff converges downstream. In the northern sections, some of the more developed drainage corridors reach widths of approximately 20 m, while elsewhere they remain limited to only a few meters.

The wider spaces between drainage lines are generally characterized by very low to low flood-risk conditions. These areas remain part of the hydrological catchment because they generate runoff during storms, but they are not the principal zones of concentrated flood routing.

6.4.3.7 Additional Flood Risk Modeling

In addition to the above analysis, a detailed hydrological and hydraulic flood modeling assessment was undertaken by the Developer's technical consultant (WSP, Hydrology Report, 27 March 2026) to quantify flood risk to the Project and to identify appropriate mitigation measures. Rainfall inputs were derived from open-source gridded datasets (CHIRPS, ERA5, and GPM) covering the period 1981–2026, in the absence of local rain-gauge records within the Project catchment. The CHIRPS dataset (4.8 km resolution) was adopted for design rainfall estimation on the basis of its higher spatial resolution and stronger representation of extreme rainfall events. Frequency analysis using the L-Moments method identified the

Gumbel distribution as the best fit, producing a 24-hour design storm depth of 137.22 mm for the 1-in-100-year event, increasing to 164.66 mm under a 100-year plus 20% climate change allowance.

Hydrological modeling (HEC-HMS) generated flood peak discharges at each junction contributing to the Project site, summarized in the table below.

Table 38: Flood Peak Discharge by Return Period

Location	5-yr (m^3/s)	10-yr (m^3/s)	25-yr (m^3/s)	100-yr (m^3/s)	100-yr + 20% CC (m^3/s)
Junction 2	8.78	11.90	16.03	22.37	28.17
Junction 3	40.34	53.84	71.54	98.67	123.36

Note: Junction 2 and Junction 3 are presented as they represent the primary external inflow points to the Project site; Junction 1/Sink 1 and Junction 4 correspond to downstream outlet locations outside the Project boundary and are therefore not the basis for the present flood risk assessment.

Two-dimensional hydraulic modeling (HEC-RAS) was undertaken for the 1-in-100-year event with a 20% climate change allowance, the governing design scenario for this assessment. Results indicate that flood exposure is concentrated along Stream 1 to Stream 4, with flooding inside the Project site predominantly influenced by Stream 2 and Stream 3.

Maximum inundation depths along the natural stream valleys generally range between 1.0–1.5 m. Within the Project boundary, flood depths vary mainly between 0.3–1.0 m, with localized pockets of elevated depth where Streams 2 and 3 traverse the site.

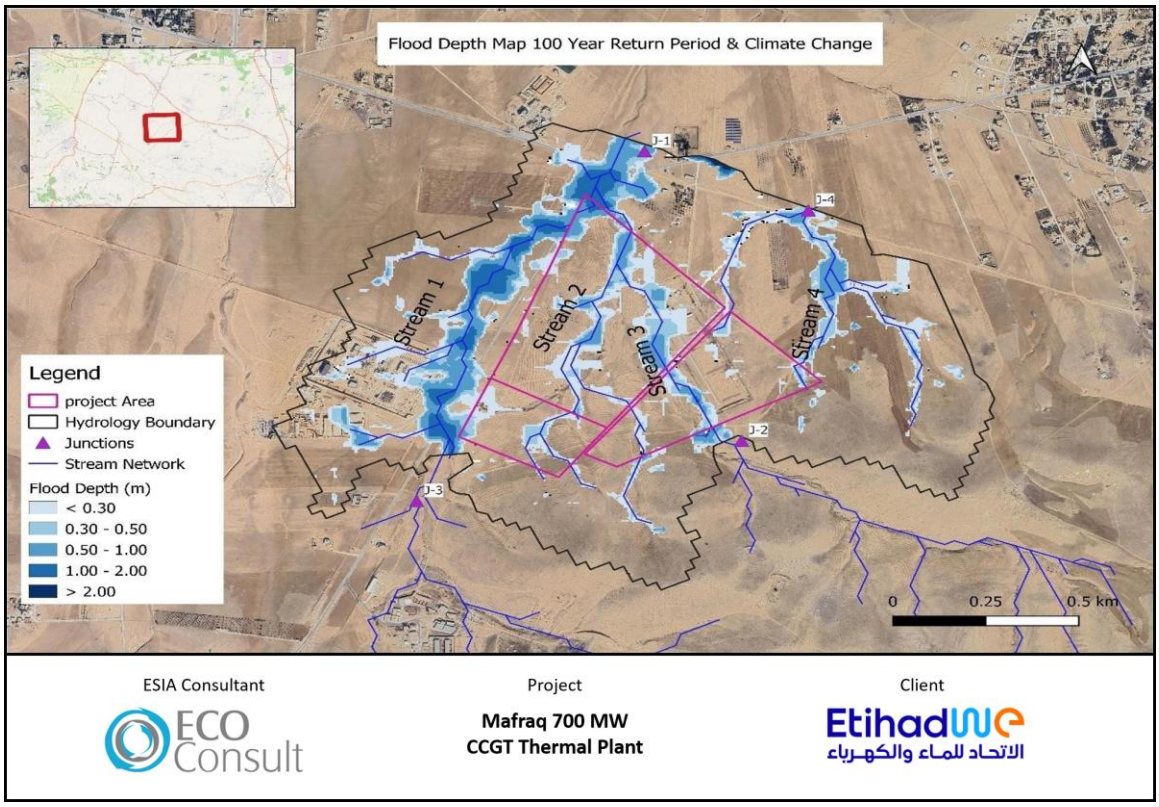


Figure 50: Flood Depth Map for 1 in 100-Year Event with 20% Climate Change Allowance

Velocities along the primary stream pathways commonly exceed 2.0 m/s, rising above 3.0 m/s in upstream and mid-reach sections. Within the Project boundary, the majority of inundated areas fall within a lower velocity class (0.0–0.75 m/s).

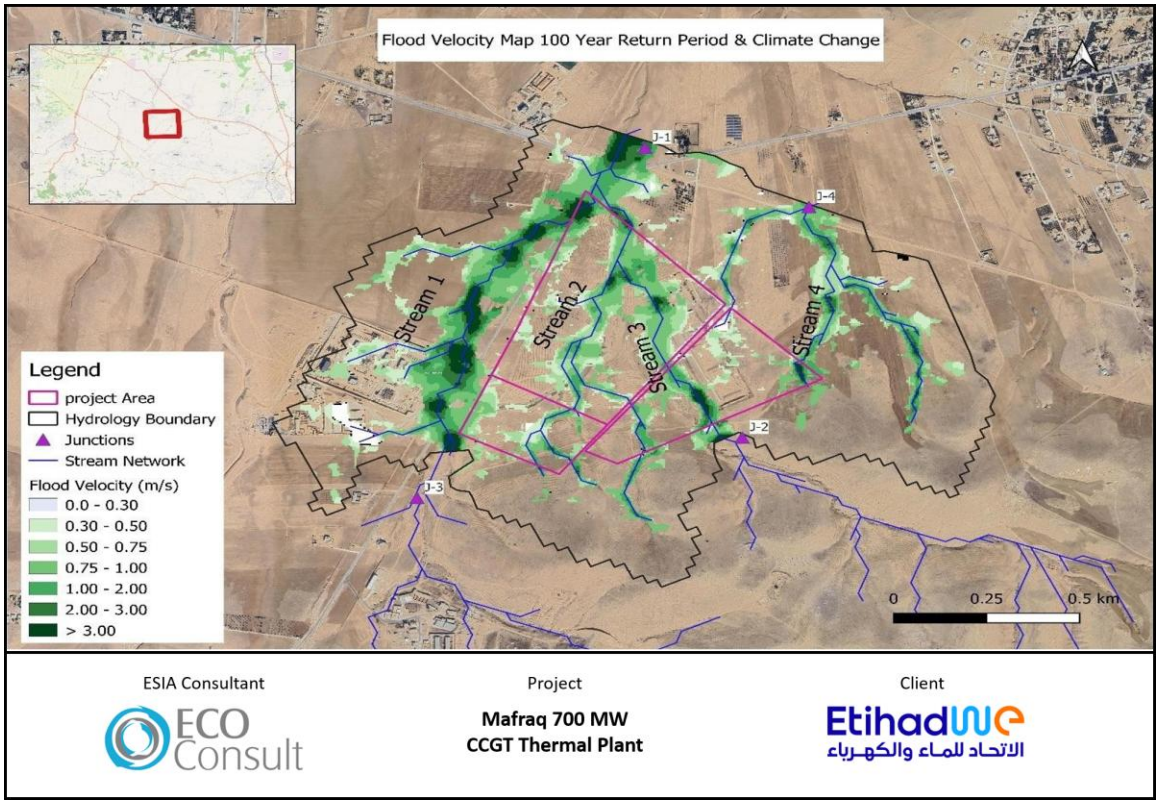


Figure 51:Flood Velocity Map for 1 in 100-Year Event with 20% Climate Change Allowance

Flood hazard was classified in accordance with the UK Flood Risks to People methodology (Defra/Environment Agency, FD2321/TR1 and FD2320/TR2), based on the combination of flood depth and velocity. Extreme hazard areas were identified near Stream 1, particularly at the downstream junction; the Project area is notably influenced by Stream 2 and Stream 3, resulting in moderate to significant hazard levels in places.

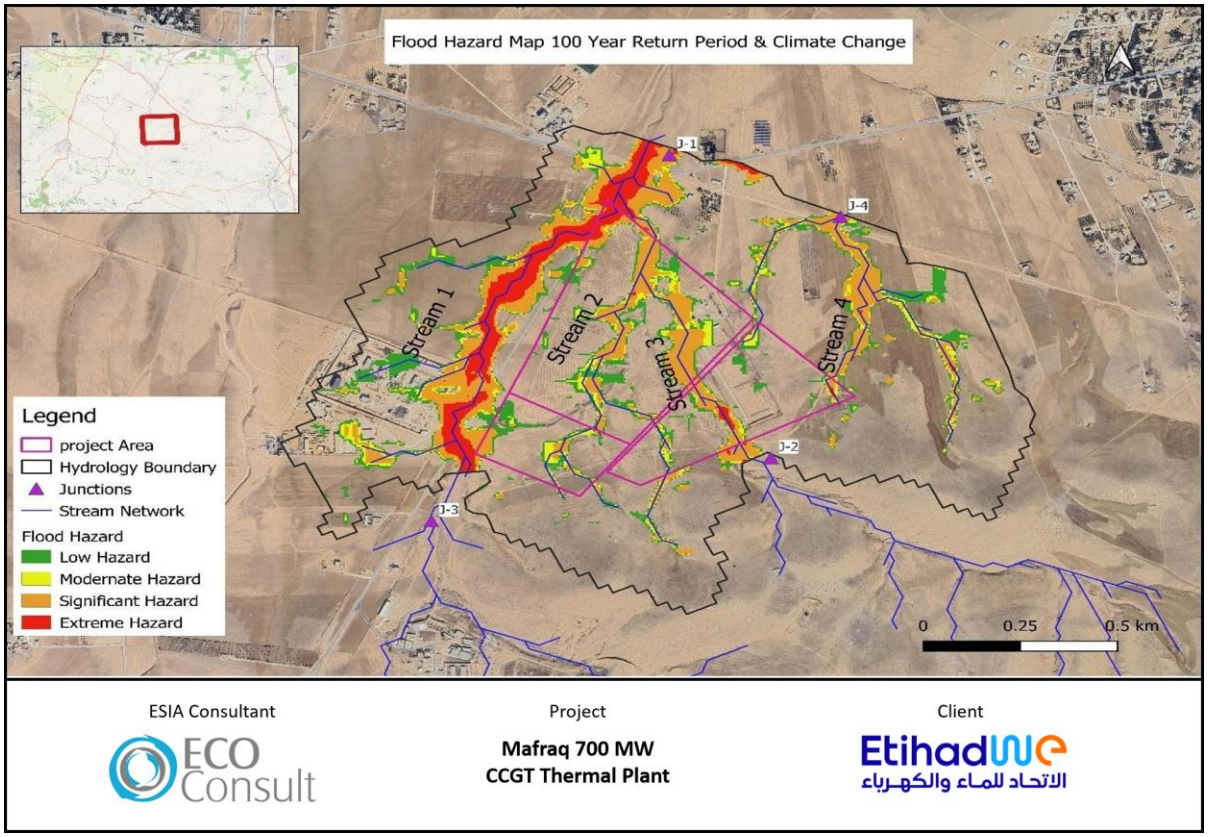


Figure 52: Flood Hazard Map for 1 in 100-Year Event with 20% Climate Change Allowance

Based on the above, the following identifies the mitigation measures that the study recommends:

- Construction of an earthen dyke/embankment of approximately 1.5 m height, 500 m length, 0.5–1.0 m top width, and 3:1 side slope along the north-east and north-west sides of Plot A, to mitigate flooding potential from Stream 1 and from the northern and north-eastern boundaries of Plot A;
- Construction of Diversion Channel 1 (trapezoidal, 1 m bottom width, 0.8 m depth, 4.2 m top width, 2:1 side slope, approximately 363 m length) along the common boundary of Plot A and Plot C, and the common boundary of Plot A and Plot B, to capture and convey runoff from the minor tributary draining Plot C and prevent it from spilling into Plot A;
- Construction of Diversion Channel 2 (trapezoidal, 4 m bottom width, 1.25 m depth including freeboard, 9.0 m top width, 2:1 side slope) on the western side of Plot B, intercepting approximately 28 m^3/s of upstream flow before it enters Plot A and routing it to a branch of Stream 4;
- Re-grading and organization of the internal drainage system to direct internal runoff toward the north-east corner of Plot A, for discharge into a combined evaporation and infiltration pond.

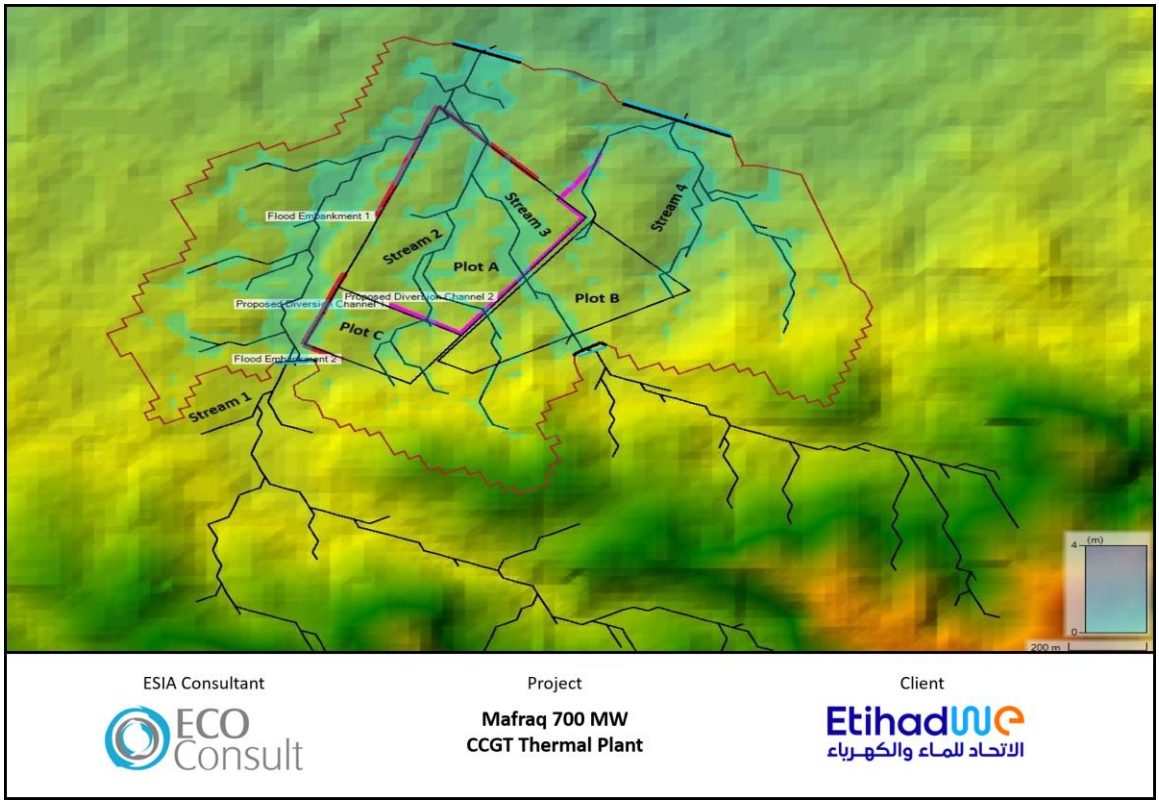


Figure 53: Mitigation Setup in HEC-RAS

Note: Flood Embankment 2 falls within Plot C and is shown for reference only; its design and implementation are outside the scope of the Project's mitigation measures.

Following implementation of the mitigation measures described above, the 2D hydraulic model was re-run under the same design event (1-in-100-year plus 20% climate change) to assess residual flood risk. Results show a marked reduction in flood exposure within Plot A. The perimeter embankments intercept lateral overflow from Stream 1 and the confluence of Streams 2 and 3, preventing floodwaters from these natural channels from entering the Project area, while Diversion Channels 1 and 2 route intercepted flows to downstream natural outlets — Channel 1 toward the lower reach of Stream 3, and Channel 2 toward the Stream 4 outlet near Junction 4 — without building up within the Project footprint.

As a result, flood depths within Plot A are reduced to predominantly less than 0.30 m, with only isolated depressions retaining 0.30–0.50 m, reflecting localized ponding rather than stream-driven flooding. Flow velocities within the site are reduced to predominantly below 0.75 m/s, with only small, localized stretches near the diversion channels reaching 0.75–1.0 m/s due to guided conveyance. Flood hazard within Plot A shifts predominantly to low and moderate categories, with high-hazard conditions confined to narrow sections immediately adjacent to the natural stream channels, where flow remains concentrated.

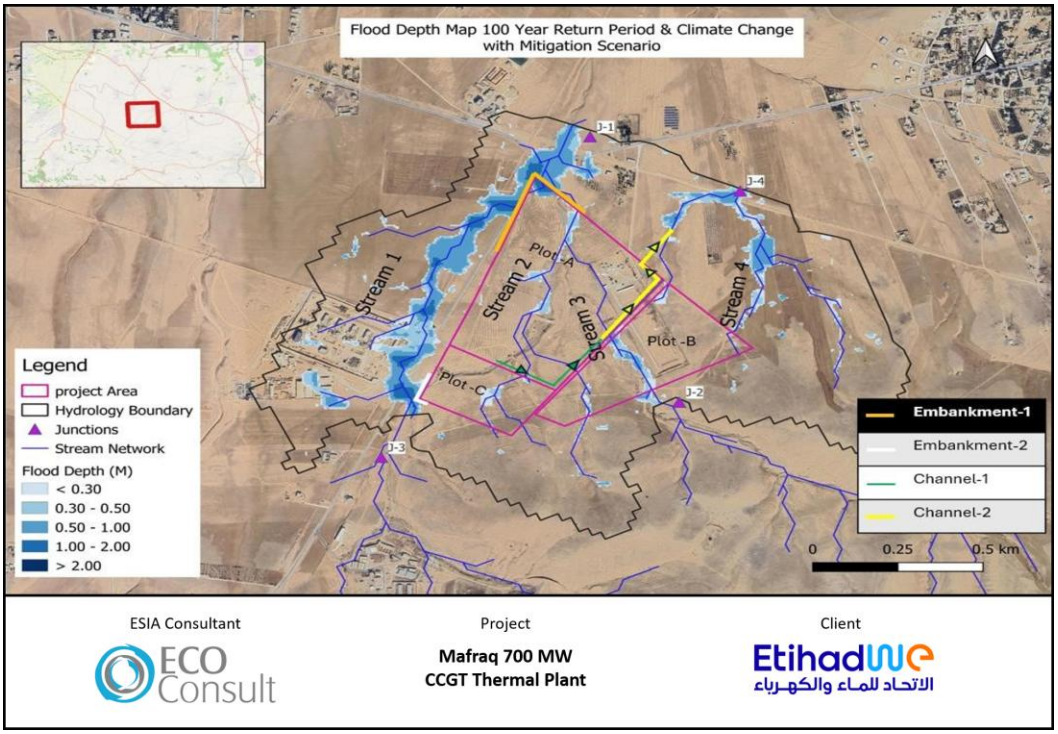


Figure 54: Flood Depth Map Post-Mitigation

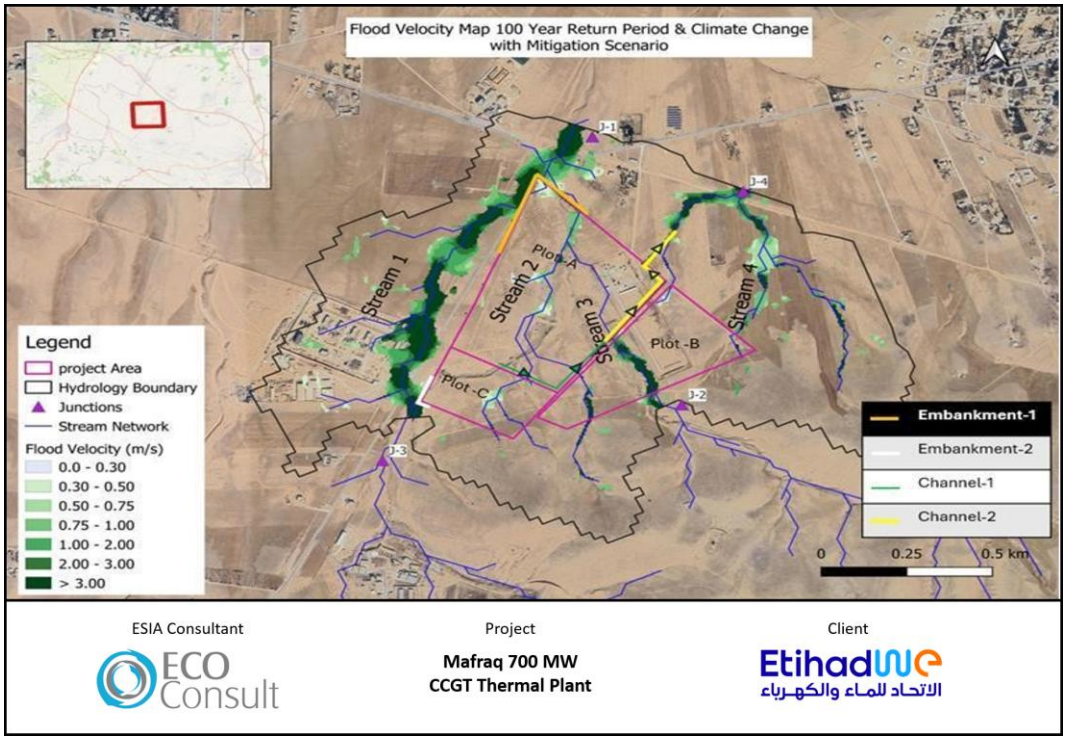


Figure 55: Flood Velocity Map Post-Mitigation

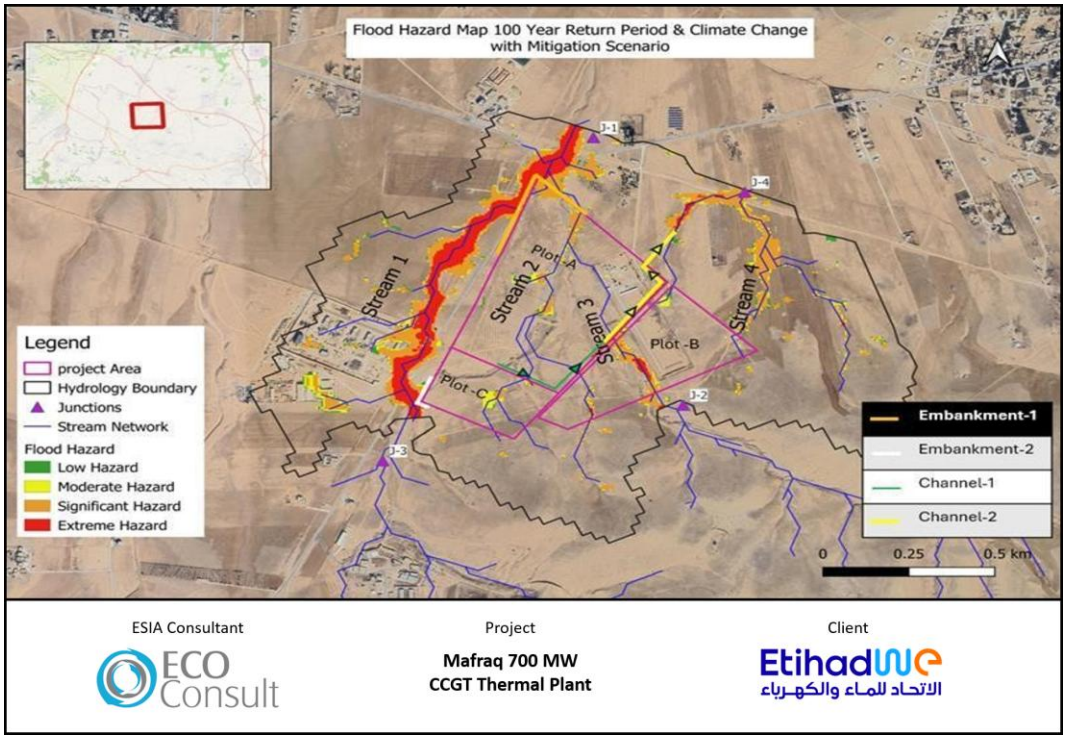


Figure 56: Flood Hazard Map Post-Mitigation

6.4.4 Groundwater Setting

6.4.4.1 Groundwater-Level Distribution

The groundwater-level map presents the spatial distribution of groundwater elevations across the study area, expressed in meters above sea level. The mapped groundwater surface ranges from approximately 405–420 m asl in the northern part of the catchment to approximately 521–540 m asl in the southern and south-western sectors.

The pattern shows a distinct regional groundwater-level gradient. Higher groundwater elevations occur in the southern and south-western parts of the study area, particularly around the Umm Zaytuna and southern catchment environment. Groundwater levels then decrease progressively toward the central, northern and north-eastern parts of the watershed.

The Project Site and the groundwater abstraction point are located within the 481–500 m asl groundwater-level zone. This places the project area within the central part of the wider groundwater-gradient system, between the higher groundwater elevations of the south and the lower groundwater elevations of the north.

The mapped groundwater-level surface indicates a broad conceptual groundwater-flow direction from the higher hydraulic-head areas in the south and south-west toward the lower-head areas in the north and north-east. This interpretation is based on the progressive reduction in mapped groundwater elevation across the catchment.

The groundwater-well locations shown on the map are distributed both within and around the study area. These wells provide the basis for the mapped groundwater-level surface and show that the groundwater

system extends beyond the immediate project boundary into the surrounding regional aquifer environment.

6.4.4.2 Depth to Groundwater

The depth-to-groundwater map shows the vertical distance between the ground surface and the groundwater level. The mapped depth classes range from approximately 142–194 m below ground level to 358–455 m below ground level.

The depth pattern differs from the groundwater-level map because it is controlled by both groundwater elevation and surface topography. The southern part of the catchment contains the highest land elevations and also the deepest groundwater conditions. In contrast, the northern and north-central areas contain lower land elevations and shallower mapped groundwater depths.

The Project Site and groundwater abstraction point are located within the 142–194 m depth-to-groundwater class, representing the shallowest mapped groundwater-depth category within the study area. This zone extends across the northern and north-central terrain and is associated with the lower-elevation part of the watershed.

The proposed water pipeline alignment is located mainly within the shallow-depth groundwater environment of the north-central area. As the alignment extends eastward, it approaches the transition toward the 195–244 m groundwater-depth class.

The power transmission line corridor crosses a wider groundwater-depth gradient. Its central and eastern sections pass through the shallow and intermediate groundwater-depth environment, while the western and south-western parts of the corridor extend toward areas characterized by deeper groundwater conditions.

The regional depth pattern is closely related to the elevation pattern of the catchment. The southern and south-western sectors contain elevations exceeding 900 m asl in several locations, while groundwater levels remain within the 501–540 m asl range. This creates a larger unsaturated zone and results in groundwater depths exceeding 300 m and, locally, 400 m below ground level. In the northern project-area setting, lower surface elevations combined with groundwater levels of approximately 481–500 m asl produce shallower groundwater depths.

6.4.4.3 Groundwater Recharge Distribution

The groundwater-recharge map classifies annual recharge across the study area into three mapped values:

- 25 mm/year
- 30 mm/year
- 35 mm/year

The recharge pattern shows a gradual increase from the northern part of the catchment toward the southern and south-western sectors. The northern and north-central areas are dominated by the 25 mm/year recharge class, while the central and eastern transition areas are mainly associated with

approximately 30 mm/year. The higher recharge class of approximately 35 mm/year occurs mainly across the southern and south-western parts of the watershed.

Table 39: Groundwater Recharge Classes

Recharge class	Main spatial distribution
25 mm/year	Northern and north-central catchment, including Buraiqa and the project-area setting
30 mm/year	Central, eastern and transitional catchment areas
35 mm/year	Southern and south-western terrain, including areas toward Umm Zaytuna

The Project Site and the groundwater abstraction point are located within the 25 mm/year recharge zone. The immediate water pipeline alignment is also located primarily within this same recharge environment, while parts of the eastern route approach the transition toward the 30 mm/year recharge class.

The southern and south-western areas show the highest mapped recharge values of approximately 35 mm/year. These areas also correspond with the higher-elevation terrain, deeper groundwater depths and more developed agricultural and vegetated land-cover pattern visible in the other thematic maps.

The recharge map includes magenta contour lines marked approximately 200, 220, 240, 260 and 280, indicating a broader rainfall-gradient pattern across the catchment. The mapped recharge distribution generally follows this gradient: lower recharge values occur in the northern areas, while higher recharge values are associated with the southern and south-western sectors.

The recharge pattern reflects the combined effect of rainfall distribution, terrain, slope, soil depth, land cover, geology and infiltration conditions. In the northern project-area setting, recharge is lower in absolute annual terms but remains part of the wider groundwater replenishment system. The southern and south-western areas represent the higher mapped recharge environment of the catchment.

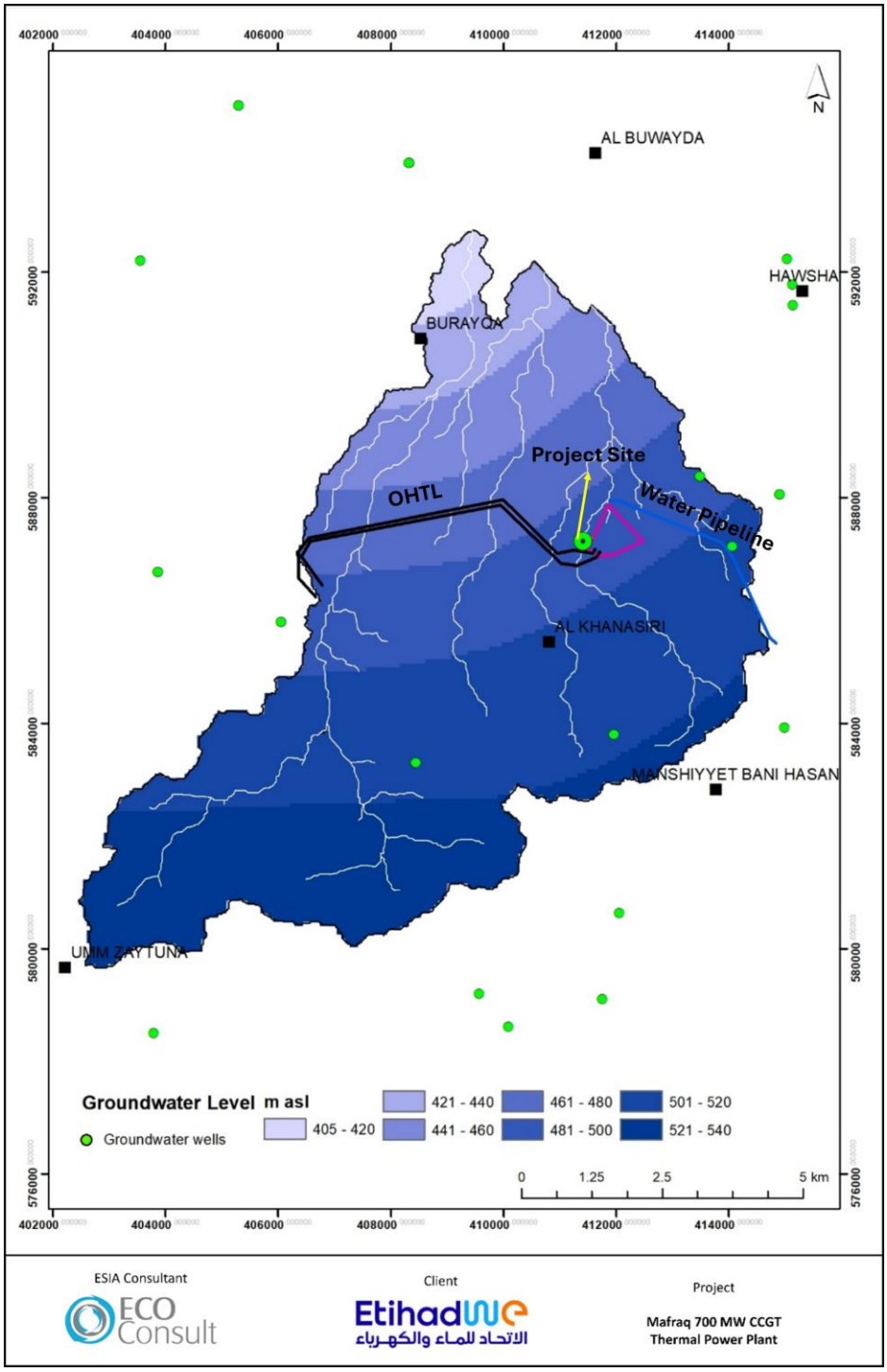


Figure 57: Groundwater Levels within the Project Area

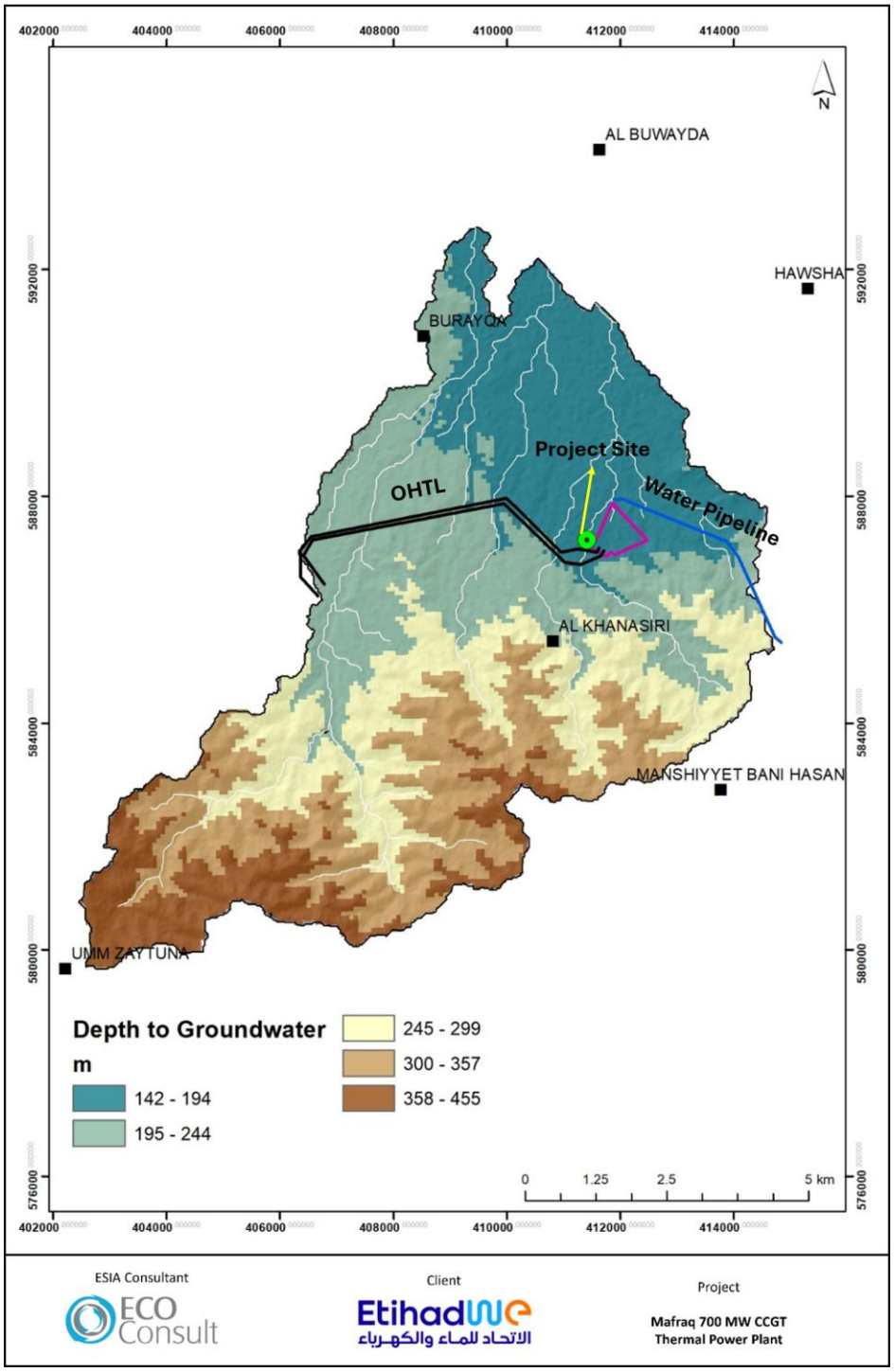


Figure 58: Depth to Groundwater within the Project Area

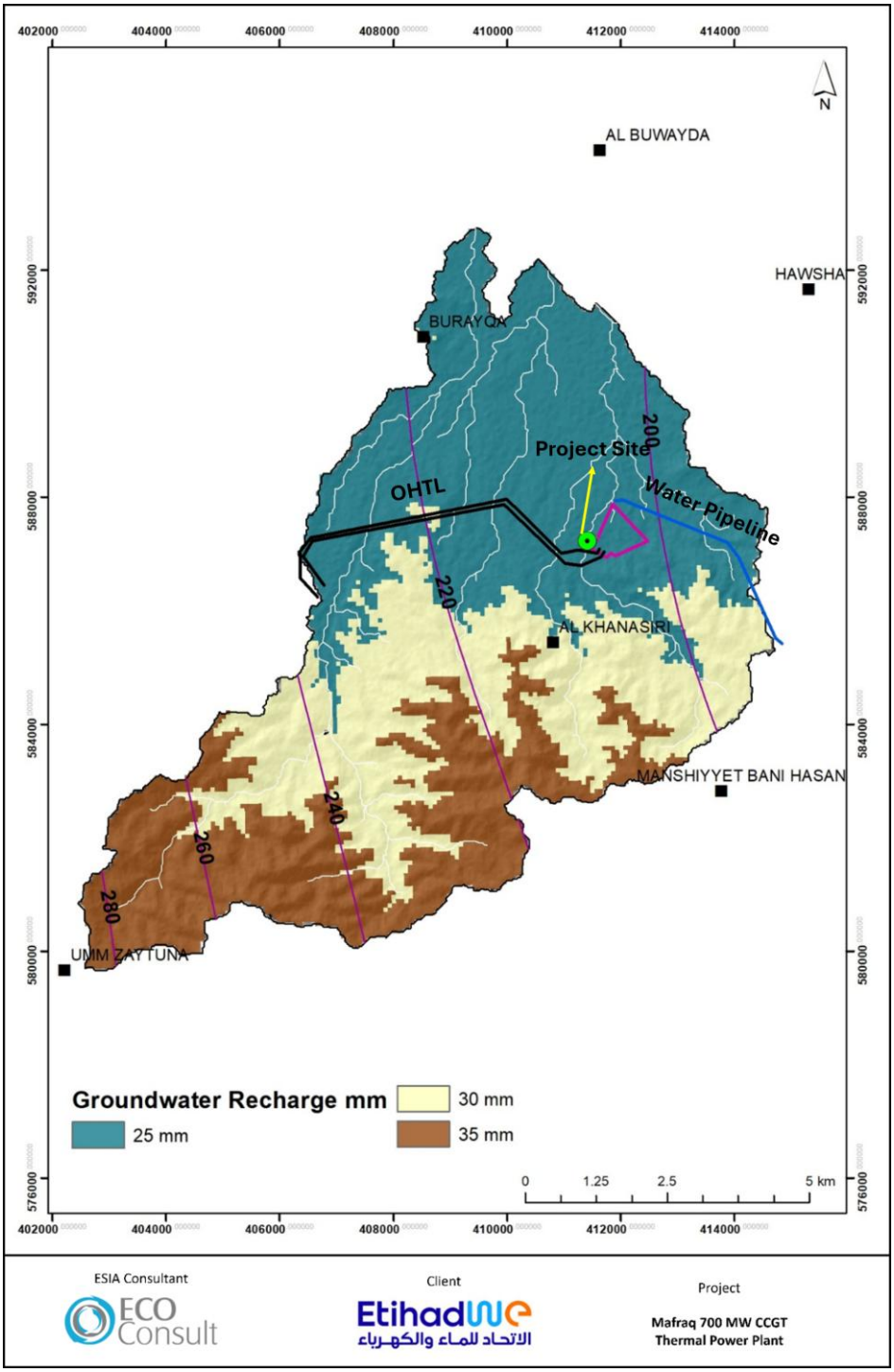


Figure 59: Groundwater Recharge within Project Area

6.4.4.4 Groundwater Sensitivity Assessment Using the DRASTIC Model

Groundwater sensitivity was assessed using a DRASTIC-based model to describe the relative intrinsic sensitivity of the B2/A7 aquifer system across the study area. The model integrates the main hydrogeological and surface conditions that control the movement of water from the land surface toward the aquifer.

The assessment is an intrinsic groundwater-sensitivity analysis. It describes the relative hydrogeological setting of the aquifer and does not represent measured groundwater pollution or a prediction of future water quality. Groundwater salinity and nitrate records were used as supporting hydrogeological reference information rather than as direct DRASTIC input parameters.

The assessment integrates seven DRASTIC factors:

$$DI = 5D_r + 4R_r + 3A_r + 2S_r + 1T_r + 5I_r + 3C_r$$

Where:

Table 40: DRASTIC Factor Symbol and Weight

Symbol	DRASTIC factor	Weight
D	Depth to groundwater	5
R	Net recharge	4
A	Aquifer media	3
S	Soil media	2
T	Topography / slope	1
I	Impact of vadose zone	5
C	Hydraulic conductivity	3

The original DRASTIC factor weights were retained. The rating of each factor was adapted to the range of conditions observed in the study area in order to preserve spatial differentiation between the northern, central and southern hydrogeological settings.

This local rating approach is important because the mapped groundwater depths range from approximately 142 m to 455 m below ground level. Under the original international DRASTIC depth categories, much of the study area would fall within the same deepest class. A locally scaled rating system was therefore applied to represent the relative differences within the B2/A7 aquifer environment.

- Hydrological Setting of the B2/A7 Aquifer

The study area is underlain by the B2/A7 aquifer system, a major regional carbonate aquifer composed mainly of limestone and marly limestone sequences. The aquifer thickness increases from approximately 300 m in the southern part of the study area to approximately 500 m toward the north.

The southern lithological sequence is characterized by approximately:

- 50 m of limestone;
- 70 m of marly limestone;
- a further limestone interval of approximately 70 m.

The northern part contains a relatively greater proportion of marly limestone near the upper section, followed by thicker limestone intervals forming the principal groundwater-bearing horizons at depth. This north–south variation is reflected in the groundwater sensitivity model through both the aquifer-media and vadose-zone parameters.

The available hydrogeological information indicates a hydraulic conductivity of approximately 2.7 m/day. The reported transmissivity value is 26, although the original unit was not available in the supplied records; it is therefore retained as supporting hydrogeological information rather than as a numerical DRASTIC input.

Typical groundwater wells reach approximately 500 m depth, with a screen interval of around 20 m and a pumping rate of approximately 35 m³/hour. These data indicate that groundwater abstraction targets selected productive intervals within the wider B2/A7 carbonate aquifer sequence.

- DRASTIC Input Parameters and Rating Framework

- Depth to Groundwater

Depth to groundwater is one of the most influential DRASTIC parameters because it represents the vertical travel distance between the land surface and the saturated aquifer environment.

The mapped depth to groundwater ranges from approximately 142–194 m in the northern and north-central areas to approximately 358–455 m in the southern and south-western areas. The Main Project Site and groundwater abstraction point are located within the shallowest mapped groundwater-depth class of 142–194 m below ground level.

For the local DRASTIC model, the groundwater-depth classes were ranked relatively within the study area, with the shallowest mapped groundwater conditions receiving the higher rating.

Table 41: Groundwater Depth Class and Relative DRASTIC Rating

Depth to groundwater	Relative DRASTIC rating	Main distribution
142–194 m	10	Northern and project-area setting
195–244 m	8	Central transition zone
245–299 m	6	Central-southern areas
300–357 m	4	Southern terrain
358–455 m	2	South-western and highest terrain

The depth-to-groundwater pattern is the principal reason for the higher sensitivity classification in the northern part of the catchment and the lower sensitivity classification in the southern and south-western sectors.

- Net Groundwater Recharge

Recharge across the study area ranges from approximately 25 mm/year in the north to 35 mm/year in the south and south-west. The Main Project Site and groundwater abstraction point are located within the 25 mm/year recharge class, while the southern and south-western parts of the catchment are associated with recharge values of approximately 35 mm/year.

Table 42: Groundwater Recharge Class and Relative DRASTIC Rating

Annual recharge	Relative DRASTIC rating	Main distribution
25 mm/year	3	Northern and project-area setting
30 mm/year	5	Central and eastern transition zone
35 mm/year	7	Southern and south-western area

Recharge is linked to the wider rainfall gradient, terrain configuration, soil-depth distribution, land cover, slope and geological conditions. Although recharge is higher in the southern part of the catchment, this area also has considerably greater groundwater depth and steeper terrain, resulting in an overall very low groundwater-sensitivity classification.

- Aquifer Media

The aquifer-media parameter represents the physical nature of the saturated groundwater-bearing formation. The B2/A7 aquifer is dominated by limestone and marly limestone, with thicker limestone sections forming the principal groundwater-bearing horizons.

The limestone units represent the main carbonate aquifer medium, while the marly limestone layers form comparatively less transmissive intervals within the geological sequence. The southern area contains alternating limestone and marly limestone, while the northern area contains a larger upper marl component above thicker limestone sections.

Table 43: Aquifer Media Setting and Relative DRASTIC Rating

Aquifer-media setting	Relative DRASTIC rating
Marl-rich carbonate sequence	4
Alternating limestone and marly limestone	5
Limestone-dominated productive interval	6

The aquifer-media parameter is spatially linked to the geological map and the available lithological data from Ministry of Water well records.

- Soil Media

The soil environment ranges generally from loamy silt to loamy soil textures. Soil thickness varies strongly with topographic position.

On slopes and dissected terrain, soil profiles are generally shallow and commonly less than 30 cm thick, with weathered rock or bedrock occurring close to the surface. In flatter terrain, particularly in the northern part of the catchment, soil depth may exceed 1 m.

The soil parameter was therefore represented by the mapped soil units and grouped according to the dominant loamy and silty-loamy soil environment, soil thickness and terrain position.

Table 44: Soil Setting and Relative DRASTIC Rating

Soil setting	Relative DRASTIC rating
Deeper loamy soils in flatter terrain	4
Loamy soils of intermediate thickness	5
Shallow silty-loamy soils on slopes	6

The soil-media factor contributes to the differentiation between the flatter northern landscapes and the more elevated, shallow-soil terrain in the southern and south-western sectors.

- Topography and Slope

The slope map shows terrain ranging from nearly level land to slopes exceeding 30 degrees. Lower slopes are concentrated within flatter terrain and valley-side areas, while steeper slopes occur mainly in the southern, south-western and dissected parts of the catchment.

In the DRASTIC model, flatter terrain receives a higher rating because it supports longer water residence time at the surface and greater opportunity for infiltration. Steeper slopes receive lower ratings because rainfall runoff is routed more rapidly toward drainage pathways.

Table 45: Soil Setting and Relative DRASTIC Rating

Slope class	Relative DRASTIC rating
0–2.48°	10
2.49–4.49°	9
4.5–6.5°	5
6.51–8.98°	3
8.99–12.1°	2
12.2–30.1°	1

The low-slope northern and central areas therefore contribute to higher relative groundwater sensitivity compared with the steeper southern and south-western landscape.

- Impact on the Vadose Zone

The vadose zone is the unsaturated interval between the land surface and the saturated groundwater system. Available hydrogeological information indicates a vadose-zone thickness ranging approximately from 40 m to 300 m across the wider aquifer system.

The vadose zone consists mainly of limestone and marly limestone. The relative rating reflects the dominant lithological composition of the unsaturated sequence, including the proportion of marl and limestone within the profile.

Table 46: Vadose Zone Setting and Relative DRASTIC Rating

Vadose-zone setting	Relative DRASTIC rating
Marl-rich upper sequence	3–4
Alternating marly limestone and limestone	4–5
Limestone-dominated vadose sequence	5–6

The northern area includes a more pronounced marly limestone component near the surface, while limestone-dominated intervals become thicker at depth. In the southern area, the vadose zone includes alternating limestone and marly limestone layers above the principal aquifer system.

- Hydraulic Conductivity

The available hydraulic conductivity value for the B2/A7 aquifer is approximately 2.7 m/day. This represents moderate groundwater-transmission conditions within the carbonate aquifer system.

The hydraulic-conductivity parameter was assigned a consistent DRASTIC rating across the study area because no spatially distributed pumping-test dataset was available.

Table 47: Hydraulic Conductivity and Relative DRASTIC Rating

Hydraulic conductivity	Relative DRASTIC rating
Approximately 2.7 m/day	2

The available conductivity value was used together with the lithological data, groundwater-level information and well-construction records to characterize the regional groundwater-transmission setting.

- Groundwater Sensitivity Distribution

The final DRASTIC-based groundwater-sensitivity map classifies the study area into three relative classes:

- Very Low Sensitivity
- Low Sensitivity
- Moderate Sensitivity

The mapped pattern shows a clear north-to-south sensitivity gradient.

- Moderate Sensitivity Zone

The moderate sensitivity class is concentrated mainly in the northern and north-eastern part of the study area, including the terrain around Buraiqa and the northern drainage environment. This area is characterized by the shallowest mapped groundwater depths, generally between 142 m and 194 m below ground level, together with relatively low slopes and a more developed soil profile in flatter local terrain.

The moderate sensitivity classification does not represent the entire northern catchment uniformly. It follows the combined distribution of groundwater depth, topography, soil conditions, vadose-zone character and aquifer-media properties.

- Low Sensitivity Zone

The low sensitivity class forms a broad central and eastern belt across the catchment. It includes much of the landscape surrounding the Main Project Site, the water pipeline alignment and the central sections of the power transmission corridor.

The Main Project Site is located principally within the low groundwater-sensitivity zone, immediately south and east of the moderate-sensitivity area. The groundwater abstraction point is located close to the transition between the low and moderate classes. The water pipeline alignment extends eastward mainly through the low-sensitivity environment.

The low-sensitivity zone represents an intermediate hydrogeological setting, where groundwater depth, slope, soil conditions and aquifer characteristics lie between the relatively shallow northern setting and the much deeper southern groundwater environment.

- Very Low Sensitivity Zone

The very low sensitivity class dominates the southern and south-western parts of the study area, including large areas toward Umm Zaytuna and the lower southern catchment. This zone corresponds mainly with the deepest groundwater conditions, often exceeding 300 m below ground level, together with steeper terrain and a more dissected landscape.

Although recharge is relatively higher in the southern and south-western sectors, the combination of deeper groundwater level, greater unsaturated-zone thickness and steeper terrain results in a very low overall sensitivity classification.

Table 48: Groundwater Sensitivity Class, Spatial Distribution, and Characteristics

Groundwater sensitivity class	Main spatial distribution	Dominant hydrogeological characteristics
Moderate	Northern and north-eastern area	Shallower groundwater depth, flatter terrain and more developed soil profile
Low	Central and eastern area, including Main Project Site	Intermediate groundwater-depth and terrain conditions

Very Low	Southern and south-western catchment	Deepest groundwater conditions, steep terrain and thick unsaturated zone

- Relationship to the Project Components

The Main Project Site, represented by the pink polygon, is located predominantly within the low groundwater-sensitivity class. The northern edge of the site is close to the transition toward the moderate-sensitivity zone.

The groundwater abstraction point is located near the transition between the low and moderate sensitivity classes as shown in Table 49. This position reflects the local combination of shallow groundwater depth relative to the rest of the study area, low-slope terrain and the B2/A7 carbonate aquifer setting.

The well is identified as AD1156 – Umm Al Lulu S23. It is an existing well drilled to approximately 300 m depth and forms part of the Yarmouk Water Company water-supply system. It is also not an informal local community well; rather, it is part of the official supply-well network connected to the pumping and distribution system serving households within the Yarmouk Water Company service area. The proposed water pipeline alignment extends eastward through terrain classified mainly as low groundwater sensitivity. The line begins near the groundwater-sensitivity transition zone and then continues across the central-eastern low-sensitivity environment.

The power transmission line corridor extends across a broader range of sensitivity conditions. Its central and eastern sections are associated mainly with the low-sensitivity zone, while some northern-adjacent portions approach the moderate-sensitivity setting. The western and south-western parts of the wider corridor are associated with the lower sensitivity environment of the catchment.

Table 49: Groundwater Sensitivity Setting in Relation to the Project Components

Project component	Groundwater-sensitivity setting
Main Project Site	Predominantly low sensitivity
Groundwater abstraction point	Near low-to-moderate sensitivity transition
Water pipeline alignment	Mainly low sensitivity
Power transmission line corridor	Primarily low sensitivity, with local proximity to moderate and very low zones

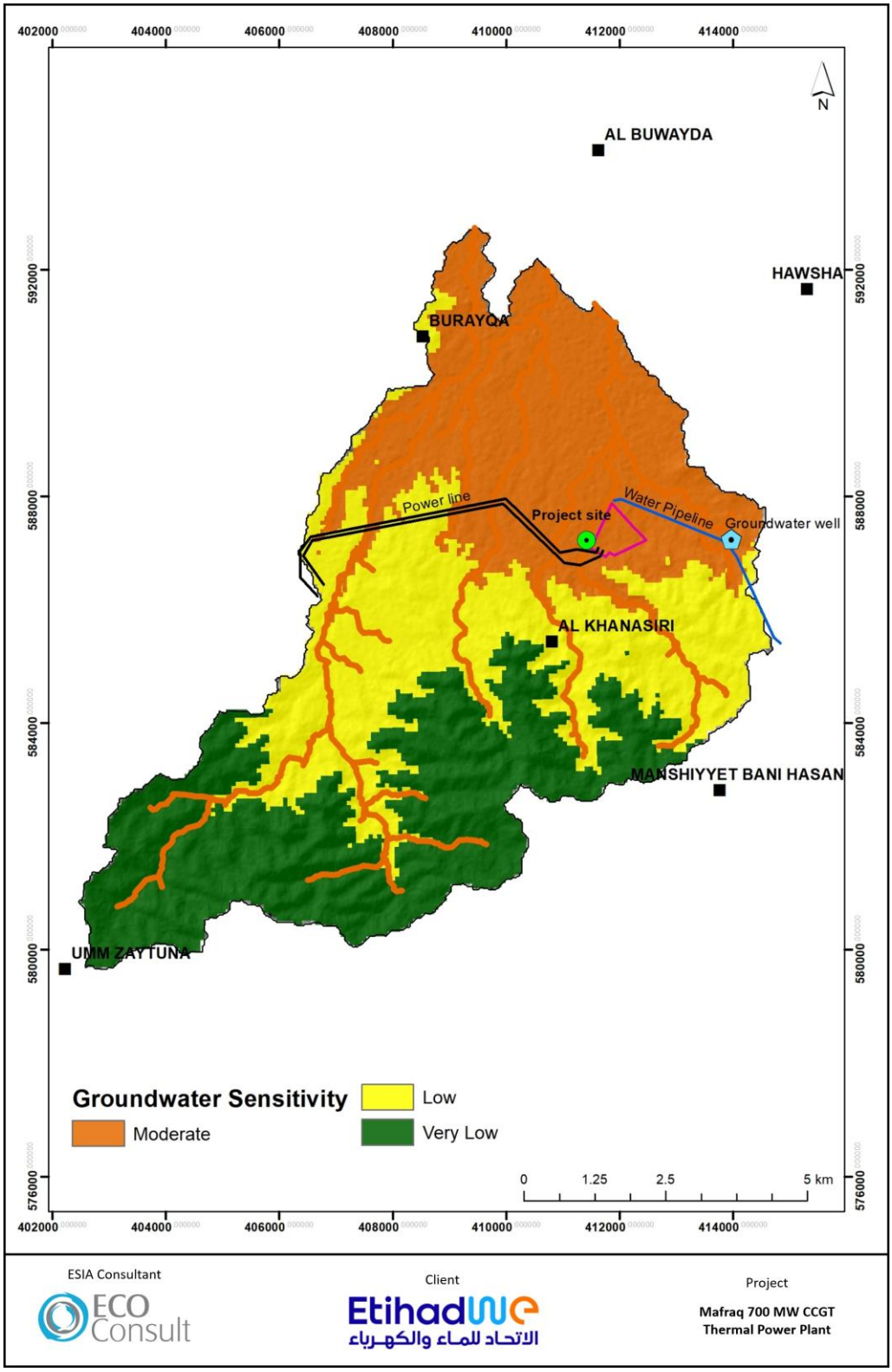


Figure 60:Groundwater Sensitivity within the Project Area

6.5 Landscape and Visual

This section provides an assessment of baseline conditions within the Project site and its surroundings in relation to landscape and visual character.

6.5.1 Assessment of Baseline Conditions

6.5.1.1 Methodology for Assessment

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

The baseline was first based on defining the study area relative to the Project components. This will include the area over which landscape and visual interactions occur from the Project based on the following:

- Project. The study area is largely defined as the site footprint itself in terms of landscape character. For visual character this will include the critical visual receptors from which Project components will be visible. This will mainly include the stacks, being the tallest structures from the Project components. Defining visibility distance is determined by the theoretical maximum line of sight distance as per the equation below. Based on that, the maximum theoretical distance from which the Project would be visible is 32 km (assuming 1.7 m for the height of the observer).

$$d_{max} \approx 3.57 \left(\sqrt{h}observer + \sqrt{h}_{object}\right)$$

- Associated Facilities. Similarly, this will include the site footprint itself in terms of landscape character. For visual character this will include the OHTL towers in specific with a height of 50 m. Taking the above into account, the maximum theoretical distance from which the Project would be visible is 30 km. For the gas and water pipeline given that those will be underground, no visual footprint is considered.

For the term critical visual receptors, this will be based on the "Guidelines for Landscape and Visual Impact Assessment (GLVIA)[5]" and which includes:

- Residents at home.
- People engaged in outdoor recreation, whose attention/interest is likely to be focused on the landscape or particular views, including from public rights of way.
- Communities where views contribute to landscape setting enjoyed by residents.
- Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience.
- Travelers on scenic routes.

For the above, sensitivities of critical visual receptors must also be taken into account and that will also be based on the GLVIA requirements. The assessment of visual receptor sensitivity considers both the category of the visual receptor and the nature of their existing view. It takes account of the location of the receptor or viewpoint, the expectations, occupation, or activity of the people present, the quality of the existing visual context, and the importance or value likely to be attributed by them to the available view.

[5] Guidelines on Landscape and Visual Impact Assessment 3rd Edition

It is therefore the case that not all receptors within a given category are deemed to display equal sensitivity.

In accordance with the GLVIA, for the purposes of the visual assessment, the visual receptors have been graded according to their sensitivity to change against criteria set out in the table below.

The number of people likely to be present as well as the duration that a view is likely to be experienced may also influence the visual sensitivity of a particular location.

Table 50: Visual Receptor Sensitivity

Receptor Sensitivity	Description
High	▪ Occupiers of residential properties. ▪ Users of outdoor recreational facilities, including public rights of way, whose attention or interest may be focused on the landscape. ▪ Communities where the development results in changes in the landscape setting or valued views enjoyed by the community.
Medium	▪ People traveling through or past the affected landscape in cars, on trains or other transport routes where higher speeds are involved and views sporadic and short-lived. ▪ People engaged in outdoor recreation where enjoyment of the landscape is incidental rather than the main interest.
Low	▪ People at their place of work, industrial facilities.

6.5.1.2 Secondary Data Review

Secondary datasets were used to support the classification of landscape character types, landscape sensitivity, and the identification of potential sensitive visual receptors within the study area, as defined earlier in this chapter (i.e. a 30 km radius from the Project Site). Given the extent of the study area, it was not practicable to identify all potential sensitive visual receptors solely through field surveys. Accordingly, the identification of sensitive visual receptors relied primarily on the review of secondary datasets, supplemented by observations made during the site visit.

Such secondary data sets included UNESCO World Heritage Sites databases, up-to-date high-quality satellite images, data on community settlements and populated areas, etc.

6.5.1.3 Site Survey

A detailed site survey for the Project area was undertaken in April 2026. The survey aimed to characterize the general topography and landscape characteristics of the Project area and verify potential visual receptors to the extent possible within the immediate surrounding area. In addition, viewpoints were also established from selected receptors toward the Project site.

6.5.1.4 Stakeholder Consultation and Engagement

FGDs undertaken with local communities did include discussions on visual character sensitivity. As noted earlier within “Chapter 7.4”, the local communities did indicate the visual importance of the area in general as they indicated that the wider area is used recreationally (i.e. the OHTL area in particular).

6.5.2 Results and Outcomes

6.5.2.1 Landscape

The table below presents an overall summary of the landscape character of the Project site and associated facilities. A detailed description is also provided in the text that follows along with photo representations as applicable.

Table 51: Summary of Landscape Character of the Project Site

Landscape Character	Landscape Character
Project Site	Predominantly arid landscape with flat topography. The area is extensively disturbed by agricultural plowing, resulting in a uniform and modified landscape character
Gas Pipeline	Similar to the Project Site, characterized by an arid, generally flat landscape with a largely uniform and disturbed character.
OHTL	Traverses predominantly open, semi-natural terrain characterized by gently undulating to hilly topography and extensive wadi systems, resulting in a more varied landscape character.
Water pipeline	Similar to the OHTL landscape but with a more uniform and flat landscape.

Based on the site visit, the Project Site is characterized by a predominantly arid and barren landscape with generally flat topography. The area has been extensively modified by agricultural plowing, with plowing marks observed throughout much of the site. As a result, the landscape exhibits a uniform and disturbed character with limited landscape diversity. Vegetation cover within the Project site is limited and generally scattered, with only a few shrubs recorded.

The gas pipeline corridor generally traverses terrain with landscape characteristics similar to those of the Project Site, comprising predominantly arid, flat, and disturbed land.

The OHTL corridor passes through predominantly open, semi-natural terrain characterized by gently undulating to hilly topography and extensive wadi systems. Compared with the Project Site, this corridor exhibits greater landscape variation and stronger natural landform characteristics.

The water pipeline corridor traverses open terrain with landscape characteristics generally comparable to those of the OHTL corridor, although the topography is generally flatter and more uniform.

However, the surrounding area is characterized by existing infrastructure including roads to the immediate west and east of the Project site, a gas compression facility currently under construction, among others. The area to the north of the Project site outside of the current fenceline is known to be used by nomadic grazers and include a limited number of residential structures.

The figure below presents the various landscape characteristics of the various components above.

The figure that follows presents the topography variations onsite based on a 3-D Digital Elevation Model (DEM). In terms of elevation, the Project site elevation ranges between 650 – 680 m above mean sea level (amsl). In general elevation in the area decreases by around 365 m from south to north (starting at 935 m and ending at 570 m), with the Project site and associated facilities all being more or less within the same elevation profile.



Figure 61: Landscape Character

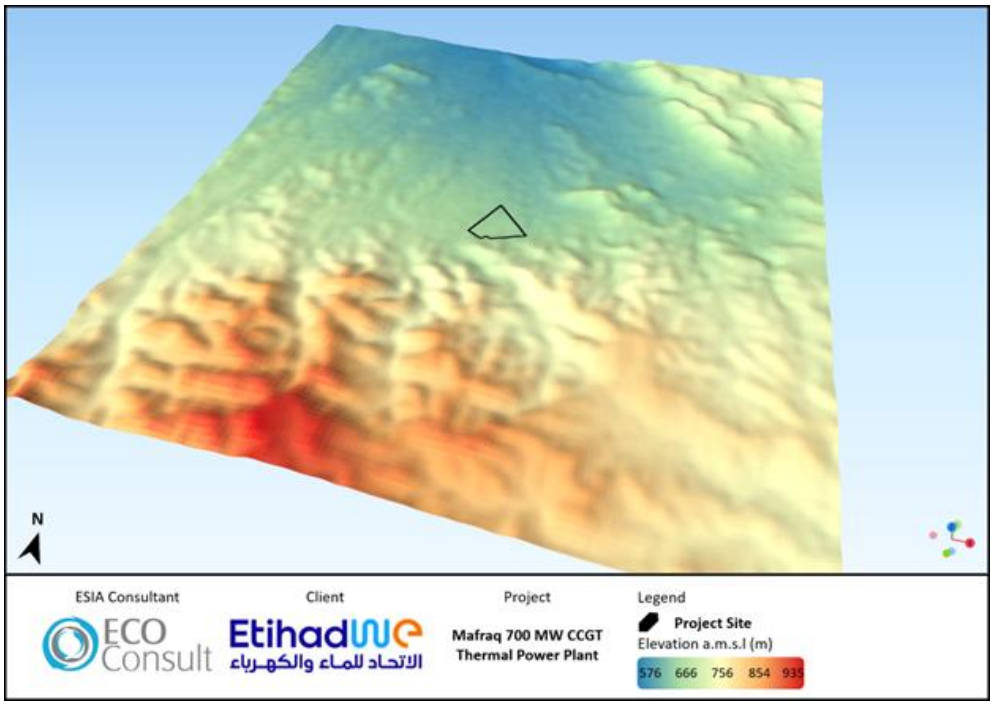


Figure 62: Extended Area Topography & Elevations including Project Site

6.5.2.2 Visual

As a first step, a Zone of Theoretical Visibility (ZTV) was undertaken for the study area (up to 30 km) taking into account the Project and associated facility heights (60 m for the stacks and 50 m for the OHTL towers). The figure below presents the overall outcomes of the ZTV.

As noted below, the surrounding terrain is acting as a natural barrier blocking views in most directions apart from the NNW.

The figure below also aims to map out all visual receptors within the study area based on the outcomes of the desktop review. The table below identifies the critical visual receptors and sensitivity based on the GLVIA guidelines discussed earlier.

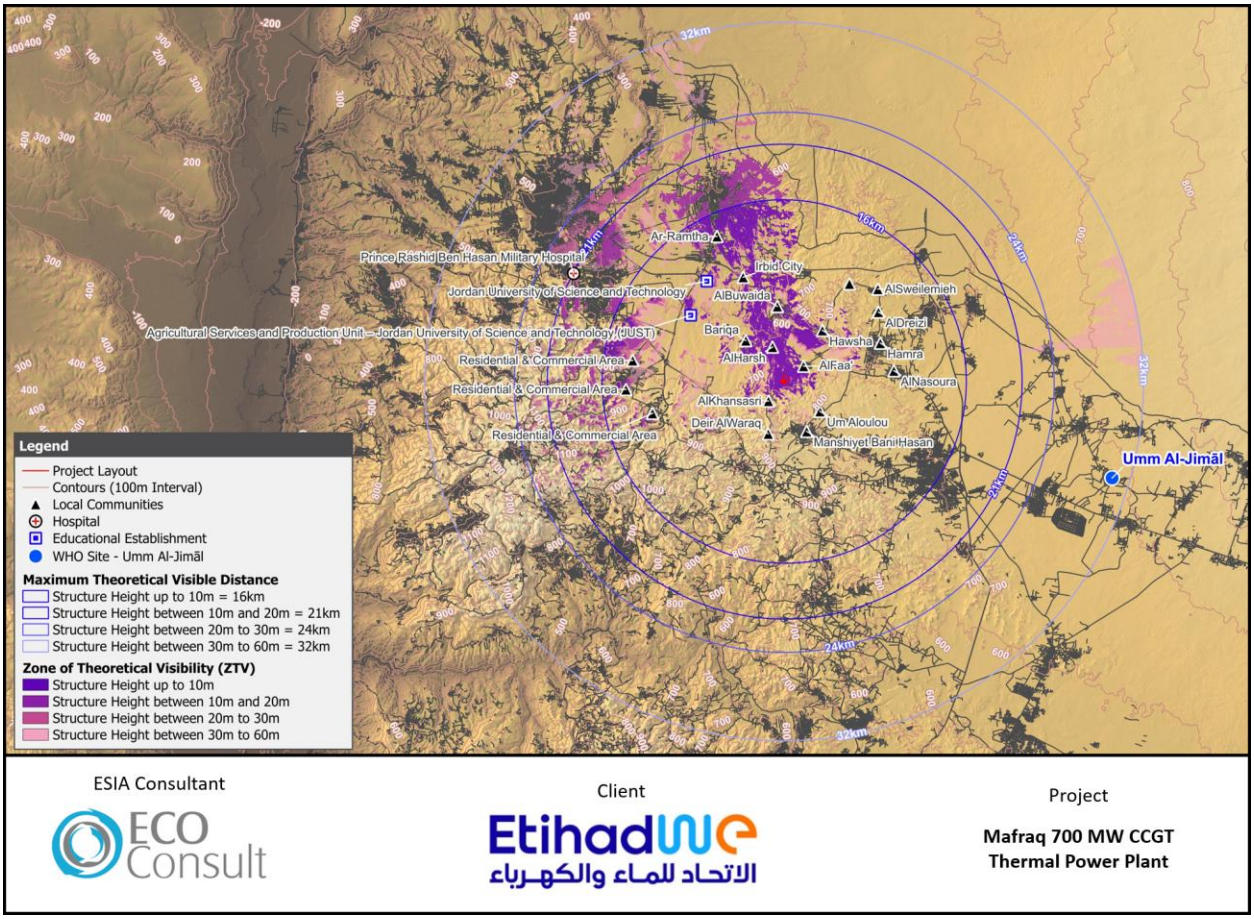


Figure 63: Critical Visual Receptors and Sensitivity

Table 52: Critical Visual Receptors and Sensitivity

Receptor	Critical per GLVIA	Relevance per GLVIA	Sensitivity per GLVIA	Visible
Faa'	Yes	Residents at home / People engaged in outdoor recreation	High	Yes
AlHarsh	Yes	Residents at home / People engaged in outdoor recreation	High	Yes
AlKhanasri	Yes	Residents at home / People engaged in outdoor recreation	High	Yes

Khanasri Hill (*Tell Al Khanasri*)	Yes	Visitors to attractions, where views of the surroundings are an important contributor to the experience. Refer to "Chapter 6.6"	High	Yes
Buraiqa	Yes	Residents at home / People engaged in outdoor recreation	High	Yes
Hosha	Yes	Residents at home / People engaged in outdoor recreation	High	Yes
Umm Al Lulu	Yes	Residents at home / People engaged in outdoor recreation	High	Yes
Deir Al Waraq	Yes	Residents at home / People engaged in outdoor recreation	High	Yes
Manshyet Bani Hassan	Yes	Residents at home / People engaged in outdoor recreation	High	Yes
Umm Al Jimal	Yes	Visitors to heritage assets / World Heritage Site	High	No
Gas Facility	No	Not relevant	Low	Yes
Road Users	No	Not relevant	Low	Yes

Typical views from key receptors toward the Project area are provided in the figure below. The photo representation was considered as follows:

- Views from Faa' which can be considered typical for those communities to the north



Figure 64: Typical Views from Faa'

- View from AlKhanasri which can be considered typical for those communities to the south



Figure 65: Typical Views from AlKhanasri

- Views from the Gas facility



Figure 66: Typical Views from the Gas Facility

- View from the road users



Figure 67: Views from the Road Users

6.6 Archaeology and Cultural Heritage

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to archaeology and cultural heritage.

6.6.1 Assessment of Baseline Conditions

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

6.6.1.1 Secondary Data Review

A comprehensive desktop review was undertaken to identify known archaeological and/or cultural heritage resources within and around the Project area. The review included internationally and nationally recognized heritage databases, including the UNESCO World Heritage List and MEGA-Jordan (Middle Eastern Geodatabase for Antiquities), the official archaeological database maintained by the Department of Antiquities (DoA).

MEGA-Jordan contains records of registered archaeological sites, monuments, cultural heritage features, surveys, and archaeological investigations conducted throughout Jordan. The review was undertaken to identify designated heritage assets and assess the potential presence of known archaeological and cultural heritage resources within the Project area.

6.6.1.2 Stakeholder Consultation and Engagement

Stakeholder consultation and engagement activities were undertaken with the DoA, which is the key entity involved in archaeology and cultural management and protection in Jordan. Refer to “Chapter 6.8.1” earlier for additional details.

In addition, as part of the FGD undertaken with the local communities, discussions were undertaken in relation to cultural heritage sites within the Project area. Refer to “Chapter6.6” for additional details.

6.6.1.3 Site Survey

A field survey was undertaken by a team of three (3) archaeology and cultural heritage experts from the DoA in May 2026.

The objective of the survey was to investigate the presence and/or absence of any surface archaeological or cultural heritage remains within the Project site and its associated facilities.

With regard to the Project site, the methodology involved traversing the area along established west-to-east transects to ensure full coverage of the site. Areas that were inaccessible by vehicle (e.g. wadi systems) were surveyed on foot. For the associated facilities, transects were established along the full length of the linear infrastructure and within their respective Rights of Way (RoW). These transects were surveyed by vehicle at an appropriate speed.

During the survey, the ground surface was visually inspected, and any features or sites of potential archaeological or cultural heritage significance were recorded and photographed.

A survey for the water pipeline was not undertaken as the route was only recently obtained. However, as discussed in further detail in "Chapter 4.2.1", given that the water pipeline runs within the RoW of a formal road within which an existing water pipeline runs as well, there is no risk from excluding the water pipeline from such surveys.

6.6.2 Results and Outcomes

6.6.2.1 Secondary Data Review

The UNESCO World Heritage List Database did not identify any sites of interest within the Project site and surroundings. The closest is "Umm Al Jimal", located approximately 30 km southeast of the Project site, as presented in the figure below.



Figure 68: Project Site and UNESCO WHS

Review of MEGA-Jordan database identified two (2) archaeological records within the Project site, as shown in the figure below. These records are classified as follows:

- Point 1: Sherd/Flint Surface Scatter; and
- Point 2: Unspecified/Unknown General Site Element.

Apart from the two (2) records identified above, a number of additional potential archaeological records have been identified within the wider area. These records are situated at substantial distances from the Project site. Their locations are presented in the figure below for reference.

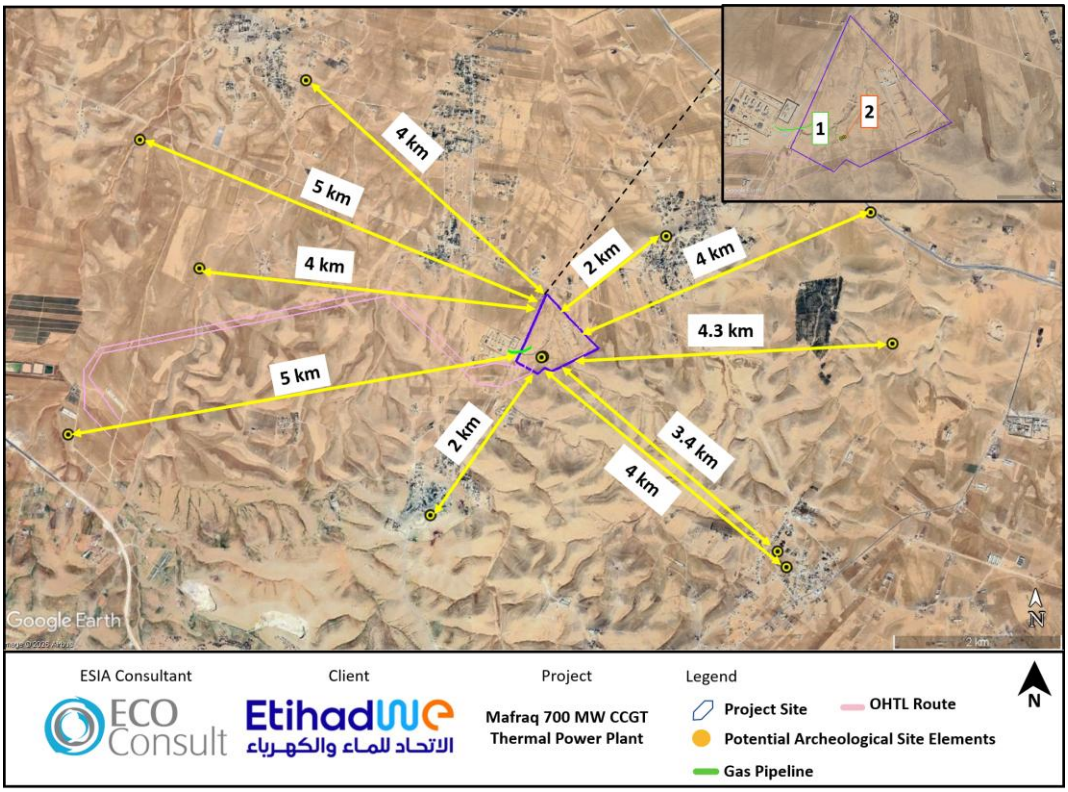


Figure 69: Project Site in MEGA Jordan

The closest site of importance from MEGA-Jordan is AlKhanasri Hill (*Tell AlKhanasri*), located within AlKhanasri village around 2.19 km from the Project site as shown in the figure below. AlKhanasri Hill is an ancient settlement consisting of an artificial mound created by repeated human occupation, occupied primarily during the Iron Age II (roughly 8th – 4th century BC), with evidence of later Roman occupation found. It is primarily a local attraction that is considered a scenic hill, particularly during green spring seasons, rather than an archaeological attraction.

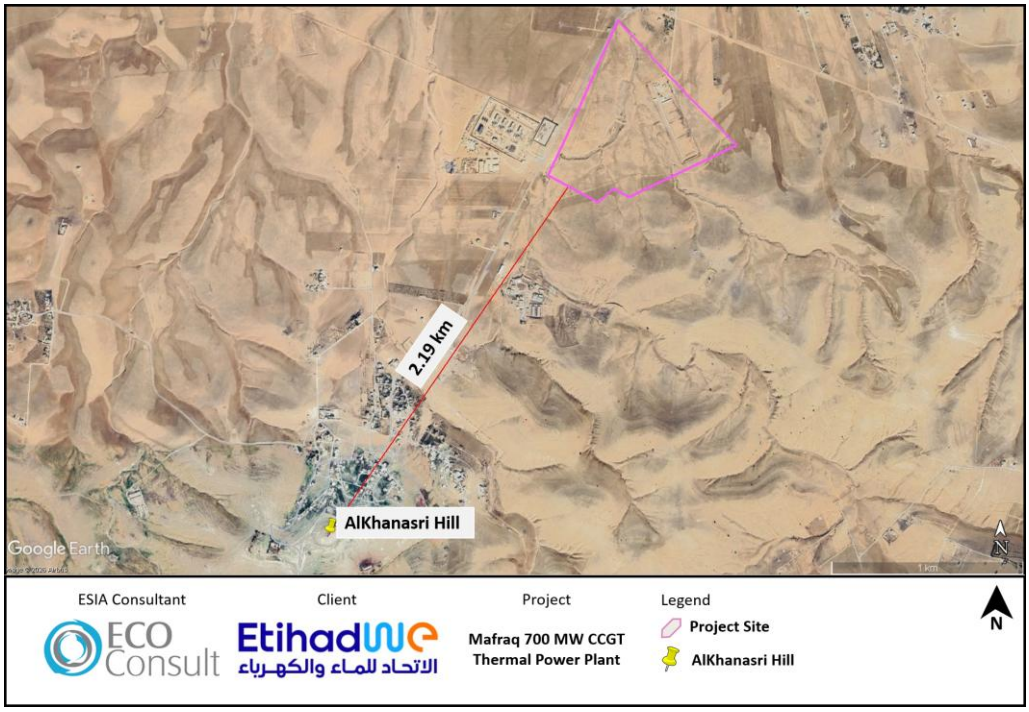


Figure 70: Project Site in relation to AlKhanasri Hill

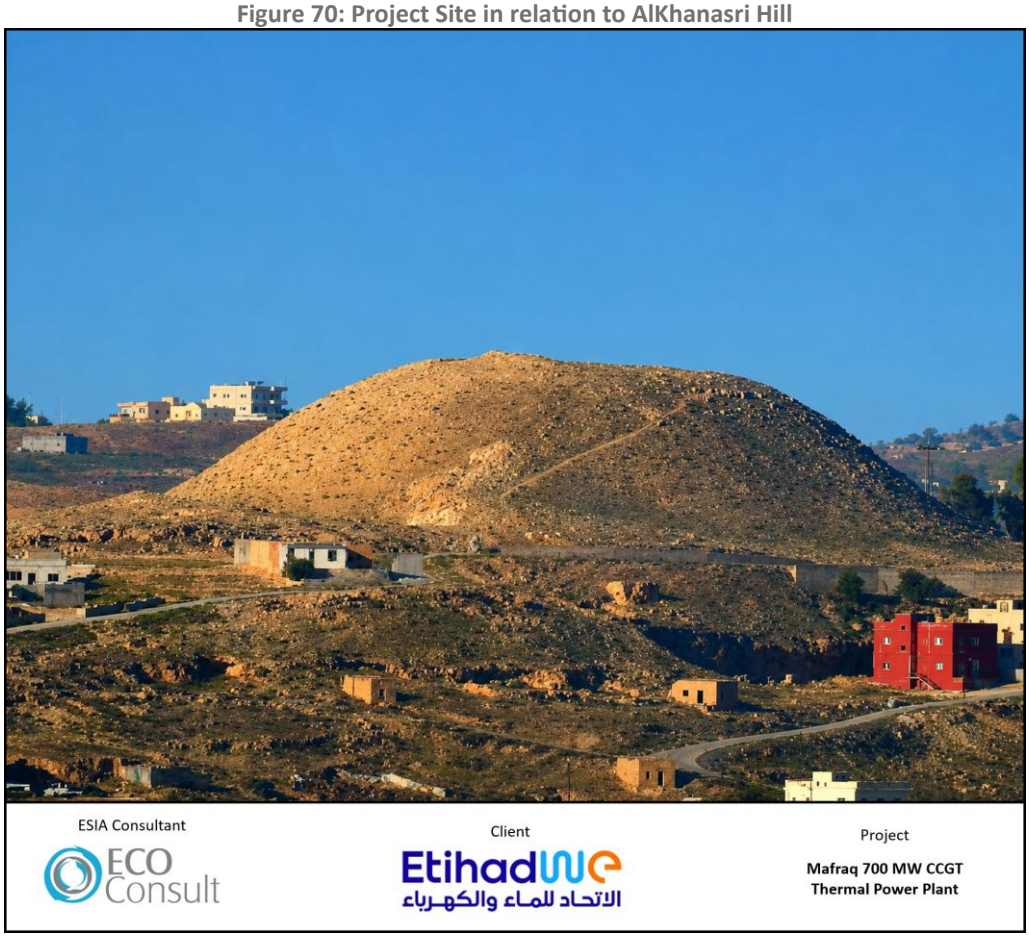


Figure 71: AlKhanasri Hill

6.6.2.2 Stakeholder Consultation and Engagement

Discussions with local communities indicated that there are no cultural, spiritual, or other cultural or historical sites of significance within or in the vicinity of the Project site.

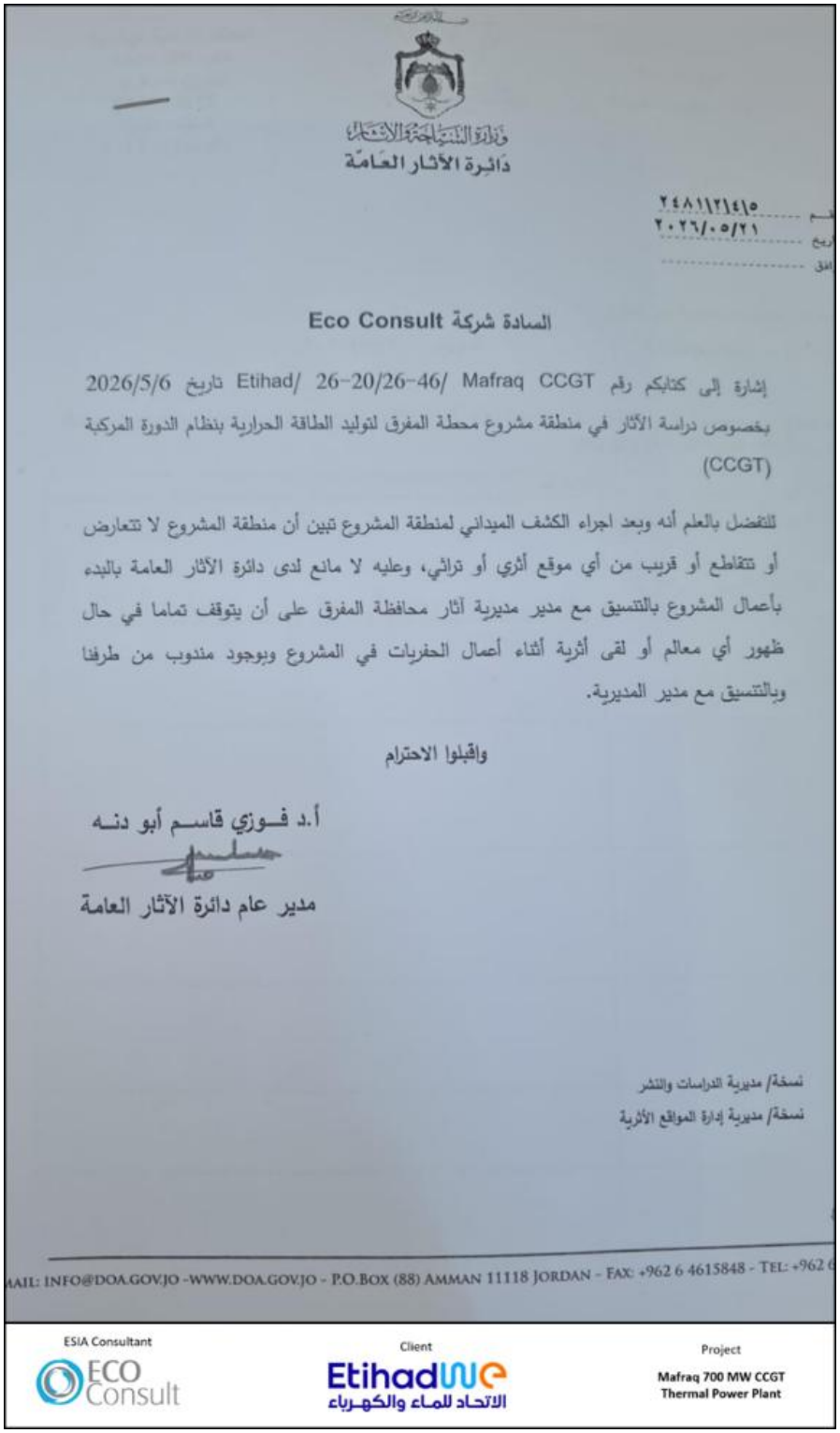
These findings were further confirmed by the DoA through the issuance of a Non-Objection Letter for the Project, indicating that no known archaeological or cultural heritage sites have been identified within the Project area and associated facilities (discussed in further detail below).

Consultation with the DoA also sought to discuss the two (2) archaeological records obtained from MEGA-Jordan. The DoA indicated that inaccuracies in recorded coordinates are relatively common within the database and may result in the incorrect allocation of site locations. These records were specifically considered during the site-specific field survey (discussed below), during which no corresponding archaeological sites or features were identified.

6.6.2.3 Site Survey

The site survey undertaken for the Project site and associated facilities confirmed the absence of any archaeological or cultural heritage sites or evidence. The DoA issued a Non-Objection Letter dated 12 May 2026 which is presented below and which states the following:

- The inspection confirmed that the Project site does not overlap, intersect, or lie in proximity to any known archaeological or cultural heritage sites.
- Based on the findings of the field inspection, the DoA has no objection to the commencement of Project activities.
- Excavation activities should be undertaken in coordination with Mafraq Directorate of Antiquities in the event that chance finds are encountered.



وزارة التنمية الحضرية والأشغال
دائرة الآثار العامة

الرقم ٢٤٨١٢١٤١٥
التاريخ ٢٠٢٦/٠٥/٢١
المرفق .....

السادة شركة Eco Consult

إشارة إلى كتابكم رقم Mafraq CCGT /Etihad/ 26-20/26-46 تاريخ 2026/5/6
بخصوص دراسة الآثار في منطقة مشروع محطة المفرق لتوليد الطاقة الحرارية بنظام الدورة المركبة (CCGT)

للتفضل بالعلم أنه وبعد اجراء الكشف الميداني لمنطقة المشروع تبين أن منطقة المشروع لا تتعارض أو تتقاطع أو قريب من أي موقع أثري أو تراثي، وعليه لا مانع لدى دائرة الآثار العامة بالبدء بأعمال المشروع بالتنسيق مع مدير مديرية آثار محافظة المفرق على أن يتوقف تماما في حال ظهور أي معالم أو لقى أثرية أثناء أعمال الحفريات في المشروع وبوجود مندوب من طرفنا وبالتنسيق مع مدير المديرية.

واقبلوا الاحترام

أ.د فـوزي قاسـم أبو دنـه
مدير عام دائرة الآثار العامة

نسخة/ مديرية الدراسات والنشر
نسخة/ مديرية إدارة المواقع الأثرية

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Figure 72: Letter from the DoA

6.7 Land Use, Resettlement and Livelihoods

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to land use and livelihoods.

6.7.1 Assessment of Baseline Conditions

This section discusses the methodology for the assessment of baseline conditions in relation to land use and presents the outcomes and results of the assessment. This included formal and informal land use, both of which are discussed in further detail below.

6.7.1.1 Formal Land Use

The baseline assessment of the formal land use was based on collection of secondary data and plans available from the relevant governmental entities. At first, this included secondary data available from the Ministry of Municipal Affairs (MoMA) and Department of Lands and Survey (DLS) to understand formal land use planning set for the area as well as land ownership. Based on that follow up data collection, consultations and site visits were undertaken with relevant entities to include Ministry of Agriculture (MoA) and Ministry of Transport.

6.7.1.2 Informal Land Use

Understanding and characterizing the informal or 'actual' land use was mainly based on a site survey undertaken by the 'E&S Team' that covered the footprint and the associated facilities along with their RoWs, as well as outcomes of consultation session undertaken with local community representatives (refer to 'Chapter 7.4' for additional details).

6.7.2 Results and Outcomes

6.7.2.1 Formal Land Use

Land Use Planning by MoMA

The Project might conflict with the allowed land use set for the area by the MoMA, which designates specific land uses in Jordan where only certain activities are allowed. This issue has been investigated, and the results are presented below.

In accordance with the "Law for the Organization of Cities, Villages and Buildings No. 79 for 1966", MoMA designates specific land uses for areas in the Kingdom that are within organized boundaries (urban areas). However, at that time, no land use plans were developed for areas that lay outside of the organizational boundaries. Therefore, in 2006 a project to prepare a land-use map for such areas (which lie outside the organized boundaries) began. The output was the "National Land Use Master Plan of 2007"; which is a recent attempt to produce a harmonized land use plan for those areas that are outside of organized boundaries.

Accordingly, the "Land Use Planning Regulation No. 6 of 2007" was issued which was later updated into the "Regulation of Land Use for Projects Outside of Organized Boundaries for the year 2026" which regulates land-use for those areas outside of organized boundaries and to divide territories by using zoning cryptography as follows:

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

The figure below presents the location of the Project site and the land use plan.

The orange areas include urban areas within organized boundaries with assigned land use categories in the "Law for the Organization of Cities, Villages and Buildings No. 79 for 1966". As noted in the figure below, the Project site is located outside of any organized boundary areas.

The rest are areas outside land use planning boundaries and are considered as areas outside planning zones with assigned land use categories set in accordance with the 2026 Regulation. According to the figure below and the 2026 Regulation, the following is noted:

- The Project site is located within Rural Areas of the 1st Degree (C1).
- The associated facilities are located within Rural Areas of the 1st Degree (C1) and Rural Areas of the 2nd Degree (C2).

Article [8(a)–1] of the Regulation states that "C1 are areas suitable for forestry and grazing" while "C2 are area suitable for grazing". Article [8(b)–3] of the Regulation states that within C1 and C2 areas the following activities are allowed "wire and wireless telecommunication facilities and electric generation facilities along with their distribution and transmission facilities".

To this extent, it is evident that the Project site does not conflict with MoMA's land use plan; in fact the designated land use for the area allows the development of such a Project.

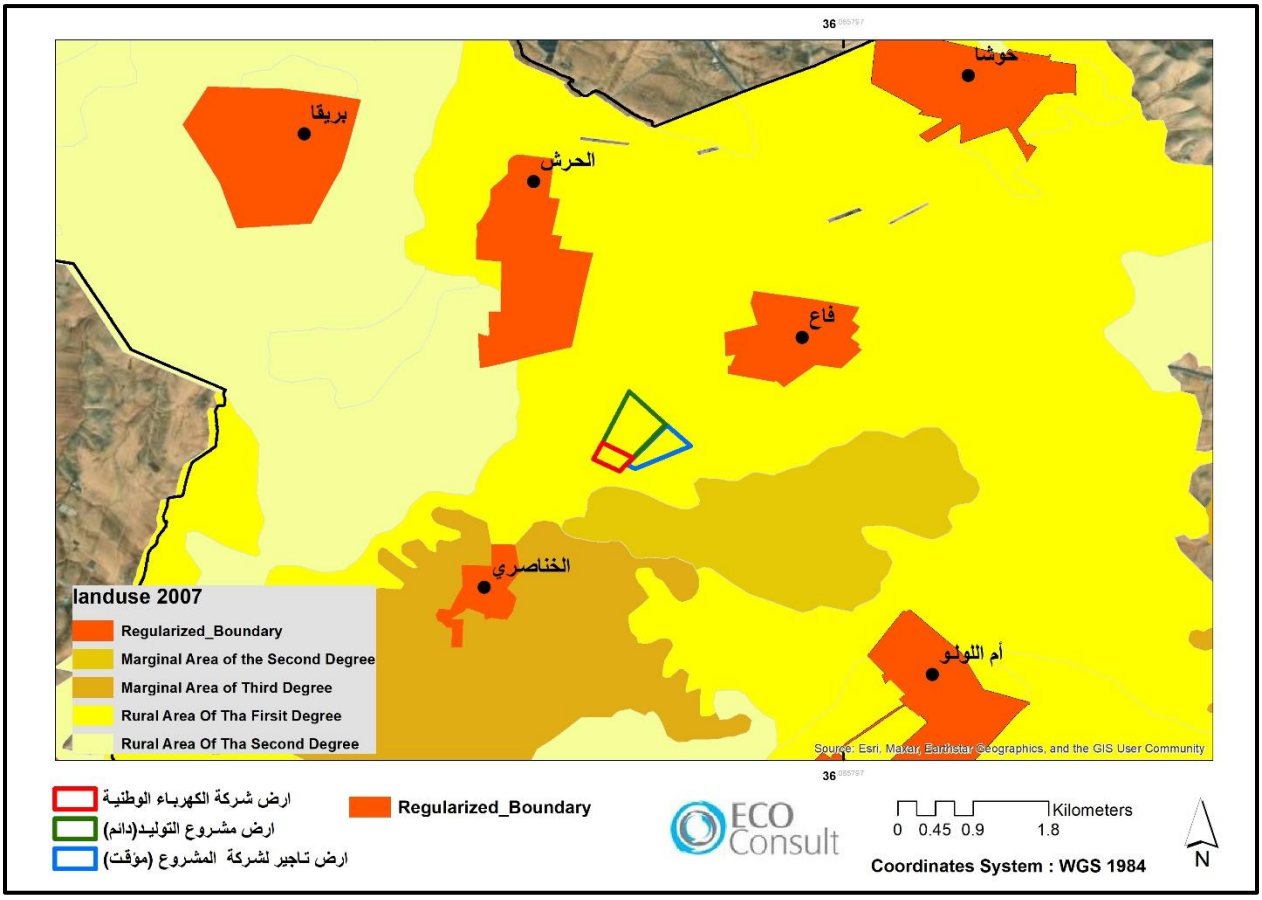


Figure 73: MoMA National Land Use Master Plan for the Project Site

Formal Land Ownership

The official Land Deed as issued by Department of Lands and Survey (DLS) for the Project plot was collected and reviewed. The plot is officially numbered Plot No. (1), Parcel No. (1) of Khanasri Lands. This Plot has a total area of 3,432 Dunums and 816 m2 (~3.5 km2) as presented in the figure below.

The Deed indicates that the land is under the ownership of the Treasury of the Government of Jordan with the following allocations:

- Assigning an area of 300 Dunums to MEMR for the development of a CCGT Project. Date of Assignment is 9 May 2025.
- Assigning an area for the Ministry of Transport (Railway Project). Date of Assignment is 13 May 2009

The Deed indicates that the type of land is '*Haraj Lands'*. According to the "Agriculture Law No. 13 for the year 2015" *Haraj Lands* are forest Lands of the Treasury of the Government of Jordan that are registered as forests and allocated for forestry purposes. The Law states that it shall be prohibited to abuse forest lands whether by erecting permanent or temporary residences, buildings or structures thereon, or digging wells or caves, or installing water, electricity or telephone lines, or opening sewage lines or canals therein, or by cultivation or plowing, or by grazing therein, without a license. However, Article 26(b) specifically states that excluded from this are "lands that can be utilized for the public benefit or allocated for the benefit of the country and which the Prime Ministry decided to allocate it for this purpose".

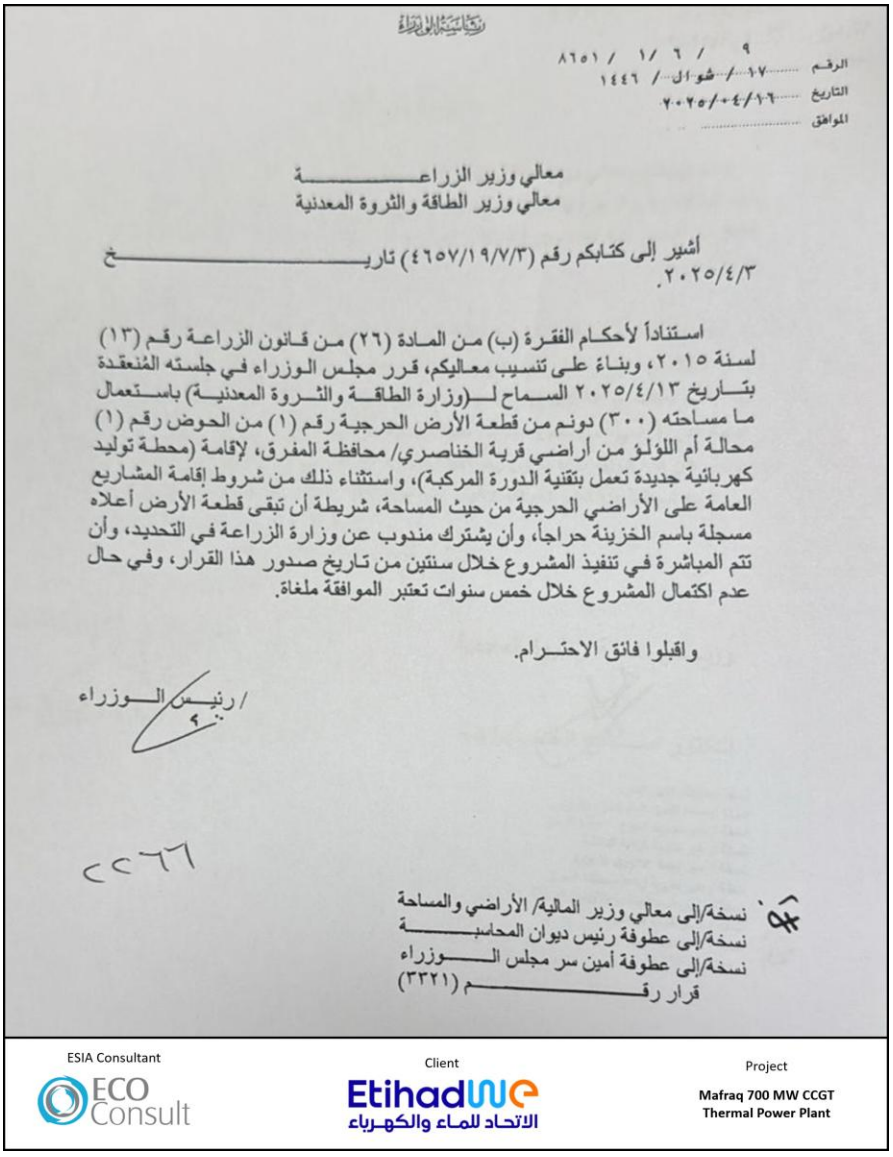
A Prime Ministry Decision was issued Number 9/6/1/8651 dated 16 April 2025 allocating 300 Dunums from the entire Plot for the development of CCGT Project. The letter states that "Reference to Article 26 (b) from the "Agriculture Law No. (13) of 2015" and based on the Minister of Agriculture's recommendation, the Prime Ministry has decided to allow the MEMR utilize an area of 300 Dunums to develop a CCGT Project and exempt this from restrictions on Haraj lands".

The letter is also conditional that: (i) area remains under governmental ownership; (ii) a representative from the MoA is involved in selection of the 300 Dunums areas to be allocated from the entire Plot; (iii) Project starts the development cycle within two (2) years from the date of the Decision; (iv) if Project is not developed within five (5) year from date of the Decision the approval is considered void.

The Prime Ministry Decision is presented in the figure below.



Figure 74: Land Deed



رئاسة الوزراء

الرقم ٩ / ١/ ٦ / ٨٦٥١
التاريخ ٢٧ / شوال / ١٤٤٦
الموافق ٢٠٢٥/٠٤/٢٦

معالي وزير الزراعـــــــــــة
معالي وزير الطاقة والثروة المعدنية

أشير إلى كتابكم رقم (٣/٧/١٩/٤٦٥٧) تاريـــــــــــــــخ ٢٠٢٥/٤/٣.

استناداً لأحكام الفقرة (ب) من المادة (٢٦) من قانون الزراعة رقم (١٣) لسنة ٢٠١٥، وبناءً على تنسيب معاليكم، قرر مجلس الوزراء في جلسته المُنعقدة بتاريخ ٢٠٢٥/٤/١٣ السماح لـ(وزارة الطاقة والثروة المعدنية) باستعمال ما مساحته (٣٠٠) دونم من قطعة الأرض الحرجية رقم (١) من الحوض رقم (١) محالة أم اللؤلؤ من أراضي قرية الخناصري/ محافظة المفرق، لإقامة (محطة توليد كهربائية جديدة تعمل بتقنية الدورة المركبة)، واستثناء ذلك من شروط إقامة المشاريع العامة على الأراضي الحرجية من حيث المساحة، شريطة أن تبقى قطعة الأرض أعلاه مسجلة باسم الخزينة حراجاً، وأن يشترك مندوب عن وزارة الزراعة في التحديد، وأن تتم المباشرة في تنفيذ المشروع خلال سنتين من تاريخ صدور هذا القرار، وفي حال عدم اكتمال المشروع خلال خمس سنوات تعتبر الموافقة ملغاة.

واقبلوا فائق الاحتـــرام.

رئيـــس الـــوزراء

نسخة/إلى معالي وزير المالية/ الأراضي والمساحة
نسخة/إلى عطوفة رئيس ديوان المحاسبـــــة
نسخة/إلى عطوفة أمين سر مجلس الـــــوزراء
قرار رقـــــــــــم (٣٣٢١)

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Figure 75: Prime Ministry Decision Letter

With regards to associated facilities, a formal letter was issued by the E&S Team to the DLS requesting data on land ownership for such facilities. To date, DLS has not provided such information, and it is not clear if this will be possible given that DLS might not provide such information for a consultant.

However, informal information was collected on this and is presented in the figure below. As noted, the entire area in general is under private ownership.

- The OHTL runs within 99 private land plots. Please refer to “Chapter 4.2.2” for rationale of OHTL routing;
- The gas pipeline runs within three (3) private land plots; and

Although the figure does not provide information on the water pipeline, consultations with Yarmouk Water Company (YWC) indicated that the pipeline runs within the existing Right of Way (RoW) of a dirt road within which another operational water pipeline runs. This is discussed in further detail in “Chapter 4.2.1”

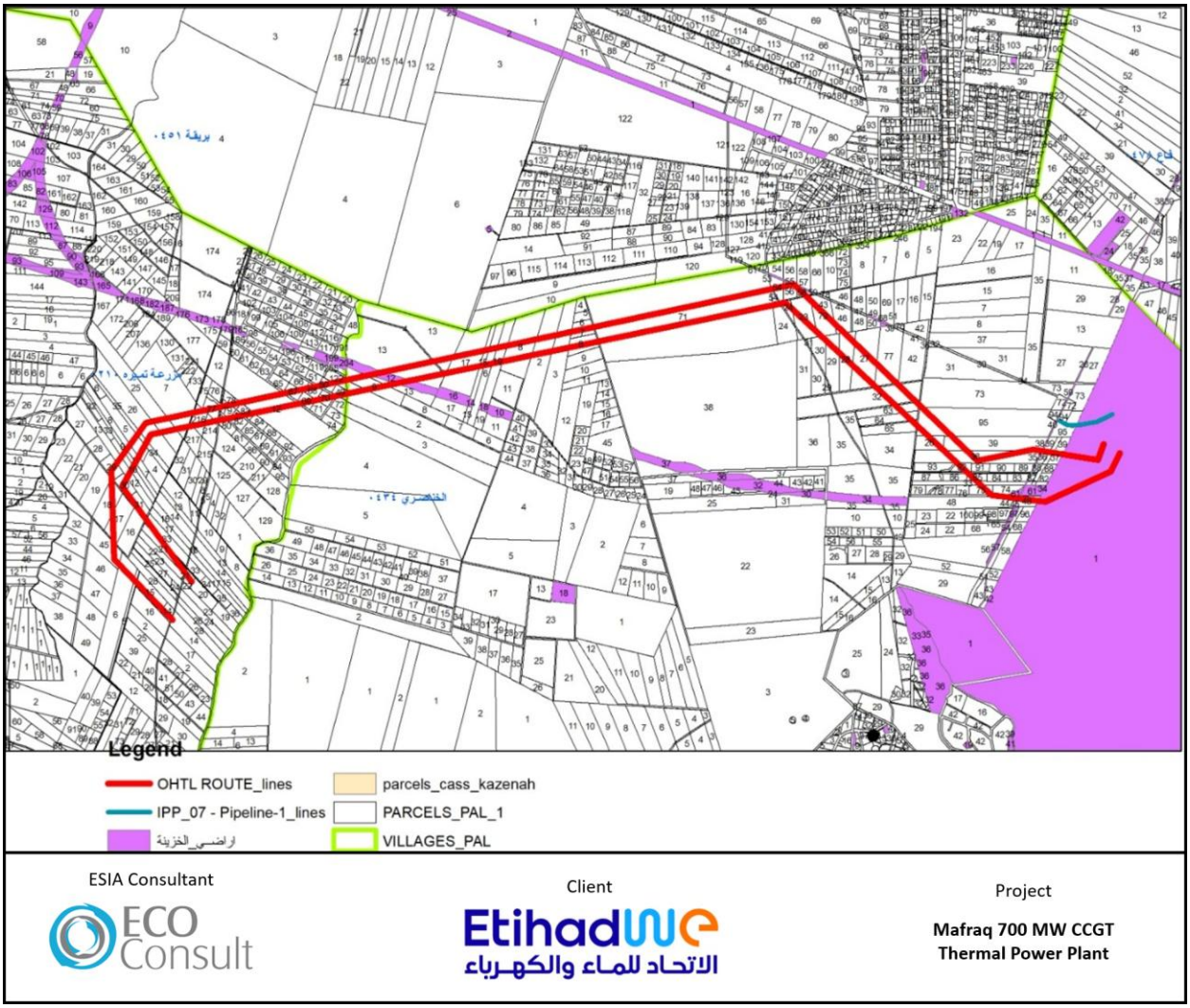


Figure 76: Cadaster Map along the OHTL Route

MoA Grazing Reserves

The figure below presents the formal grazing reserves in Jordan. The Project might conflict with current or proposed planning policies of the Ministry of Agriculture (MoA) for the general area. The most important planning issues that must be investigated include potential conflict with grazing reserves of the MoA.

The MoA is entitled to planning grazing reserves in the Kingdom on rangelands or *Haraj lands* (as noted earlier the Project plot is located within *Haraj lands*). According to discussions with the Rangeland Directorate, there are currently 34 grazing reserves distributed throughout the Kingdom that cover an area of around 80 km2. Such reserves are planned and established for sustainable grazing and prevention of overgrazing, which generally reduces the usefulness, productivity, and biodiversity of the land and is one cause of desertification and erosion.

As noted below, the Project site is located within the 'Khanasri Grazing Reserve'. The land allocated for the Project represents approximately 10% of the total reserve area. The grazing reserve is owned by the MoA and managed by the AlKhanasri Animal Research Station under the National Agricultural Research Center. Therefore, this site in particular is not a 'typical' grazing reserve in the sense that it is allocated for

sustainable grazing practices for local communities. Rather the reserve is allocated for research and development by AlKhanasri Animal Research Station.

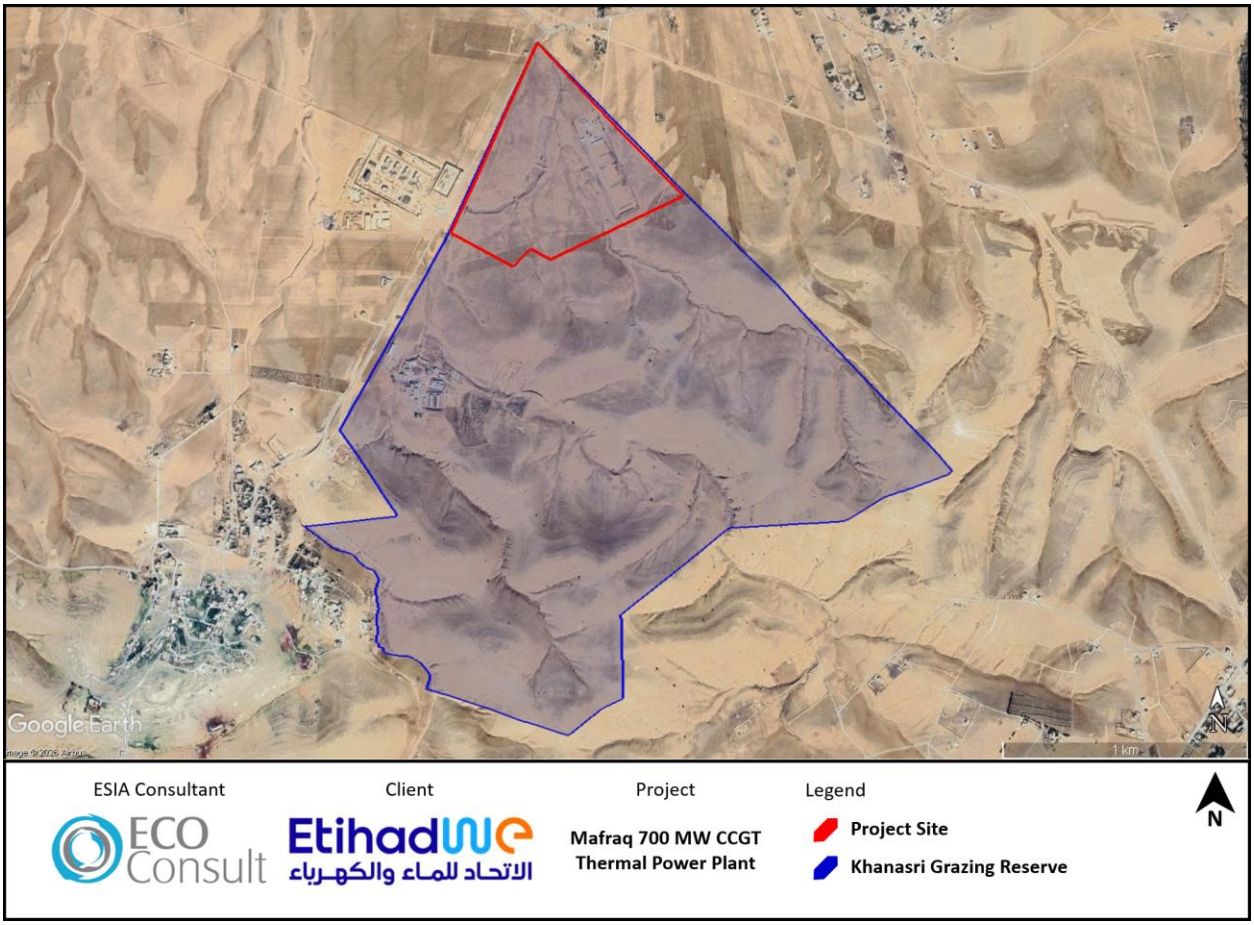


Figure 77: Project site is partially located within the 'Khanasri Grazing Reserve'

As noted within "Chapter 7.3" earlier, the Deputy Head of the Station stated the following:

- Land within the reserve is cultivated on a rotational basis, where the Project area is typically planted as pasture in September and used for grazing by MoA employees until May. The area of the Project site in specific was last planted in the 2019–2020 season. In addition, no grazing activities were observed within the Project site at the time of the visit.
- The herders that use the land are employees of the MoA / Khanasri station and the land is only used by them and on a rotational basis as scheduled by the station staff itself.
- Grazing activities by the employees within the reserve are managed exclusively by the MoA, and external grazers are not permitted to access or use the reserve. The reserve is fenced and is subject to security control and ranger patrols.
- The allocated area for the Project is empty and does not have any structures or assets onsite..
- The overlap with the Project area represents a small portion of the land and does not affect the operations within the reserve.

Consultation was also undertaken with a local grazer located outside the Project site and outside the reserve boundaries. The grazer confirmed that local grazers use lands outside the reserve for grazing, as they are aware that access to the reserve is not permitted. The Deputy Head of the Station noted that occasional encroachment into the reserve by local grazers may occur; however, such encroachment is understood to be limited and generally encroachers are escorted outside of the reserve by the rangers patrolling the area. There was no particular evidence of such practices from site observations and the consultations undertaken.

However, as noted within "Chapter 7.3" earlier, subsequent discussions with the Head of the AlKhanasri Animal Research Center indicated during the scoping session that there are some elements within the allocated plot for the Project, such as water harvesting structures.

The 'E&S Team' undertook a follow-up site visit and invited the Head of the Research Center to participate in this site visit. The visit was undertaken in June 2026 for the Project plot in specific. During the visit, no elements or structures were noted onsite apart from the Vallerani Micro Water Harvesting plowing marks.

This entails a mechanized rainwater-harvesting technique used to rehabilitate degraded arid and semi-arid land. A specialized tractor-drawn plow creates small micro-catchments along land contours, which collect surface runoff, increase water infiltration and retain soil moisture to support the establishment of planted or naturally regenerating vegetation. However, as stated earlier, the Deputy Head of the Station confirmed that the Project site has not been used for such activities since the 2019–2020 season.

Finally, a formal letter was issued by 'E&S Team' to the MoA stating the following:

- Requesting confirmation of the Ministry's non-objection to allocating the portion of reserve land located within the Project footprint for Project development.
- Confirmation on whether all individuals currently utilizing the reserve land are employees of the MoA and/or the AlKhanasri Animal Research Station affiliated with the National Agricultural Research Center (NARC).
- Confirmation that no MoA employees or reserve users would be adversely affected by the allocation of part of the reserve land to the Project.

MoA provided a response confirming all of the above points.

Considering the points below, there are no issues of concern in relation to land allocation for the Project.

- MoA was involved in the allocation of the Project specific plot within the grazing reserve and MoA's Minister recommended the specific allocation to MEMR.
- Deputy Head of Khanasri Reserve confirmed that allocated area is empty and does not have any structure or assets onsite. In addition, it was confirmed that the Project area represents a small portion of the land and does not affect the operations within the reserve.
- Several site visits undertaken confirmed that there are no structures or assets within the Project site.
- MoA provided further confirmation letter with a no-objection on the Project as well as confirmation that no individual is affected by the allocation of the reserve land to the Project.

Military Shooting Range

Based on site visit undertaken to the Project site, it was noted that a military shooting range is located within some part of the Project site as noted within the figure below.

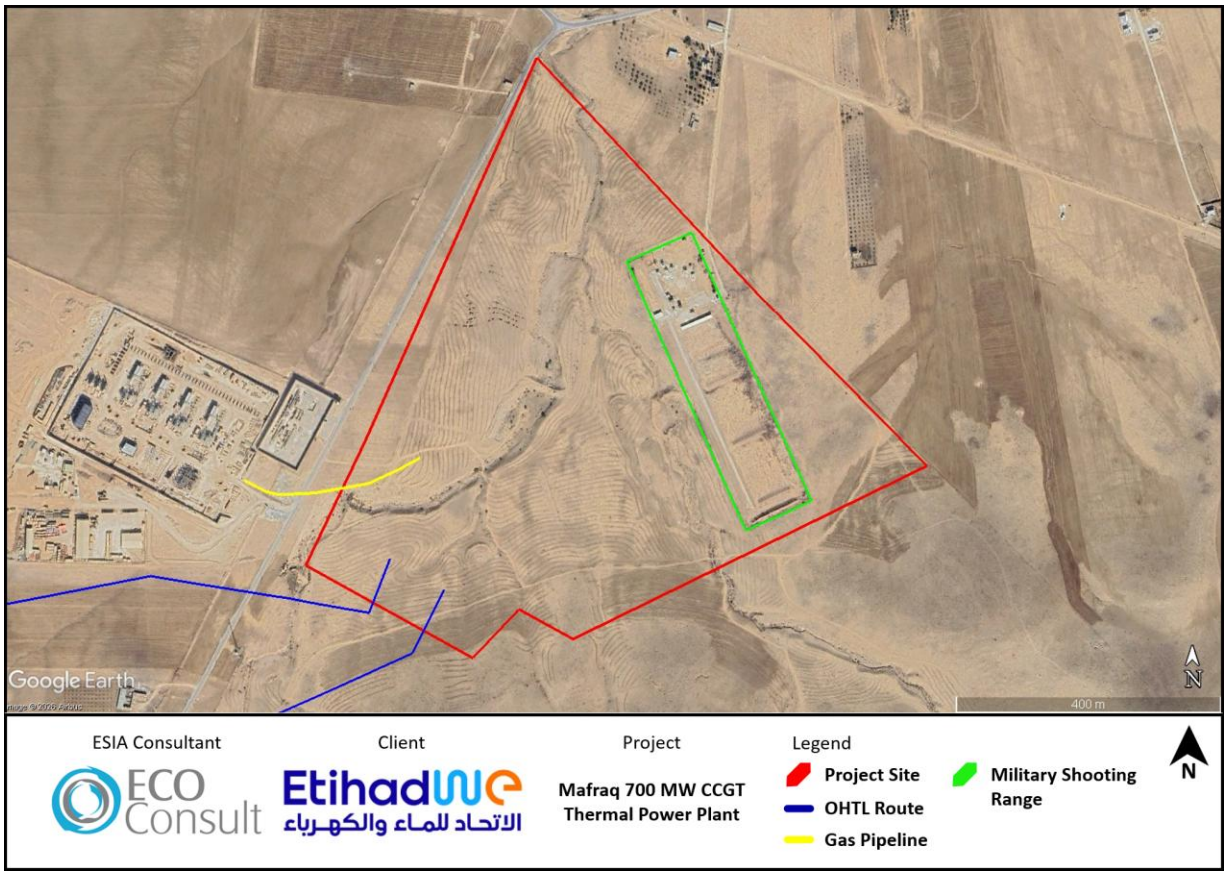


Figure 78: Shooting Range Location Within the Project Site

As noted within "Chapter 7.3", based on consultations with a representative from the Armed Forces, it was indicated that the facility will be relocated with all related structures removed and land cleared and remediated by end of 2026. The representative confirmed that the Military Shooting Range will be relocated to another nearby location outside the Project site, where construction for the new facility has already started.

A request for a formal letter on this from the E&S Team was denied by the Military indicating this is a government-to-government transaction and no such letter can be provided to a consultant.

MoT Railway

Based on land ownership details included within "Chapter 6.7" it was indicated that a future railway is planned within the Project area.

The E&S Team established formal communication with Jordan Hijaz Railway (formal governmental authority responsible for all railways in Jordan). The Jordan Hijaz Railway indicated that communication must occur with the Ministry of Transport (MoT) on this issue.

The E&S Team therefore established formal communication with the Ministry of Transport. The Ministry provided in a formal letter the railway route and required a 100 m buffer to be respected from the railway, and Project components to maintain operational safety requirements for the planned railway project.

The figure below presents the Project site and the planned railway along with the 100 m buffer. The following is noted:

- The Project site itself is not located within the 100 m buffer required. Therefore, there are no further requirements to be considered for the Developer.
- The laydown area is located within the 100 m buffer. However, given that the temporary area will only be used during the construction period from October 2026 to December 2028, and the railway timeline is not scheduled to start before the Project construction, the Ministry indicated that no additional requirements are to be considered.
- Based on consultation with MoT, it was confirmed that the railway is a long-term Project that is not within the GoJ priorities currently and is extremely unlikely that anything will move forward with this Project within the next 10 years.
- The NEPCO substation areas and OHTL route both are within the 100 m buffer. Therefore, it is recommended that NEPCO undertake further discussions with MoT to determine if this is acceptable and whether there are any additional requirements or measures to be considered whether as part of the detailed design or construction phase.

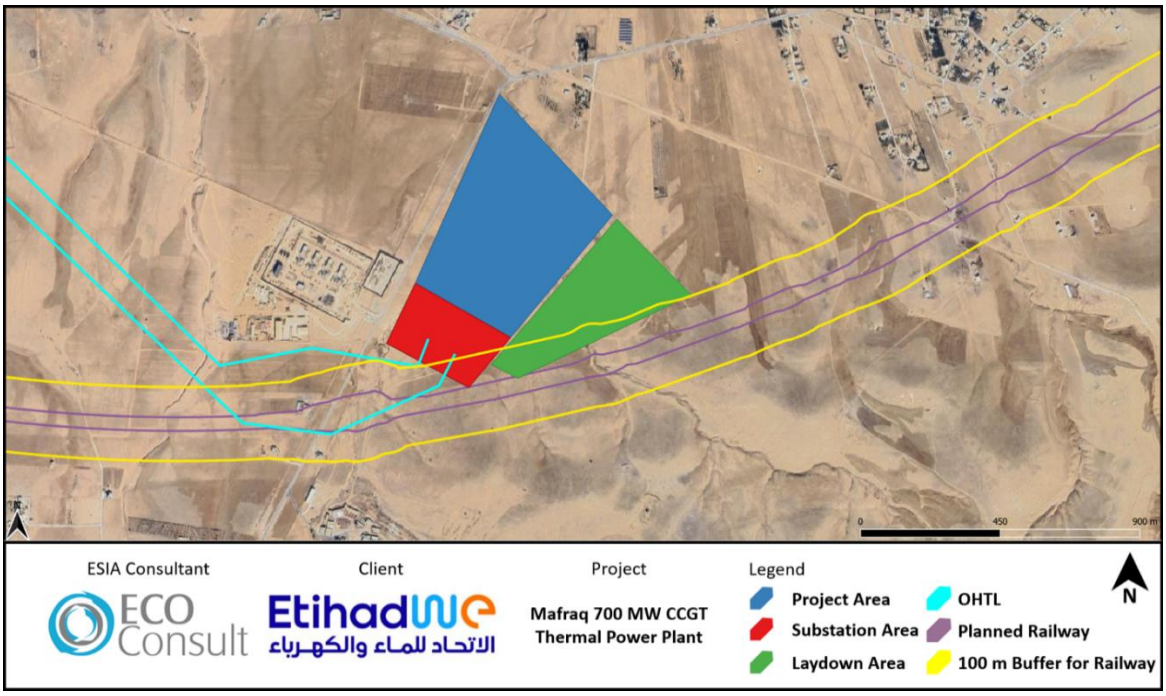


Figure 79: Proposed Railway in Relation to the Project Site

6.7.2.2 Informal Land Use

Project Site

As noted within "Chapter 7.3" earlier, the site is fenced and no access is allowed. Based on this, no informal land use by local communities is allowed within the Project site to include grazing (apart from MoA employees), agriculture (apart from MoA employees) and others. In addition, during the site visit, no informal activities were noted within the Project site.

Associated Facilities

A site survey was undertaken for the associated facilities that covered the footprint of these components along with their RoWs as identified within "Chapter 6.7.1.2" earlier. The site visit identified the following structures within the OHTL.

Table 53: Land Use Points Identified

Point	Description
1	Telecommunication Tower
2	Poultry Farms
3	Two Abandoned Structures
4	Fenced Unidentified Area
5	Water Wells
6	Semi-fenced Area
7	Nomadic Bedouin Camp



Figure 80: Existing Land Use within the OHTL Corridor and 45 m Buffer Zone



Figure 81: Sample Photos for Land Use

Consultations were undertaken with the nomadic Bedouin groups who indicated that they are there on a temporary basis. They generally move into the area during springtime to undertake grazing activities for their livestock. They continuously move throughout the area during springtime. Eventually, during winter they move to Wadi Araba due to its milder temperatures compared to such areas. It was confirmed that they do not settle within the same areas each year.

In addition, the exact usage for the unidentified areas could not be identified. Several visits were undertaken between April – June and no people were present. In addition, discussions with local communities also did not identify any users for these structures. Based on visual evidence, such structures seem to be abandoned.

With regards to the poultry farm, as evident from the OHTL routing (check figure above), this structure was avoided by NEPCO as part of the design and siting phase.

In addition, it is important to note that barley was noticed along the majority of the OHTL route as shown within the figure below. However, it could not be verified whether this is wild or whether it is cultivated, but nevertheless it is rain-fed as there are no irrigation facilities within the entire area.

Finally, no informal land uses were recorded within the gas pipeline or the water pipeline.



Figure 82: Barley Along the OHTL Route

6.8 Socioeconomics

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to socio-economics.

6.8.1 Administrative Setup

It is important to reiterate the administrative set-up since the information presented within this section will follow this structure in specific.

According to the administrative division of Mafraq Governorate, the Governorate comprises four (4) Districts (*Liwaa'*), ten (10) Sub-Districts (*Qadaa'*), eighteen (18) municipalities, and a total of 196 population localities. The Project is located within **Mafraq Governorate**, specifically within the **Northwestern Badia District** (Lewa Al Badia Al Shamaliya Al Gharbiya). More specifically, from an administrative perspective, the Project site is located within **Hosha Sub-District** (Qadaa' Hosha). Hosha Sub-District comprises two municipalities**: Al-Basiliyah Municipality** and Hosha Municipality. For additional details, please refer to "Chapter 5.15.1". As discussed in "Chapter 5.2", the affected communities include:

- Faa' located around 0.76 km northeast of the Project site.
- AlHarsh located around 1 km northwest of the Project site.
- AlKhanasri located around 1.2 km southwest of the Project site.
- Buraiqa located around 3.5 km northwest of the Project site.
- Hosha located around 3.83 km northeast of the Project site.
- Umm Al Lulu located around 2.76 km southeast of the Project site.
- Deir Al Waraq located around 3.1 km south-southwest of the Project site.
- Manshyet Bani Hassan located around 3.2 km south-southeast of the Project site.

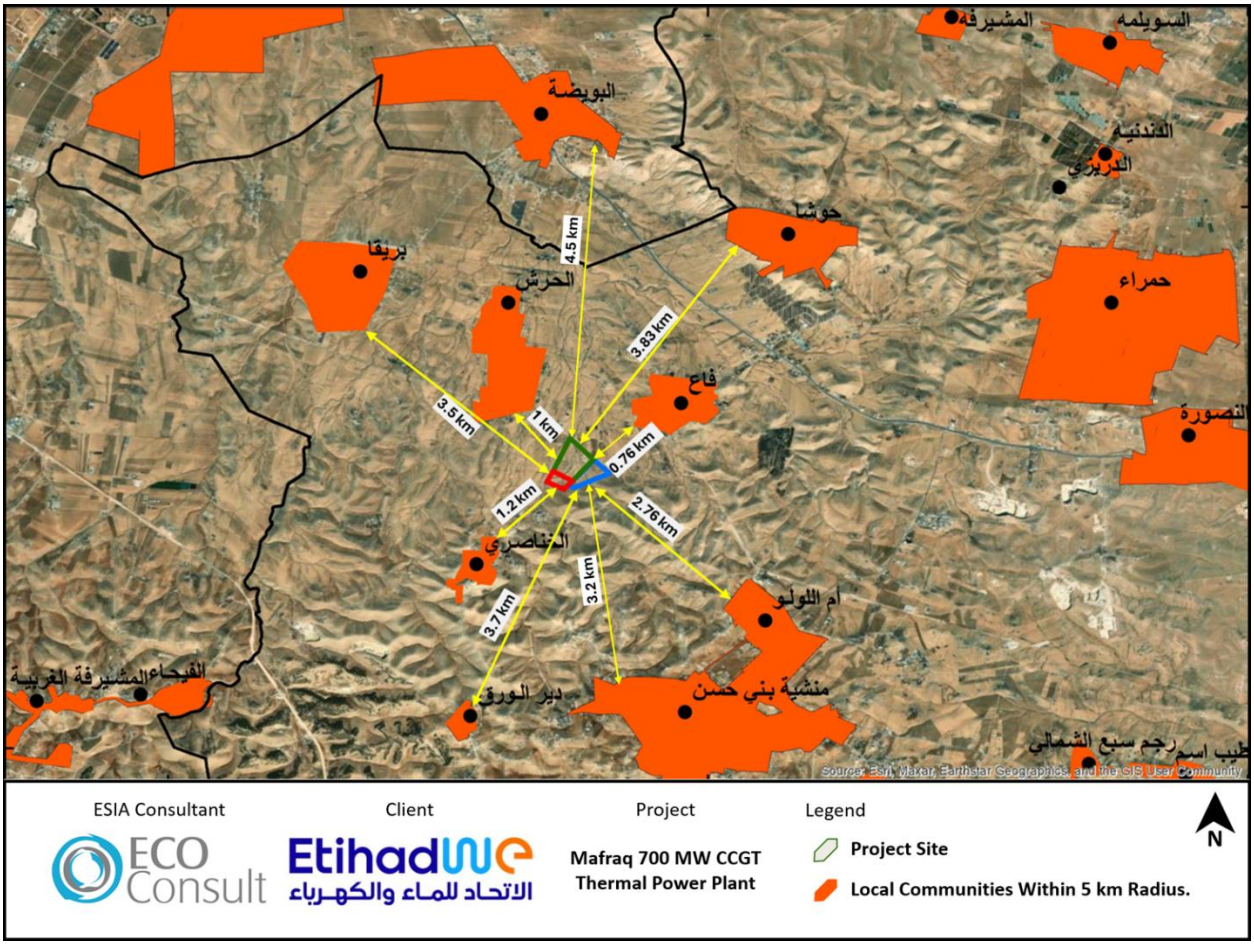


Figure 83: Project Site Nearby Communities

6.8.2 *Methodology for Assessment*

Assessment of baseline conditions was undertaken based on the following:

- Department of Statistics (DoS) website[6]. DoS is considered the official source for all socio-economic data and indicators. DoS maintains a comprehensive database based on annual socio-economic surveys undertaken across Jordan. This includes statistics on: (i) labor force (employment and unemployment, job creation, employment in establishment, etc.); (ii) population (population, gender indicators, poverty, health, marriage etc.). However, data at DoS is generally only available at the Governorate level and not sub-district or locality level.
- Local Development Unit (LDU) statistics. Within Mafraq Governorate as well as Hosha Sub-District, an annual socio-economic report is available that is known as "The Economic and Social Reality for Local Communities" and that is prepared by the LDU within each entity (i.e. the Governorate and sub-district). Both reports for 2025 were collected based on consultations with these entities with data utilized within the assessment as applicable in this section.

[6] Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025; and Estimated Population of the Kingdom by Administrative Divisions, End of Year 2025, January 2026.

- Focus Groups Discussion (FGDs). It is important to note that the majority of the socio-economic data is mainly available at the Governorate or district level; little or no data is available specifically for the local communities near the Project area. Therefore, as part of the consultation session undertaken with local communities, the 'E&S Team' aimed to obtain additional insights and information on socio-economic conditions within the local communities.
- Gender and Human Rights Assessment. A comprehensive Project specific gender and human rights risk assessment was undertaken. The key outcomes of this assessment are included within the section below. The detailed assessment is presented in Annex II.
- Nearby Houses. The E&S Team conducted a site visit to identify and consult with households located within a 1 km buffer of the Project site, as shown in the figure below. These are all the scattered households that are not within the municipality boundaries. As discussed later in "Chapter 7.4", a total of 34 households/structures were identified. These included occupied permanent residential structures, rented accommodation, houses under construction, abandoned or apparently unused structures, storage areas, and structures where no occupants were present at the time of the visit.

Household-level information was collected and compared against the statistics above.

Based on the above, data was collected and is presented in relation to key socio-economic indicators to include but not limited to demographic dynamics, population characteristics, employment status, community structure, livelihoods, and other data sets.

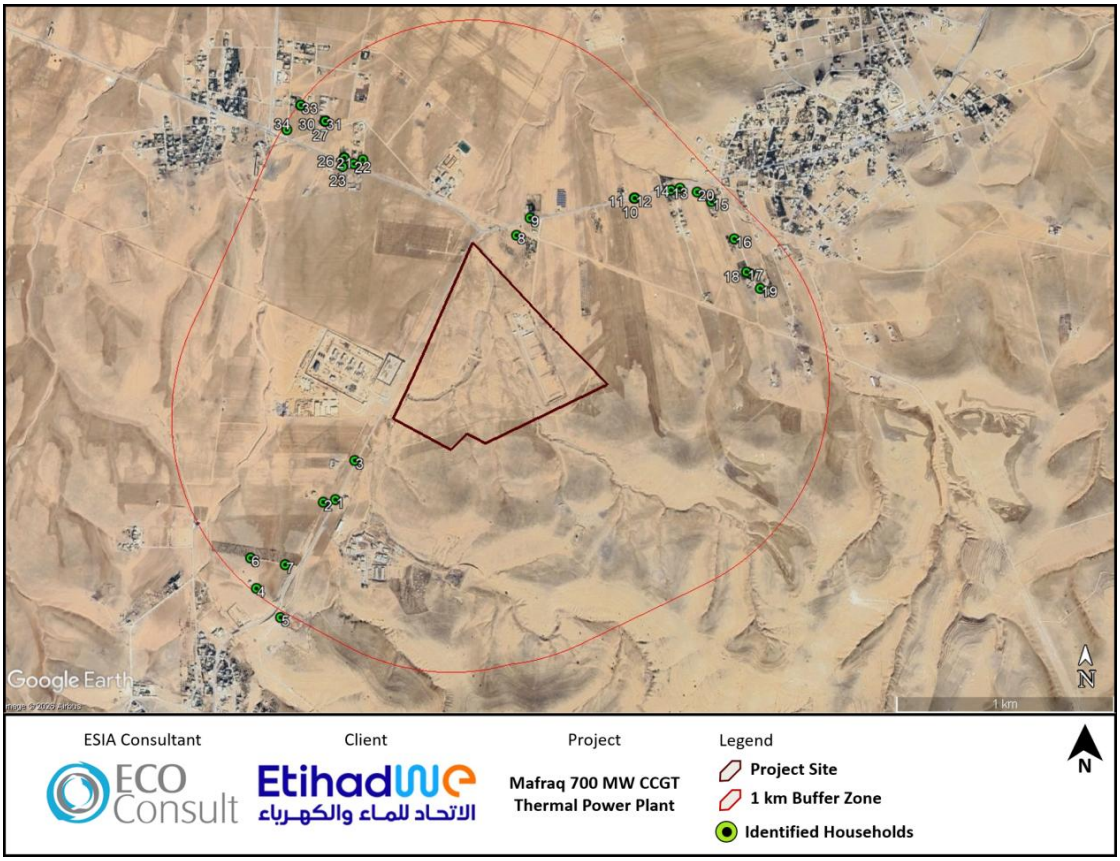


Figure 84: Identified Households within a 1 km Buffer

6.8.3 Population and Demographic Profiles

The population of Mafraq Governorate is estimated at 675,200 as of Q4 2024, rising to 686,800 by Q4 2025, representing approximately 5.8% of Jordan's total national population. Population is concentrated predominantly in the west of the Governorate, around Mafraq city, with a population density of 25.9 persons per km² [7]. The Governorate is divided across four (4) Districts, with the Northwestern Badia District accounting for the largest share of the Governorate's population at approximately 39.5%, equivalent to 271,730 persons in 2025[8].

More specifically, as noted in the table below, the population of Hosha Sub-District is 34,390 persons distributed across 6,129 households in 2024, rising to 34,980 persons across 6,234 households in 2025[9]. The table below presents further information in relation to the number of households and total population, as well as birth and mortality rates where available, including those where available for the local communities.

The average household size in Mafraq Governorate stands at 5.38 persons, above the national average of 4.8 persons per household. The total fertility rate for the Governorate is 5.0 births per woman, compared to a national average of 2.7. The demographic dependency ratio stands at 79, compared to a national figure of 61.4[10], indicating a proportionally higher burden of dependents per working-age individual relative to the national average.

Table 54: Household Demographics around the Project Area

Area	Households	Total Population	Birth Rate (Births per 1,000 persons)	Mortality Rate (Deaths per 1,000 persons)
Mafraq Governorate	130,074 (2024) 132,307 (2025)	675,200 (2024) 686,800 (2025)	17.53	1.82
Northwestern Badia District	51,188 (2024) 52,067 (2025)	267,140 (2024) 271,730 (2025)	N/A	N/A
Hosha Sub-District	6,129 (2024) 6,234 (2025)	34,390 (2024) 34,980 (2025)	N/A	N/A

Note: A sex ratio of 112.5 males per 100 females is recorded at the Governorate level [11]. Sub-district level gender breakdown is unavailable. Birth and mortality rates are presented at the Governorate level only, as disaggregated data for lower administrative tiers is not available.

Table 55: Population of Local Communities

Community	Population
Faa'	3,076
AlHarsh	1,833
AlKhanasri	1,033
Buraiqa	1,437

[7] Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025; and Estimated Population of the Kingdom by Administrative Divisions, End of Year 2025, January 2026.

[8] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.

9 Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025. Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025; and Estimated Population of the Kingdom by Administrative Divisions, End of Year 2025, January 2026.

10 Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.

11 Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025; and Estimated Population of the Kingdom by Administrative Divisions, End of Year 2025, January 2026.

Hosha	3,029
Umm Al Lulu	856
Deir Al Waraq	501
Manshyet Bani Hassan	15,143

6.8.4 Social Structure

In general, Mafraq Governorate is characterized by two (2) main social environments: the city style and the village style. The city style is represented mainly by the capital of the governorate (Mafraq city). In spite of that, the simple village lifestyle is dominant in the villages and small settlements scattered along the Governorate (including the local communities near the Project site), and which are still the base that governs all social relations in Mafraq.

Local communities within Mafraq Governorate in general identify themselves primarily in terms of tribal affiliations. Based on "The Economic and Social Reality for Local Communities" and consultations with local communities, the following is concluded.

Within Hosha Sub-District specifically, the resident population primarily belongs to two main tribes, Bani Khaled and Bani Sakher, with smaller tribal groups also present, including Shammar, Al-Hadidi, Al-Azzi, and Al-Rwashdeh[12]. The communities of Umm Al Lulu, Deir Al Waraq, and Manshyet Bani Hassan fall under Manshiyah Sub-District and are primarily associated with the Bani Hassan tribal grouping, which is one of the principal tribes of Mafraq Governorate. The tribal composition of all communities in the immediate vicinity of the Project site is summarized in the table below.

[12] Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide.

Table 56: Tribal Composition of Communities in the Vicinity of the Project Site

Community	Tribe	Clan	Branch
Faa'	Bani Sakher	Al-Jabour	Al-Dikeh, Al-Anbar
	Bani Sakher	Al-Hammad	Muzaynah (Al-Houran, Al-Jallanzi, Al-Rabi', Al-Nughaimish, Al-Sahban, Al-Habour, Al-Bala'is); Al-Sindat (Al-Nassar, Al-Hazima, Al-Shalahbeh, Al-Nabi'an, Al-Samoudeh, Al-Kayfat, Al-Adawin); Al-Lubdan (Al-Shuraydeh, Al-Faqir, Al-Amoud, Al-Nuhair); Al-Musarribin (Al-Tawafha, Al-Qusairin); Al-Assoul (Al-Abdullah)
Al-Harash	Bani Sakher	Al-Harsh	Al-Harsh
	Bani Sakher	Al-Sleem	Al-Tlelan, Al-Khatar, Al-Mushji, Al-Ali
	Bani Sakher	Al-Jabour	Al-Dikeh, Al-Anbar
Al-Khanasri	Bani Sakher	Al-Shara'a	Al-Zuwayymel, Al-Shtewi, Al-Hamoud, Al-Shara'a
	Al-Rwashdeh	Al-Rwashdeh	Al-Muwajaha
Buraiqa	Bani Sakher	Al-Qudah	Al-Qudah
	Bani Sakher	Al-Khuraisha	Al-Mulhem, Al-Hamad, Al-Badr
	Bani Sakher	Al-Shara'a	Al-Zuwayymel, Al-Shtewi, Al-Hamoud, Al-Shara'a
Hosha	Bani Khaled	Al-Hidyan	Al-Qadi, Al-Uqdah, Al-Tuwal, Al-Basharah, Al-Subh, Al-Abbas, Al-Hamid, Al-Hadid, Al-Qobbah, Al-Nuwayran, Al-Shaqif, Al-Marrara, Al-Ali, Al-Dandann
Umm Al Lulu*	Bani Hassan	Al-Shdiyfat	N/A
Deir Al Waraq*	Bani Hassan	Al-Shdiyfat	N/A
Manshyet Bani Hassan*	Bani Hassan	Al-Shdiyfat	N/A

Note: Tribal data for Faa', Al-Harash, Al-Khanasri, Buraiqa, and Hosha is sourced from the Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide, which constitutes the official administrative record for Hosha Sub-District.

6.8.5 Refugees

It is important to note that Mafraq Governorate has experienced significant demographic change as a result of successive regional crises, particularly the Syrian refugee crisis. The Governorate hosts the Zaatari Refugee Camp, established in July 2012 approximately 12 km east of Mafraq city and 28 km southeast of the Project site. The presence of the camp has substantially altered the demographic composition of the Governorate, with non-Jordanian residents constituting approximately 43.6% of the total Governorate population as of 2024, compared to 31.5% at the national level[13].

[13] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.

Based on discussions with the Social Development Unit (SDU) and consultations with the local community conducted as part of the Focus Group Discussions (FGDs), the following was confirmed:

- Based on statistics in 2019, approximately 5,000 Syrian refugees reside in Manshyet Bani Hassan. No other local community hosts Syrians. This includes both registered (legal) and unregistered (undocumented) Syrians. Syrian families continue to reside in the area today, although their numbers have declined given that in 2023 an increasing number of Syrians returned to Syria.
- Within Manshyet Bani Hassan Syrians are generally integrated within the local community, many of whom are married to Jordanians.
- They generally reside in conventional housing rather than in formal camps.
- They are engaged in various livelihood activities within small businesses to include:
    - Owners of approximately 4–5 dessert/sweets shops.
    - Carpenters.
    - Blacksmiths.
    - Furniture manufacturing.
    - Bicycle-related businesses and repair services.

- Syrian refugees are generally well integrated into the local community, and no significant concerns regarding discrimination or social tensions were raised during the consultations.

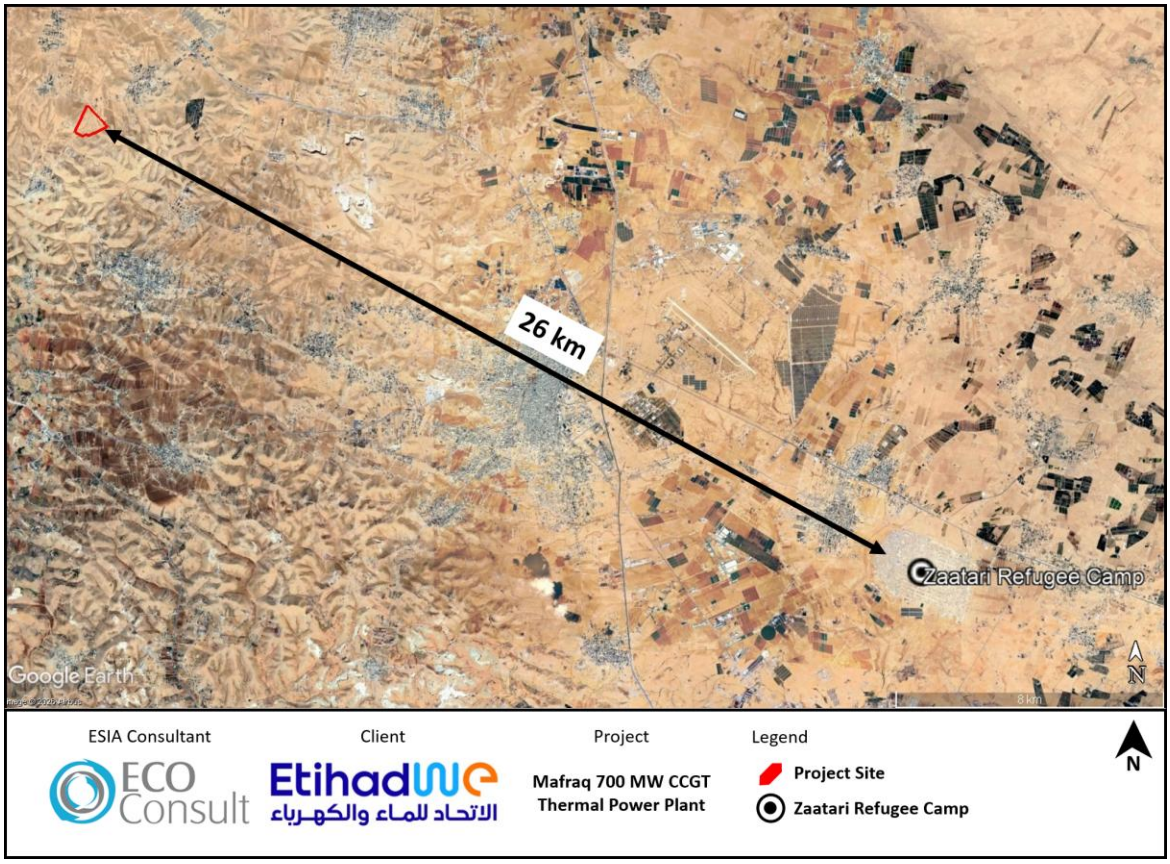


Figure 85: Al Zaatari Refugee Camp in Relation to the Project

6.8.6 *Indigenous Peoples (IPs)*

In accordance with the requirements of IFC Performance Standard 7 (PS7) and the AIIB Environmental and Social Framework (ESS3), an assessment was undertaken to determine whether Indigenous Peoples, as defined under these standards, are present within the Project Area of Influence.

Within the context of the Project Area of Influence, the communities comprise Jordanian tribes, with some Syrians in one (1) village. In addition, within the OHTL nomadic Bedouins were also noted.

Jordan is not generally recognized as having Indigenous Peoples that meet the characteristics set out under IFC PS7 or AIIB ESS3. While the country comprises various tribal, ethnic, and cultural groups, these communities are integrated into mainstream Jordanian society, share the official language (Arabic), participate in the country's political, economic, and social systems, and are not considered to constitute distinct Indigenous Peoples under the applicable lender standards. Previous assessments undertaken by international financial institutions, including the IFC and the World Bank, have similarly concluded that PS7 is generally not applicable to projects in Jordan[14].

The assessment above entailed an analysis of the four characteristics outlined in PS7: (i) the communities' own perspective on whether they identify as Indigenous Peoples; (ii) their possible collective attachment

[14] IFC-ManagementReport-MAP-JordanBaynouna-FEB012025-ENG.pdf

to ancestral lands; (iii) their integration into the mainstream society and culture; and (iv) their use of a language different from the official language.

The assessment determined that the Bedouins in Jordan are a sizable groupsizable that speaks Arabic (the Jordanian official language) and are reasonably well integrated into Jordanian society and culture.

In addition, in general tribes self-identify as Bedouins, maintain genealogical records and tribal structure and do not self-identify as Indigenous People. While Bedouin tribes might have ancestral or customary use of rangeland (particularly by herders), these lands do not hold ceremonial significance tied to their identity or community. Bedouins have strong social cohesion and allegiance to their sheikhs (the head of the tribe) and convene regularly to discuss community matters, typically deferring to their customary laws to resolve their disputes prior to going to court. Despite this tribal structure, today, the majority of Bedouins have settled in urban and rural areas and are citizens integrated into Jordan's mainstream society, including through intermarriages, access to courts and participation in the broader political system.

Therefore, there are no communities within the Project Area that exhibit the collective characteristics of Indigenous Peoples as defined under IFC PS7 and AIIB ESS3.

Accordingly, IFC Performance Standard 7 and AIIB ESS3 relating to Indigenous Peoples are not triggered for the Project, and no further assessment or Indigenous Peoples-specific management measures are required.

6.8.7 Employment and Livelihoods

The most recent data on employment and livelihoods in Mafraq Governorate, as reported in the Social, Economic and Development Status Report for Mafraq Governorate, indicates that the economic activity rate for Jordanian males aged 15 years and above stands at approximately 55.3%, compared to 14.9% for females. Approximately 60% of the active labor force in the Governorate is concentrated in public sector employment, defense, and education[15]. The table below presents further information in relation to economic activity and employment rates in Mafraq Governorate. It is important to note that specific data at the Sub-District level is unavailable.

Table 57: Economic Activity in Mafraq Governorate in 2022

Indicator	Mafraq Governorate (Males)	Mafraq Governorate (Females)	National Average (Males)	National Average (Females)
Economic Activity Rate (15 years and above)	55.3%	14.9%	N/A	N/A
Employment Rate (Employed / Total Population 15+)	41.3%	9.6%	N/A	N/A

Note: Data presented reflects Jordanian residents only. National average disaggregated figures for economic activity and employment rates by gender are not available in the published sources consulted. Published data at the Sub-District level is unavailable; figures are presented at the Governorate level only.

According to DoS the main employment sectors in Mafraq Governorate were public services, education, and industry and trade. The public service constitutes the highest percentage of the working population, accounting for 42% of the population in Mafraq. This sector mainly entails working for armed forces, police, and public administration offices and civilian central government. On the other hand, the education sector accounts for 19% of the working force mainly in public schools. The staff mainly includes teachers

[15] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.

and administrative personnel, who are mostly female. Together, these two sectors constitute around two thirds of the working population in Mafraq Governorate, indicating that the majority of the workforce work for the government and in the public sector.

Industry and commerce form an important part of the employment sector in Mafraq Governorate, accounting for around 25% of the workforce. This includes mainly two development zones hosting a range of manufacturing and processing facilities. However, the majority of economic establishments in the Governorate are those that engage in retail trade of commodities (food, beverage, clothing, and household appliances) all of which are considered to be small establishments.

Agriculture and livestock rearing remains a significant economic activity within Mafraq Governorate that accounts for around 25% of the workforce respectively. The Governorate also holds approximately 22% of the national livestock population[16].

Within Hosha Sub-District specifically, the characteristics are similar to the above. The main livelihood patterns among residents include public services. Typically, this includes working for armed forces, police, and public administration offices and civilian central government. Other key sectors include agriculture and other small-scale economic activities (food, beverage, clothing, and household appliances). The Sub-District also includes small industrial and manufacturing establishments, which include:

- One (1) plastic manufacturing facility.
- One (1) sponge manufacturing facility.
- One (1) clothing manufacturing facility.

No statistics or data is available for livelihood and employment patterns for the local communities. However, based on discussions with local community representatives, it was stated that the majority of the working population is in fact in the public sector – mainly the Jordanian Armed Forces, public administration offices and civilian central government as well as education. Employment opportunities within the private sector are considered low and very limited and mainly include small scale establishments such as retail shops. Finally, it was also indicated that grazing and agriculture are common practices by the local communities undertaken as an additional source of income and/or for self-sufficiency purposes.

6.8.8 Unemployment and Poverty

Unemployment rates in Mafraq Governorate have presented a persistent and significant challenge, with the Governorate recording the highest unemployment rate in the Kingdom in both 2022 and 2023. According to published statistics, the overall unemployment rate in the Governorate stood at 27.4% in 2022, decreasing to 24.8% in 2023, and further to 22.1% in 2024, before rising again to 24.3% in the third quarter of 2025[17]. These figures consistently exceed the national average, which stood at 22.8% in 2022[18].

[16] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[17] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[18] Department of Statistics Jordan (DoS), Labour Force Survey, 2022.

Data from SDU further highlights significant gender disparities within the labor market. Female unemployment in the Governorate reached 35.2% in 2022, compared to 25.4% among males, reflecting a pronounced gap in employment opportunities for women. The economic activity rate for females remains notably low at 14.9%, well below the male rate of 55.3%[19].

The table below presents unemployment rates for Mafraq Governorate over the period 2021–2024, with comparison to national figures when available.

Table 58: Unemployment Rates in Mafraq Governorate

Year	Mafraq Governorate (Males)	Mafraq Governorate (Females)	Mafraq Governorate (Total)	National Average (Total)
2021	26.5%	31.1%	25.2%	24.1%
2022	25.4%	35.2%	27.4%	22.8%
2023	N/A	N/A	24.8%	N/A
2024	N/A	N/A	22.1%	N/A

Note: Data presented reflects Jordanian residents aged 15 years and above only. Gender-disaggregated figures for 2023 and 2024 are not available in the published sources consulted. Sub-District level unemployment data is unavailable; figures are presented at the Governorate level only.

Poverty rate accounts for the percentage of residents whose per capita expenditure falls below the national absolute poverty line. The absolute poverty line represents the minimum level of income or expenditure required for an individual to secure basic nutritional needs along with other essential non-nutritional needs related to housing, clothing, education, health, and transportation. According to the most recent published poverty study in Jordan, based on the Household Expenditure and Income Survey 2010, the absolute poverty line was estimated at JOD 814 per individual per year[20]. Poverty rates in Mafraq Governorate are estimated at 19.2%, compared to a national average of 14.4%[21].

In addition, poverty pockets are the districts/sub-districts in Jordan where poverty rate equals or exceeds 25%. According to the latest statistic, the Governorate contains three (3) identified poverty pockets, with elevated poverty levels, partly attributable to the presence of the Zaatari Refugee Camp and associated pressures on local services and employment opportunities[22]. However, Northwestern Badia District is not listed as a poverty pocket.

Discussions with local officials and community representatives during the stakeholder consultation process confirmed and emphasized that there are limited employment opportunities and elevated poverty rates; both of which present key development challenges within Hosha Sub-District as well as within the local communities. Note that there are no published statistics available on unemployment and poverty levels specifically for Hosha Sub-District[23].

6.8.9 Income

Average annual household income in Mafraq Governorate is lower than the national average, with a gender gap also evident. Comparing those figures to the national averages clearly reveals that households

[19] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[20] Department of Statistics Jordan (DoS), Poverty Report: Poverty Status in Jordan, based on Household Expenditure and Income Survey 2010, published 2012.
[21] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[22] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[23] Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide.

in Mafraq Governorate are poorer and are at a lower standard of living when compared to the average Jordanian household.

Table 59: Average Annual Household Income in Mafraq Governorate

Gender	Mafraq Governorate	National Average
Male-headed Households	JOD 9,451	JOD 11,519
Female-headed Households	JOD 6,873	JOD 9,534

6.8.10 Education

According to published data from the Department of Statistics, Jordan's national illiteracy rate for individuals aged 15 years and above stood at approximately 7.3% for females and 2.4% for males in 2022. Mafraq Governorate records higher illiteracy rates than the national average, with female illiteracy at 9.8% and male illiteracy at 3.7% as of 2022, reflecting an improvement from 12.5% and 4.6% respectively in 202124. Despite this improvement, illiteracy rates in the Governorate remain above the national average and continue to represent a challenge for the local education sector. The table below presents the educational services available in Mafraq Governorate and Hosha Sub-District.

Table 60: Educational Services in Mafraq Governorate and Hosha Sub-District

Type of Education	Item	Hosha Sub-District	Mafraq Governorate
Kindergarten	No. of schools	N/A	N/A
Primary and Preparatory	No. of schools	37	710
	No. of rented schools	10	N/A
	No. of male schools	13	N/A
	No. of female schools	24	N/A
	Total students	N/A	164,924
	Total teachers	N/A	11,797
Secondary	No. of schools	N/A	N/A
Private Schools	No. of schools	1	N/A

Note: The figure of 37 government schools refers to all government schools across Hosha Sub-District, of which 10 are rented, 13 are male-only, and 24 are female or mixed. The single private school in Hosha Sub-District is the Northern Badia Educational Academy, located in Al-Hamra. Data on classroom capacity and student enrollment at the Sub-Districtenrollment level are not available[25].

Governorate-level data indicates that 93.3% of students in Mafraq Governorate attend government schools, compared to a national average of 73.5%, reflecting the limited presence of private education providers within the Governorate. The average student-to-teacher ratio in Mafraq Governorate stands at 14.34 students per teacher in government schools[26], compared to a national average of 15.3 students per teacher, indicating relatively adequate staffing levels within available facilities. Approximately 20.8% of government schools in the Governorate operate from rented premises, compared to a national average of 33.2%[27], and 10.2% operate on a two-shift basis, reflecting localized pressures on available school infrastructure.

[24] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[25] Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025, Tables 13.1.6 and 13.1.7. Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025. Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide.
[26] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[27] Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025.

With respect to higher education, Mafraq Governorate is home to one public university, Al al-Bayt University, which offers undergraduate, diploma, and postgraduate programs across multiple faculties. The Governorate also hosts the King Hussein Air College, which provides undergraduate programs in aviation sciences in cooperation with the Royal Jordanian Air Force28. Consultations conducted as part of the ESIA process confirmed the presence of 37 government schools and 1 private school within Hosha Sub-District, in addition to 7 government kindergartens located across the communities of Buraiqa, Al-Suwailimieh, Al-Hamra, Al-Khanasri, and Al-Ekader. No universities or colleges are located within the Sub-District29. Data on classroom capacity and student enrollment at the Sub-Districtenrollment level are not available.

6.8.11 Health

Health services in Mafraq Governorate are provided through a combination of public, military, and private facilities. The Governorate hosts four public hospitals, one military hospital, and two private hospitals, with a total of 571 hospital beds, equivalent to a bed rate of 9 beds per 10,000 persons — significantly below the national average of 14 beds per 10,000 persons[30]. The public hospitals in Mafraq Governorate are as follows[31]:

- Mafraq Governmental Hospital (established 1967; 70 beds).
- Obstetrics and Pediatrics Hospital (established 1996; 111 beds).
- North Badia Governmental Hospital (established 2016; 92 beds).
- Rweishid Governmental Hospital (established 1990; 25 beds).

In addition, one military hospital operates within the Governorate under the Royal Medical Services, King Talal Military Hospital, along with two private hospitals located within Mafraq[32]. It is noted that a number of specialized facilities referenced in the consultations, including Sara Specialized Hospital, Masa'ah Al Noor Specialized Hospital, and the Gynecology and Pediatrics Hospital, are to be confirmed and updated once official hospital registry data is obtained.

In terms of primary healthcare, the Governorate has a total of 22 comprehensive health centers, 32 primary health centers, and 34 sub-health centers, in addition to 62 mother and child health centers, 48 dental health centers, and 1 respiratory and communicable disease center. The Governorate accounts for 18% of the national total of comprehensive health centers and 9% of primary health centers, reflecting an above-average provision of primary care relative to population share, though this distribution does not adequately reflect population density, with some sub-districts having three comprehensive health centers serving relatively small populations while more densely populated sub-districts have only one[33].

Health insurance coverage in Mafraq Governorate stands at 87.5% of individuals, above the national average of 71.8%, largely attributable to the high proportion of residents affiliated with the Jordanian Armed Forces and covered by Royal Medical Services insurance. The number of nurses per 10,000 persons

[28] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[29] Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide.
[30] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[31] Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide.
[32] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[33] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.

stands at 14.9 in Mafraq Governorate, significantly below the national average of 36.9, indicating a pronounced shortage of nursing staff relative to the population served[34].

The following table presents a summary of health service indicators for Mafraq Governorate in comparison with national averages.

Table 61: Health Services Indicators in Mafraq Governorate

Indicator	Mafraq Governorate	National Average
No. of public hospitals	4	32
No. of military hospitals	1	18
No. of private hospitals	2	68
Total hospital beds	571	15,999
Bed rate per 10,000 persons	9	14
No. of comprehensive health centers	22	122
No. of primary health centers	32	365
No. of sub-health centers	34	184
No. of mother and child health centers	62	498
No. of dental health centers	48	440
Nurses per 10,000 persons	14.9	36.9
Health insurance coverage (%)	87.5%	71.8%

Within Hosha Sub-District, there are no public, private, or military hospitals. The Sub-District is served by 2 comprehensive health centers and 3 primary health centers, in addition to 2 private clinics and 5 pharmacies[35]. No hospital facilities are available within the Sub-District, and residents requiring hospital-level care must travel to Mafraq city or other centers within the Governorate. The absence of a hospital within Hosha Sub-District was raised as a key community concern during stakeholder consultations conducted as part of the ESIA process, with participants requesting that support for local health services be included as a community benefit commitment from the Project.

6.8.12 Civil Defense

The Security and Justice Statistical Yearbook published by the Department of Statistics Jordan (DoS) provides national-level civil defense statistics but does not disaggregate data by governorate or sub-district level. Accordingly, governorate or sub-district level civil defense data specific to Mafraq Governorate or Hosha Sub-District is not available in the published sources consulted. At the national level, civil defense operations in Jordan recorded 499,612 first aid interventions, 39,423 rescue operations, and 30,628 fire-fighting interventions in 2025[36].

It is noted from the Local Development Report that a Civil Defense Center is located in Mafraq cityCenter[37]. No civil defense unit or emergency response center is recorded within Hosha Sub-District in the published sources consulted. Residents of the Sub-District are dependent on the civil defense infrastructure of Mafraq city for emergency response services.

[34] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[35] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025. Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide.
[36] Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025, Chapter 17: Security and Justice.
[37] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.

6.8.13 Gender

An examination of governorate- and community-level gender dynamics including women's mobility, access to employment, transport, childcare, safety (including gender-based violence), decision-making, and access to consultation and grievance mechanisms is presented in the Gender and Human Rights Risk Assessment (Annex II) together with an explicit statement of data limitations. The available data as well as ., observations made during stakeholder consultations and focus group discussions conducted as part of the ESIA process, yielded the following insights:

- Female economic participation in Mafraq Governorate remains significantly below both the male rate and the national average, as discussed under Employment and Livelihoods and Unemployment and Poverty above. Limited employment opportunities for women are primarily concentrated in the public sector, particularly in education and healthcare. At the 2023 JPFHS, 13.1% of ever-married women aged 15–49 in Mafraq were employed (men: 44.8%), and Department of Statistics data for 2024 put unemployment among economically active Jordanian women in the Governorate at 60.6% for ages 20–24 and 49.6% for ages 25–29 — the most acute in the Kingdom. Among economically inactive women, 49.6% cite past failure to find suitable work, 29.2% the absence of jobs in the area, and 11% the presence of small children; recorded female employment in the Governorate's electricity, gas and construction sectors is nil.
- Despite low labor market participation, educational attainment among females in the Governorate is notable. Females account for 62.5% of academic secondary school enrollment and 58.8% of university bachelor's degree enrollment in Mafraq Governorate, exceeding male participation at both levels[38]. At the national level, female students represent 49.4% of total school enrollment and 53.5% of bachelor's degree enrollment across Jordanian universities[39]. This reflects a strong and consistent commitment among families to educating their daughters.
- The adolescent fertility rate in Mafraq Governorate stands at 61 births per 1,000 females aged 15–19, significantly above the national average of 27 per 1,000[40]. This indicator points to the prevalence of early marriage within the Governorate, which represents a vulnerability factor for young women in terms of educational continuity and economic participation.
- Women heading households, particularly widows and divorcees, represent a vulnerable group within local communities facing challenges in supporting their families and meeting daily living expenses, as discussed under Unemployment and Poverty above.
- Household decision-making among married women in Mafraq is comparatively inclusive — 81.9% participate in all three benchmark household decisions (JPFHS 2023, above the national 78.3%) — but women's asset ownership and financial access are minimal: 5.0% own a house and 2.0% own land (alone or jointly), and 11.7% hold a bank account (men: 38.0%). Compensation for land paid to title-holders will therefore almost entirely reach men, and bank-routed wages or benefits will largely bypass women unless account or e-wallet opening is supported.
- During focus group discussions conducted within Hosha Sub-District communities, women expressed a desire to participate in consultation activities and indicated interest in employment and vocational

[38] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.
[39] Department of Statistics Jordan (DoS), Statistical Yearbook of Jordan, 2025.
[40] Directorate of Local Development, Mafraq Governorate, Social, Economic and Development Status Report for Mafraq Governorate, 2025.

training opportunities arising from the Project. No significant barriers to women's participation in community dialogue sessions were reported during the consultations.

- A number of active charitable societies within Hosha Sub-District are led by or specifically serve women, including the Al-Harash Women's Society for Social Development, the Al-Hamra Society for Special Needs, and the Tafweed Charitable Society in Al-Khanasri, among others[41]. The presence of these organizations reflects an active civil society network supporting vulnerable women and families within the Sub-District.

The following indicators show published data for women's participation in education Mafraq Governorate:

Table 62: Female Participation Indicators in Mafraq Governorate

Indicator	Mafraq Governorate	National Average
Female share of academic secondary school enrollment	62.5%	53.4%
Female share of university bachelor's degree enrollment	58.8%	53.5%
Adolescent fertility rate (15–19 years, per 1,000) — 2017	61.0	27.0
Ever-married women (15–49) currently employed — JPFHS 2023	13.1%	13.6%
Married women participating in all three household decisions — JPFHS 2023	81.9%	78.3%
Women owning land, alone or jointly — JPFHS 2023	2.0%	4.6%
Women with a bank account — JPFHS 2023	11.7%	18.6%
Ever-married women experiencing any spousal violence — JPFHS 2023	12.1%	18.3%
Women using the internet in the last 12 months — JPFHS 2023	65.5%	79.3%

Note: Female economic activity, unemployment, illiteracy and household income indicators are presented under Employment and Livelihoods, Unemployment and Poverty, and Education above respectively. Gender-based violence prevalence and other gender-specific indicators are available at the Governorate level from the JPFHS 2023 and are presented in the Gender and Human Rights Risk Assessment (Annex II);. Sub-District level gender data is unavailable JPFHS 2023 women's indicators refer to ever-married women aged 15–49 and include non-Jordanian residents of the Governorate.

6.8.14 Gender and Human Rights Risk Assessment

A Project-specific Gender and Human Rights Risk Assessment (GHRRA) was undertaken in accordance with the Equator Principles (Fourth Edition) and the UN Guiding Principles on Business and Human Rights (UNGPs), benchmarking Jordanian labor legislation against the International Bill of Human Rights and the eight ILO Core Labour Standards referenced in the EP4 Guidance Note in order to identify gaps that may give rise to labor or human rights violations[42]. The assessment addresses labor and human rights risks associated with the Project workforce and directly affected rights-holders; broader environmental, resettlement and community health and safety matters are addressed in the relevant sections of this ESIA. Its key outcomes are summarized below, and the full assessment is presented in Annex II.

Jordan provides a relatively developed labor and social-protection framework, but a large informal economy, a heavy reliance on migrant and refugee labor, and uneven enforcement constrain the realization of these protections in practice. Labor inspection is concentrated in the Qualified Industrial

[41] Ministry of Interior, Mafraq Governorate, Hosha Sub-District Administrative Guide.

[42] Sama Consulting, Gender and Human Rights Risk Assessment — Mafraq CCGT (Annex II), prepared in accordance with the Equator Principles (Fourth Edition) and the EP4 Guidance Note on the Implementation of Human Rights Assessments (2020), and the UN Guiding Principles on Business and Human Rights (OHCHR, 2011). Full sourcing for the statements summarised here is provided within the assessment.

Zones and the garment sector, while construction is comparatively under-inspected, and enforcement outside these zones is oriented more toward detecting workers without valid permits than toward remedying worker grievances. This, combined with the structural dependence of workers on a single employer under the work-permit (sponsorship) system, is likely to deter at-risk workers from coming forward, and state enforcement is therefore assessed as insufficient on its own to safeguard the most exposed groups; a robust, confidential project-level grievance mechanism is consequently required. The groups most exposed on a project of this kind are migrant workers, Syrian refugees — given the Project's location in Mafraq, one of Jordan's principal refugee-hosting governorates — and women, in the context of a heavily male-dominated construction workforce.

Against this context, the assessment identifies occupational health and safety, including heat stress during Mafraq's summer, as the most significant risk (rated high). A cluster of further risks is rated medium, comprising forced labor and human trafficking linked to recruitment debt; barriers to accessing remedy; non-payment, underpayment or delay of wages; excessive working hours; gaps in social protection where workers are engaged informally or outside Social Security coverage; gender-based violence and harassment (GBVH) and barriers to women's safe participation; and risks specific to migrant workers, Syrian refugees, and to discrimination in recruitment, pay and progression. Child labor and constraints on freedom of association are rated lower but are also addressed. Notable gaps between Jordanian law and international benchmarks include the non-ratification of the ILO Conventions on freedom of association (C87), occupational safety and health (C155) and violence and harassment (C190), the absence of a comprehensive non-discrimination clause, and a maternity-leave entitlement (90 days) that remains marginally below the ILO Convention C183 benchmark.

The assessment sets out a corresponding suite of mitigation measures applying to the EPC Contractor, the Project Operator and any subcontractor or labor supplier, to be embedded in the Project's labor and management plans and contractual requirements. Priority measures include applying the "Employer Pays" principle, under which no recruitment fees are charged to workers; engaging all workers — including migrant workers and Syrian refugees — only under valid work permits and written contracts, with workers retaining their own identity documents; paying at least the national minimum wage on time and in full by traceable means, with equal pay for work of equal value; capping working hours and paying statutory overtime; registering eligible workers with the Social Security Corporation; implementing a project- and site-specific occupational health and safety plan with heat-stress controls; adopting a Worker Code of Conduct and a GBVH-specific procedure with trained grievance focal points and appropriate facilities for women; prohibiting the employment of anyone under 18 (a threshold more protective than the national minimum age of 16); and conducting recruitment, pay and promotion on the basis of competency, open to all regardless of sex, nationality, refugee status or disability. Underpinning these measures is a confidential, non-retaliatory worker grievance mechanism, explained at induction in languages understood by the workforce and usable by migrant and refugee workers without risk to their employment or permit.

6.8.15 Previous Community Experiences

As part of the consultation and engagement process undertaken, information was collected on community experiences within the area in relation to existing industrial developments. During the scoping focus group discussions conducted in May 2026, community members referenced an existing gas station facility in the area in the context of past negative experiences with industrial development. Participants indicated that the development of this facility proceeded without any community consultation being undertaken, which

is considered a concern as it has contributed to a prevailing sense of exclusion among local residents in relation to industrial development in the area.

Community members further indicated that employment opportunities arising from the facility were not made accessible to local residents at the outset, with the workforce sourced primarily from outside the area. Local employment was only partially allocated following sustained community pressure, and administrative and managerial positions continued to be filled by workers from outside the Sub-District despite the availability of qualified local candidates. This experience has directly shaped local community expectations and concerns in relation to the CCGT Project, particularly with respect to local employment, procurement, and transparency of community engagement.

Socio-economic challenges	Based on consultations with the local communities it was indicated that one of the key socio-economic challenges is unemployment and poverty. This can be attributed to the following: ▪ General difficult economic conditions in the Kingdom as a whole along with a reduction in the purchasing power due to inflation throughout the years which has been reflected on the actual expenditure; ▪ Local communities mainly work in the public sector which are considered low-income professions; ▪ The lack of governmental and private sector investment projects that can employ labor and thus positively impact unemployment and poverty levels; ▪ Most of the investment and development projects/programs that were targeted for the Mafraq Governorate do not employ local community members; and ▪ The increase in graduate numbers against the backdrop of employment opportunities in the area.

6.8.16 Vulnerable Groups

A key stakeholder group to which particular attention must be considered during identification are vulnerable groups. Those are groups that due to their socio-economic characteristics may experience impacts more severely and/or disproportionally compared to the rest of the of the community members.

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

The key vulnerable groups within the context of the Project and their relevance are summarized in the table below.

Table 63: List of Vulnerable Groups and Their Relevance

Group	Relevance	Description
Women groups	Could be considered vulnerable as cultural norms could limit their participation in the decision-making process in general that is related to the Project.	Women representatives were engaged as part of the scoping process.
		Women representative will be engaged as part of the disclosure process.
		Stakeholder engagement strategy and plan within the Stakeholder Engagement Plan (SEP) targets women groups.

Disabled groups	Could be considered vulnerable groups mainly due to physical disability which could limit their access to information on the Project as well as participation in the decision-making process in general that is related to the Project.	Representatives of disabled groups will be engaged as part of the disclosure process. Practical logistical support will be provided to assist disabled participants or their representatives to enable them to attend the disclosure process.
		Stakeholder engagement strategy and plan within the Stakeholder Engagement Plan (SEP) targets disabled group representatives. SEP will emphasize on venue accessibility as applicable.
The Aged	Could be considered vulnerable by limitations of access to participate in the Project related community decision-making process.	Practical logistical support will be provided to assist aged participants or their representatives to enable them to attend the disclosure process.
		Stakeholder engagement strategy and plan within the Stakeholder Engagement Plan (SEP) targets the elder representatives.
The Youth	Could be considered vulnerable due to their young adult, unmarried, non-asset owning status, yet likely to be savvier in 21st century technology than their elders, but may be unable to contribute in Project related community decision-making process, which will affect their generation more than most.	Youth representatives will be engaged as part of the disclosure process.
		Stakeholder engagement strategy and plan within the Stakeholder Engagement Plan (SEP) targets youth groups.
Language	Specific groups within local communities might have difference languages. This could limit their access to information on the Project as well as participation in the decision-making process in general that is related to the Project.	All consultation and engagement activities undertaken as part of the ESIA or to be identified within the SEP (including materials and presentations) were/are undertaken in accordance with the key languages of the local communities (i.e. Arabic language).
Female headed households or households headed by an elderly or household with adults that have no capability to work	Could be considered vulnerable by limitations of access to participate in the Project related community decision-making process.	Stakeholder engagement strategy and plan within the Stakeholder Engagement Plan (SEP) targets such groups in particular.
Syrian refugees	Not applicable. Refer to section above.	Not applicable. Refer to section above.
Nomadic groups	Mainly relevant within the associated facilities. Could be considered vulnerable due to limitations of access to participate in the Project related issues or grievances due their nomadic nature.	Women representatives were engaged as part of the scoping process.
		Women representative will be engaged as part of the disclosure process.
		Stakeholder engagement strategy and plan within the Stakeholder Engagement Plan (SEP) targets women groups.

6.8.17 Summary of Overall Outcomes

Based on the above, the following is concluded:

- One of the key socio-economic challenges is unemployment and poverty. This can be attributed to the following:
  - General difficult economic conditions in the Kingdom as a whole along with a reduction in the purchasing power due to inflation throughout the years which has been reflected on the actual expenditure;
  - Local communities mainly work in the public sector which are considered low-income professions;
  - The lack of governmental and private sector investment projects that can employ labor and thus positively impact unemployment and poverty levels;
  - Most of the investment and development projects/programs that were targeted for the Mafraq Governorate do not employ local community members; and
  - The increase in graduate numbers against the backdrop of employment opportunities in the area.
- The social structure within the local communities is mainly Jordanian tribal affiliations. Although there are Syrians within one community only, those are integrated within the local community, and there are no significant concerns regarding discrimination or social tensions.
- There are no IPs within the Project Area of Influence
- There are no major health (e.g. hospitals) or civil defense services within the local communities but there are health centers. Local communities rely on services from major cities such as Mafraq or Irbid.
- Female economic participation is low despite notable educational attainment among females. During focus group discussions conducted, women expressed a desire to participate.

6.9 Infrastructure and Utilities

This section provides an assessment of baseline conditions within the Project site and surroundings in relation to infrastructure and utilities.

6.9.1 Assessment of Baseline Conditions

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

The assessment of baseline conditions was based on the following:

- Site visit that aimed to identify any visible infrastructure and utility elements within the Project site and associated facilities; and
- Stakeholder consultations with relevant infrastructure and utility providers were undertaken. As discussed previously under "Chapter 7.3". The objective of the consultation was to verify the availability and capacity of existing services, identify planned infrastructure developments, and determine any constraints, requirements, or considerations relevant to the Project.

6.9.2 Water Resources and Water Assessment

The water sector in Jordan is generally governed by the Ministry of Water and Irrigation (MWI) and the Water Authority of Jordan (WAJ). MWI is the official body responsible for the overall monitoring of the water sector, water supply and wastewater system, and the formulation of national water strategies and policies. WAJ assumes all responsibilities related to water and wastewater structures including design, construction, operation, maintenance and administration. Within Mafraq Governorate (and entire north of Jordan), Yarmouk Water Company (YWC) is the responsible entity representing WAJ. The governorate is connected to the regional northern water supply system, including the Za'tary Water System, which transfers water from Zarqa and Mafraq Governorates to the entire north of Jordan.

Information was collected on the water resources and supply in the area. According to the "Strategic Master Plan for Municipal Water Infrastructure" (ISSP, 2015), water supply and resources within Mafraq Governorate is divided into four main systems:

- Mafraq Main Water System: is the main water system that covers 83 localities in Qasabit Mafraq District, Badia Al-Shamaliyeh District, and Badia Al-Shamaliyeh Gharbiyah District.
- North Badia Water System: is a small water system which covers the localities in the Badia Al-Shamaliyeh District not covered by the Mafraq Main Water System or Khaldia Water System (discussed below)
- Rwaished Water System: is a small water system that covers three small localities in the Rwaished district.
- Khaldia Water System: is a small water system which covers five localities in the Badia Al-Shamaliyeh District which are not covered in the North Badia Water System or Mafraq Main Water System.

The Project site is located in Al Khanasri, within Al Badiyyah Al Shamaliyah Al Gharbiyah District of Mafraq Governorate. This district falls within the service area of the Mafraq Main Water System. The System

provides a net annual water supply of approximately 17.3 Million Cubic Meters (MCM) and serves an estimated population of 342,835 people. This corresponds to an average water supply of approximately 138 liters per capita per day.

There are two (2) general components to the Mafraq main water system. First, there is direct pumping into the network from the Zaniyyeh and Jaber well fields. These supplies are supplemented by water from scattered local wells. Water is also imported into the Mafraq main system from the Qunaya Reservoir, which is located in the Zarqa governorate. The Qunaya Reservoir receives water from the Qunaya well, which is located in Mafraq. The second component of the system is anchored by the Za'atary reservoir, which encompasses three tanks with a total capacity of 10,000 m3. Water from the Corridor, Aqeb, and Za'atary well fields pump into the Za'atary reservoir. The Za'atary Reservoir pumps to Mafraq distribution systems, the Sumaya Reservoir, and Umm Al Lulu Reservoir. Water is pumped from the Za'atary reservoir to distribution reservoirs in the Mafraq city system through a 500 mm transmission line and there are two smaller 100mm transmission lines that deliver water from the Za'atary reservoir to smaller communities outside of Mafraq city. Water is also pumped through a 500mm pipeline from the Za'atary Reservoir to the Sumaya Reservoir, which has a capacity of $500m^3$. The Sumaya Reservoir is also supplied by the Sumaya well field, private wells, and from the Jaber well field. Water is transmitted from the Sumaya Reservoir to the Mafraq distribution network.

Water from the Za'atary reservoir is also pumped to the Umm Al Lulu reservoir, which has a capacity of 550 m3, through a 900 mm pipe. Water from Umm Al Lulu reservoir is conveyed to the Ramtha Bwaidhah water system in Irbid and to the Bwaidah Reservoir, which has a capacity of $550m^3$, in Mafraq. The Bwaidah Reservoir exports water to the Jarash water system and transmits supplies to the Mafraq distribution system. Other export lines from the Mafraq main system include the five transmission lines from the Aqeb well field to the North Badia water system. A 700mm sub-transmission line from the Za'atary-Umm Al Lulu transmission line also exports water to the Hofa Reservoir in the Irbid main water system and to the Ramtha water system.

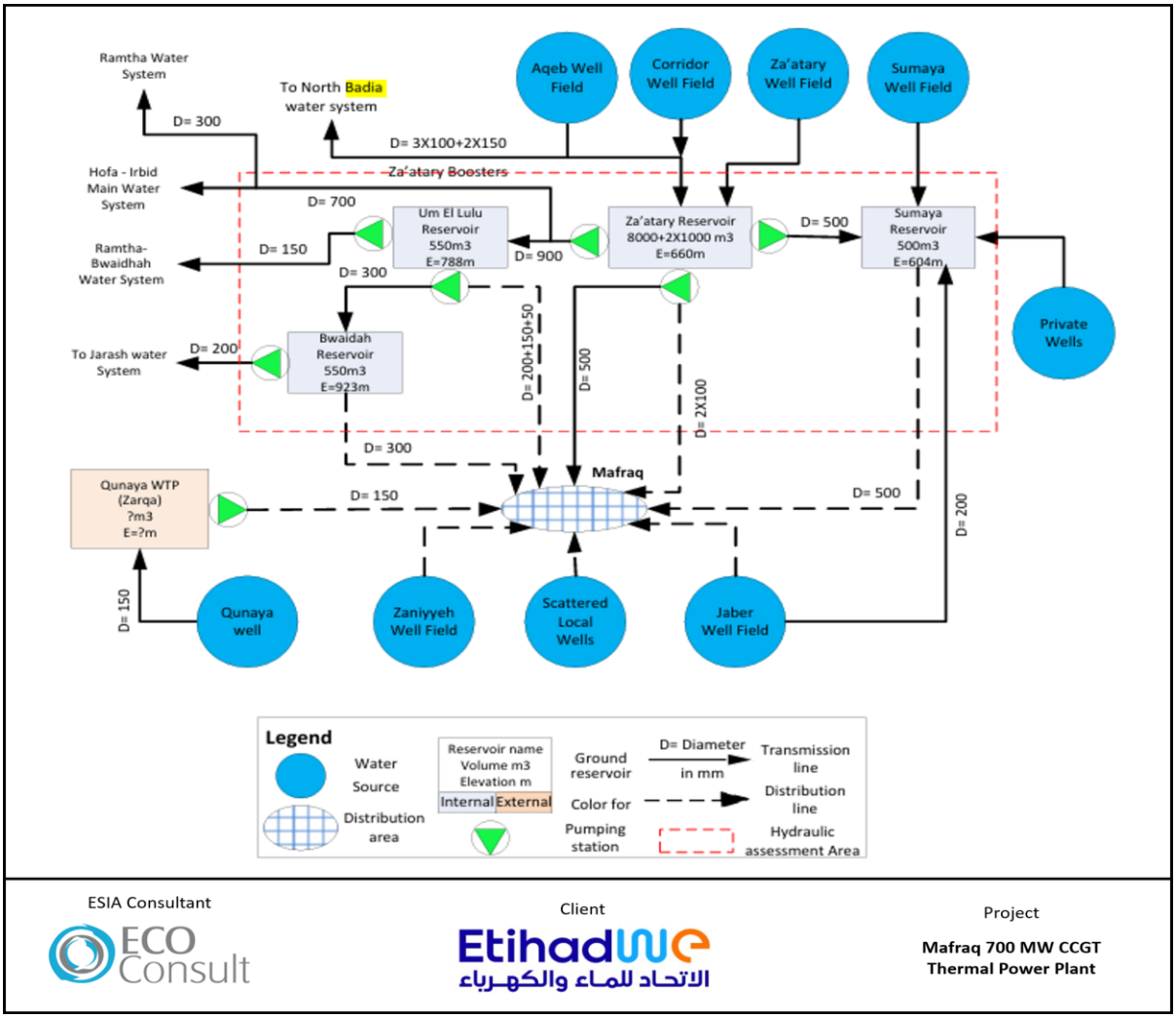
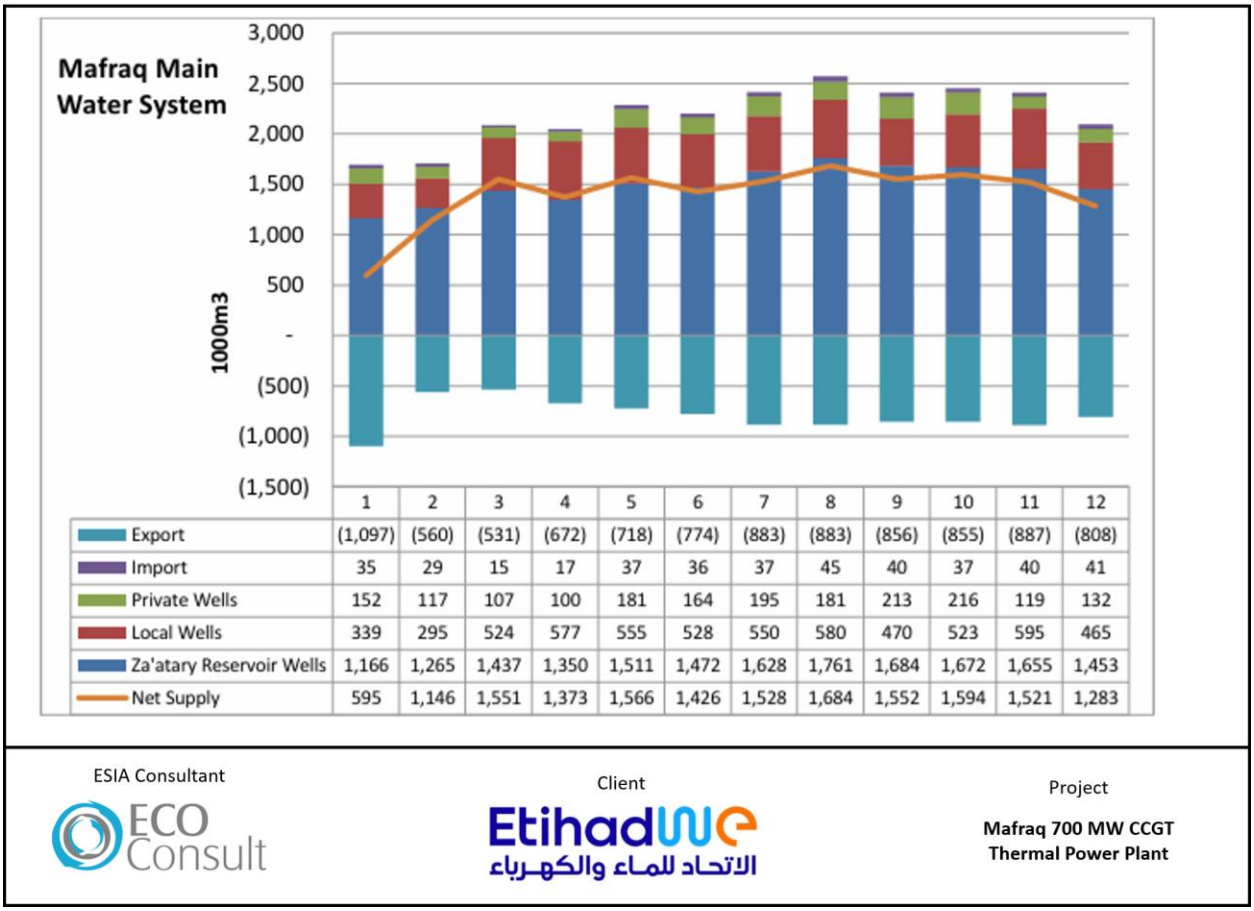


Figure 86: Schematic of the Mafraq Main Water System

The figure below indicates that the net water supply to the Mafraq Main Water System remained relatively stable throughout the years, with the highest supply recorded in August. Water supplied through the Za'atari Reservoir, including production from the Corridor, Aqeb, Za'atari and Sumaya well fields, increased progressively from relatively low levels during the first quarter to a peak in August. Production from the Zaniyyeh and Jaber well fields, together with the scattered local wells, also generally increased over the course of the year, reaching its highest level in November.

Water imports from Zarqa remained relatively consistent throughout the year. Exports to the North Badia Water System and Jerash were also generally stable, while exports to Irbid declined substantially in February and March before increasing again during the spring and summer months. However, these export volumes remained below the level recorded in January.



	1	2	3	4	5	6	7	8	9	10	11	12
Export	(1,097)	(560)	(531)	(672)	(718)	(774)	(883)	(883)	(856)	(855)	(887)	(808)
Import	35	29	15	17	37	36	37	45	40	37	40	41
Private Wells	152	117	107	100	181	164	195	181	213	216	119	132
Local Wells	339	295	524	577	555	528	550	580	470	523	595	465
Za'atary Reservoir Wells	1,166	1,265	1,437	1,350	1,511	1,472	1,628	1,761	1,684	1,672	1,655	1,453
Net Supply	595	1,146	1,551	1,373	1,566	1,426	1,528	1,684	1,552	1,594	1,521	1,283

Figure 87:Monthly Water Supply to Mafraq Main Water System

The total length the pipe network in the Mafraq Main Water System 1,773 km. The network runs close to the Project site as it is located around 140m north of the Project site. The figure below presents the location of the Project site in relation to the water network.

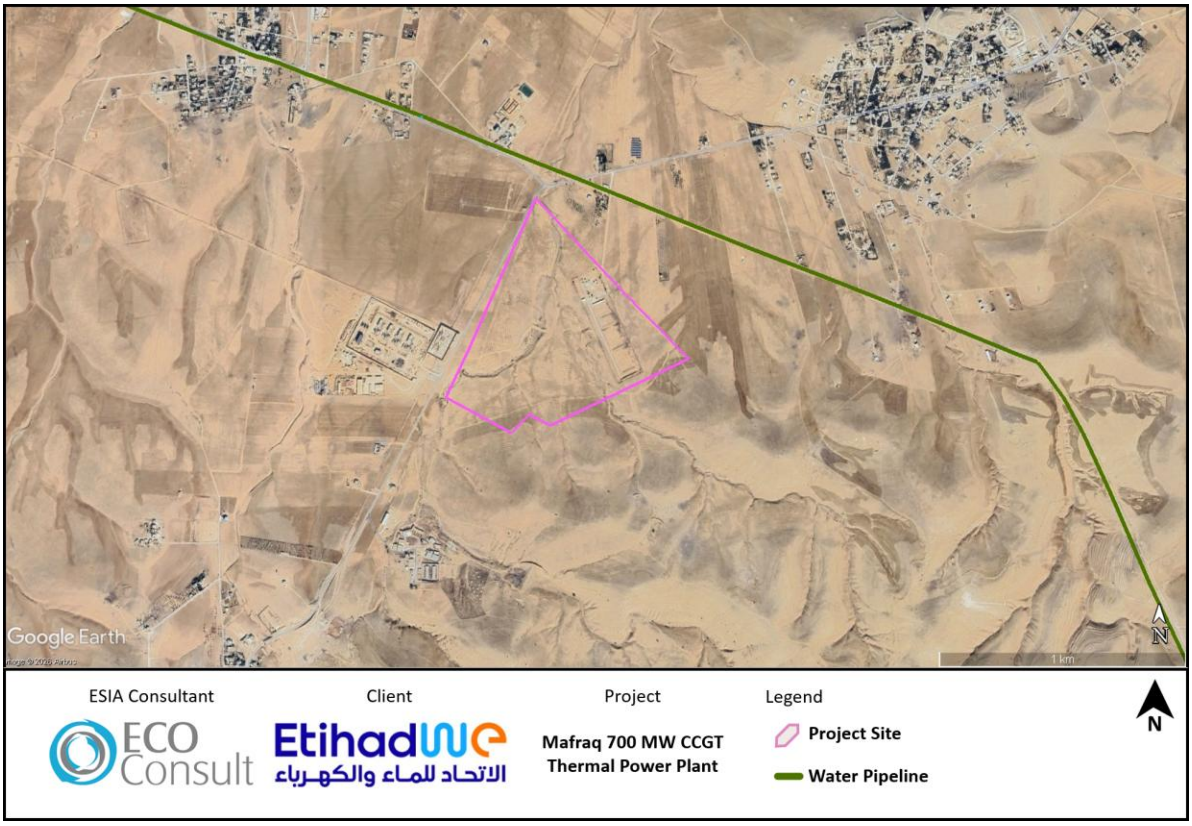


Figure 88: Location of Water Network in relation to the Project Site

Based on the above information, consultations with the WAJ representative which indicated the following:

- Za'atary reservoir has a total production capacity of approximately 70,000 m³ per day, equivalent to around 490,000 m³ per week.
- Apart from the users it supplies (as discussed above), it also supplies the Za'atari Refugee Camp through a dedicated pipeline, with the volume allocated to the camp estimated at approximately 500–700 m³ per week, representing around 0.10–0.14% of the system's total weekly production and is therefore considered negligible in relation to the system's overall capacity.
- More generally, most water demand in northern Jordan is met through the public water network; however, where network supplies are insufficient, residents may rely on water tankers to cover the shortfall.

More broadly, northern Jordan has experienced substantial pressure on water resources due to population growth and the influx of Syrian refugees, which has increased water demand, strained existing infrastructure, and intensified pressure on groundwater resources. Groundwater remains the principal source of potable water, yet over-abstraction and contamination risks pose significant challenges to sustainable resource management. Studies undertaken in northern Jordan indicate that aging infrastructure, limited wastewater collection systems, and reliance on septic tanks have contributed to groundwater vulnerability, while non-revenue water levels in the region remain high. These factors highlight the importance of integrated water resources and wastewater management approaches to protect groundwater quality and ensure the long-term sustainability of water supplies across northern governorates, including Mafraq.

In addition, as noted within "Chapter 1.1" earlier, a Water Supply Agreement (WSA) has been signed between the Developer, WAJ, and YWC for supplying the Project with its water requirements during operation.

Under the WSA, it was agreed that approximately 600 m³/day of water will be supplied to the Project for a period of 25 years. The water supply arrangements are understood to have been assessed and agreed on the basis that the Project's water requirements can be met without affecting water availability for local communities or existing users in the area.

To verify the above further, consultations were undertaken with YWC. The outcomes of such consultations indicated the following:

- Supply will be through a dedicated pipeline that will run within the Right of Way (RoW) of the existing pipeline presented in the figure above.
- The area in general has excess water during winter and deficit supply during summer. The Project's water requirements can be managed for the short-term (until 2030 when the Aqaba-Amman Water Desalination and Conveyance Project (AAWDCP) is completed). To manage this and other factors (e.g. population increase), it is likely that YWC will have to drill additional wells.
- For long-term management of water supply, YWC indicated that this is something that needs to be discussed with MWI/WAJ based on the AAWDC.
- Main supply for water in the area is from the Za'atary reservoir.
- NRW in the area is around 70%

Based on the above, additional consultations were undertaken with WAJ / PMU AAWDCP Technical Director. The consultations indicated the following:

- The AAWDCP is expected to begin pumping water in 2030. The project will provide nearly 40% of the Kingdom's drinking water needs. The annual supply of 300 MCM is nearly equivalent to the total storage capacity of all dams in Jordan and is approximately three times the output of the existing Disi project.
- The objective of the project is to meet the increasing water demand across all sectors and support the sustainable development of Jordan. This includes meeting household water needs as well as facilitating growth in infrastructure, tourism, industry, and other key sectors.
- The AAWDCP is expected to provide sufficient water supply to meet projected population growth and development needs within the Kingdom by 2040. Although a water deficit is anticipated beyond 2040, long-term planning is already underway to address this challenge. Potential options may include increasing the capacity of the AAWDCP and implementing additional water resource development measures.

6.9.3 Solid Waste Facilities

In Jordan, solid waste management is undertaken primarily by the public sector. Solid waste is managed through the operation of landfills (or dumpsites). In accordance with the "Municipalities Law Mo.13 of 2007", solid waste management is the responsibility of local municipalities under the umbrella of the

Ministry of Municipal Affairs (MoMA) and specifically under Joint Services Council (JSC) – this includes the collection of municipal solid waste, transportation, and final disposal to landfills.

Within Jordan, MoMA and municipalities have licensed and approved dumpsites as well as landfills for solid waste disposal. Within Jordan, there are only two (2) proper landfills that meet international standards – Al Ghabawi and El Ekaider landfill.

A landfill that meets international sanitary standards typically includes the following all of which are currently within El Ekaider landfill as discussed in further detail below.

- Engineered liner systems
- Leachate collection and treatment
- Landfill gas collection and management
- Controlled waste placement and daily cover
- Groundwater monitoring

The closest authorized landfill or dumpsite in relation to the Project site is El Ekaider Landfill as shown in F below. El Ekaider is the second largest MSW dumpsite of Jordan (after Al Ghabawi Landfill). The landfill started operating in 1981 and received around 80,000 tons per year. It occupies an area of 908 dunums (0,908 km^2) and is operated and managed by the Joint Service Council (JSC) of Irbid.

The landfill accepts and manages solid waste from residential, commercial, industrial, institutional, and agricultural generators, as well as sludge from wastewater treatment plants, industrial wastewater, and *zibar* (wastewater from olive-oil mills).

In 2015 and subsequently in 2017, the Government of Jordan endorsed its “National Municipal Solid Waste Management Strategy” and the “Regional Municipal Solid Waste Management of the Northern Region of Jordan”, respectively, which identified the upgrading of the Al Ekaider landfill as the top priority in the sector and specified measures to be taken in the short, mid and long-term.

In line with the Strategy and planning, and leveraging grants allocated by international donors, the following interventions were designed, constructed and operated in order to urgently address the needs for waste disposal, upgrading the operations and adopt sanitary landfill practices:

This included the following in particular:

- The development program includes construction of a new sanitary landfill, a leachate control system, rehabilitation of old disposal areas, remediation of leachate ponds, and upgrading facilities to operate in line with international standards and best available techniques.
- Objective is to deliver infrastructure required to operate the landfill in an environmentally sound manner consistent with international standards.

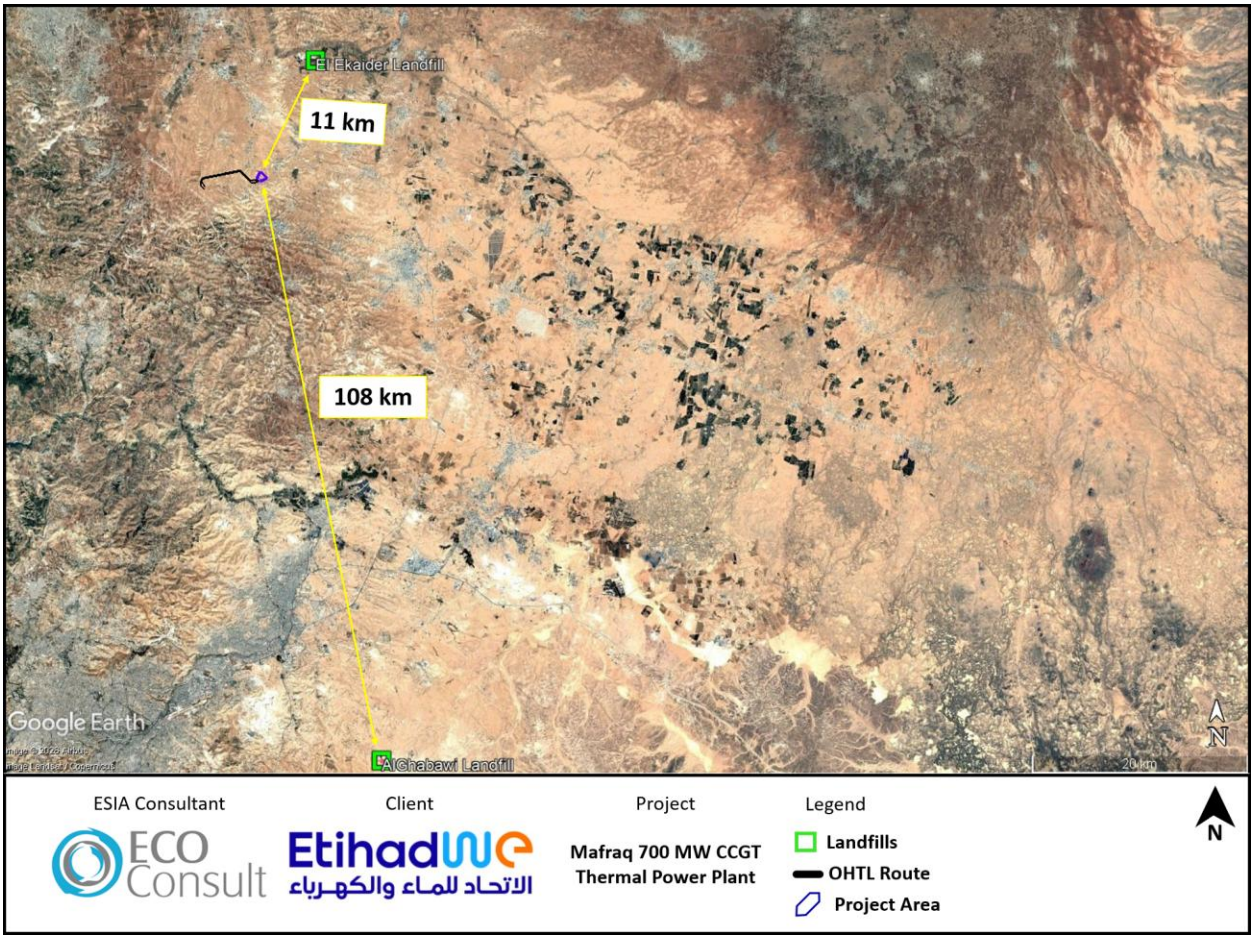


Figure 89: Landfills in Relation to the Project Site.

6.9.4 Hazardous Waste Facilities

In accordance with the "Environmental Protection Law No. (6) of the year 2017" and the "Instruction for Management and Handling of Hazardous Waste of 2003", hazardous waste must be transported and disposed at landfills which are approved by the MoEnv.

In Jordan, there is currently one official and designated landfill for disposal of hazardous waste as approved by the MoEnv – the Swaqa Hazardous Waste Treatment Facility. The facility is operated and managed by the MoEnv. The facility is located in Al-Karak Governorate, around 70 km south of the capital city of Amman and approximately 270km south of the Project site. The figure below presents the location of Swaqa Hazardous Waste Treatment Facility in relation to the Project site.

According to discussion with the ''Hazardous Substances and Waste Management Directorate" of the MoEnv, the facility is located on an area of around 8.5 km2 and receives around 8-10 tons per day of hazardous waste. Currently disposal of hazardous waste is undertaken through either landfilling of stabilized and inert hazardous waste in specially lined cells, while for other types of waste which require physical-chemical treatment or incineration they are stored in safe storage spaces (this includes for example electronic waste, chemical waste, batteries, etc.). Such storage spaces are temporarily until the second phase of the facility construction is implemented. The second phase mainly involves physical-chemical treatment and incineration facilities as well as recycling facilities for electronic waste, all of which

aim to improve handling and management of hazardous waste. Currently, there are no additional plans by the MoEnv for hazardous waste management in Jordan.



Figure 90: Hazardous Waste Treatment Plant in Relation to the Project Site

6.9.5 *Wastewater Facilities*

The same entities that govern the water sector are responsible for the wastewater as well. MWI is the official body responsible for the overall monitoring of the water sector, water supply and wastewater system, and the formulation of national water strategies and policies. WAJ assumes all responsibilities related to wastewater structures and within Mafraq District, YWC is the responsible entity representing WAJ.

The figure shows the Project site in relation to the three (3) nearest wastewater treatment plants (WWTPs) which are:

- Wadi Hassan WWTP: located approximately 9 km west of the Project site. The facility serves several communities south of Irbid and has a design treatment capacity of approximately 1,600 m³/day.
- Al-Ekader WWTP: located approximately 11 km north of the Project site. The facility receives tanker-delivered wastewater from several northern governorates, including Mafraq, Irbid, Jerash, and Ajloun, and has a design treatment capacity of approximately 4,000 m³/day.

- Mafraq WWTP: located approximately 14 km east of the Project site. The facility serves Mafraq City and has a treatment capacity of approximately 6,550 m³/day following its upgrade in 2016.

These facilities represent the nearest wastewater treatment infrastructure to the Project site and may be considered as potential receiving facilities for wastewater generated during Project construction and operation.

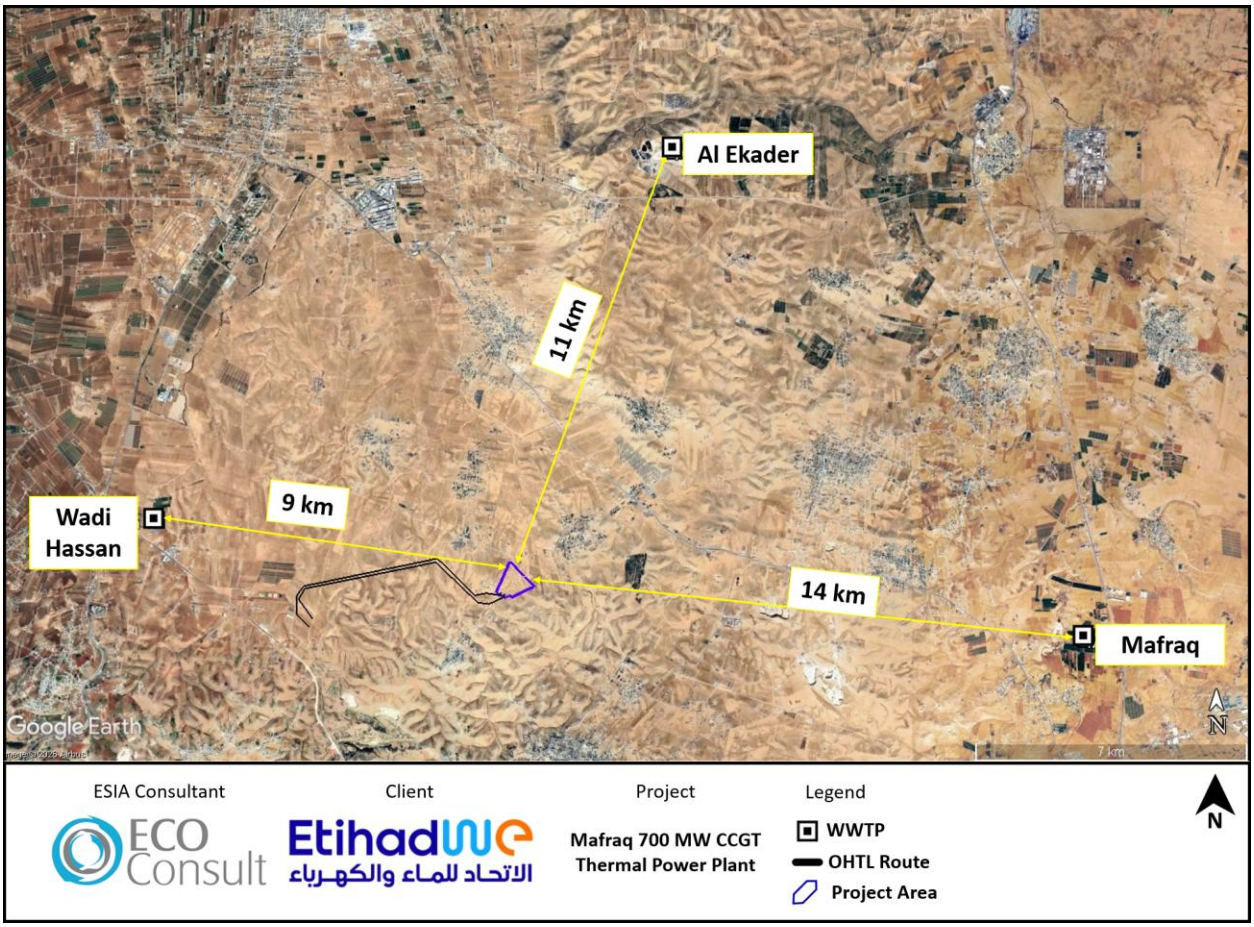


Figure 91: Nearest WWTPs in Relation to the Project Site

However, as discussed with "Chapter 5.3" earlier, the Project will incorporate wastewater handling facilities designed to achieve a Zero Liquid Discharge (ZLD) objective, ensuring that no process wastewater is discharged beyond the plant boundary. All wastewater streams generated during operation will be collected, treated, and either reused within the plant processes or directed to an evaporation pond for final disposal through natural evaporation. The wastewater management system will include a Wastewater Treatment Plant (WWTP), designed to treat wastewater to meet applicable national regulatory requirements and lender standards. Oily water and process drainage will be collected and routed through an oil-water separator prior to transfer to the evaporation pond. The evaporation pond will be designed to manage treated wastewater streams that cannot be recycled or reused within the process, allowing water to evaporate naturally through exposure to ambient temperatures and solar radiation. To protect groundwater resources, the pond will be fully lined with an appropriate impermeable lining system, and its final specifications and storage capacity will be confirmed during the detailed design stage.

Sludge from the evaporation ponds will be disposed at Al Ekaider landfill which is designated to accept sludge waste for final disposal.

Therefore, the WWTPs identified above will be used for non-process water. This will include sewage water from sanitary facilities.

6.9.6 Electricity Infrastructure

The figure below shows the existing and planned electricity infrastructure within and around the Project site. Several 132 kV OHTLs are located in the surrounding area. In addition, a 400 kV OHTL passes in the vicinity of the Project site. The figure also shows a planned substation and associated OHTL proposed in the area. Further details of the planned infrastructure are presented in the following figure.

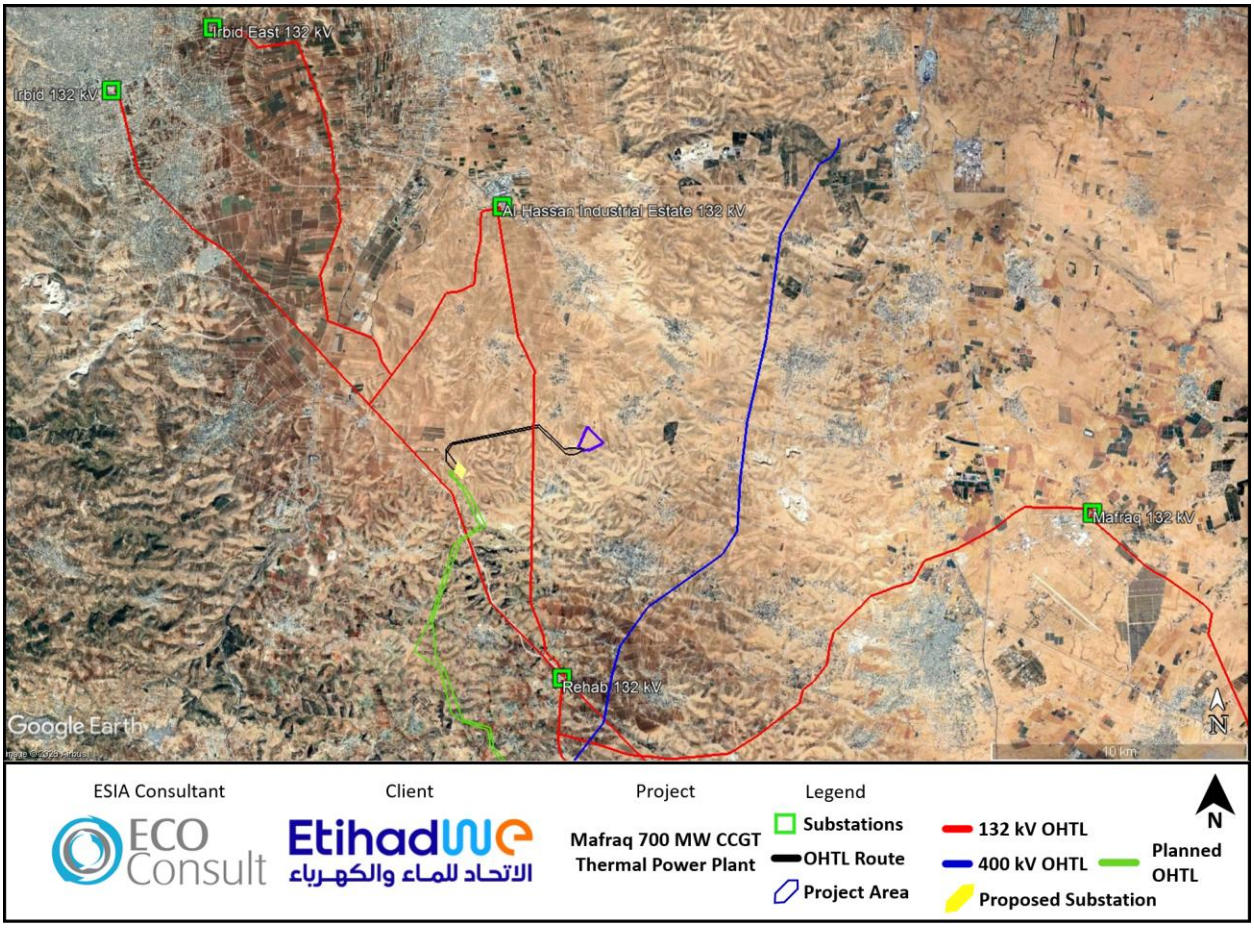


Figure 92: Electricity Infrastructure within the Vicinity of the Project Site

6.9.7 Railway

Based on land ownership details included within “Chapter 6.7” it was indicated that a future railway is planned within the Project area.

The ‘E&S Team’ established formal communication with Jordan Hijaz Railway (formal governmental authority responsible for all railways in Jordan). The Jordan Hijaz Railway indicated that communication must occur with the Ministry of Transport on this issue.

The 'E&S Team' therefore established formal communication with the Ministry of Transport. The Ministry provided in a formal letter the railway route and required a 100m buffer to be respected from the railway and Project components to maintain operational safety requirements for the planned railway project.

The figure below presents the Project site and the planned railway along with the 100m buffer. The following is noted:

- The Project site itself is not located within the 100m buffer required. Therefore, there are no further requirements to be considered for the Developer.
- The laydown area is located within the 100m buffer. However, given that the temporary area will only be used during the construction period from October 2026 to December 2028 the railway timeline is not scheduled to start before the Project construction, the Ministry indicated there are no additional requirements are to be considered.
- The NEPCO substation areas and OHTL route both are within the 100m buffer. Therefore, it is recommended that NEPCO undertake further discussions with MoT to determine if this is acceptable and whether there are any additional requirements or measures to be considered whether as part of the detailed design or construction phase.

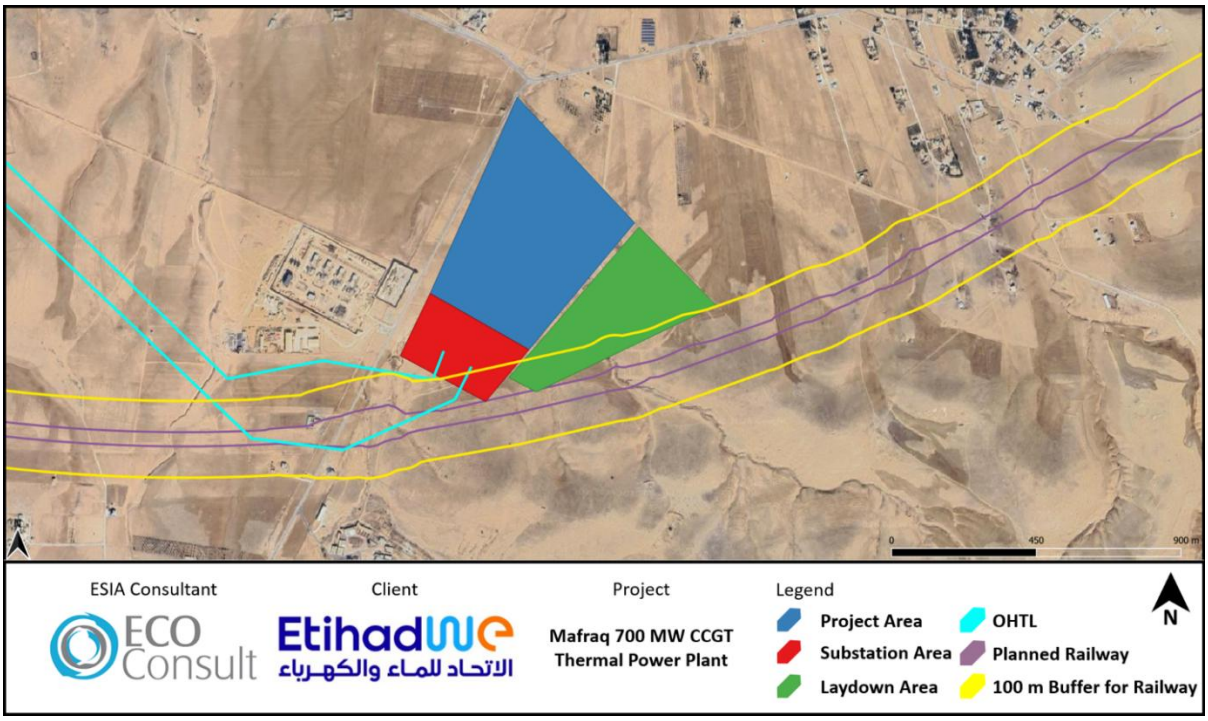


Figure 93: Planned Railway in Relation to the Project Site

6.9.8 Telecommunication

A telecommunication tower was observed during the 'E&S Team's' site visits as shown in the figures below.

Table 64: Land Use Points Identified

Point	Description
1	Telecommunication Tower

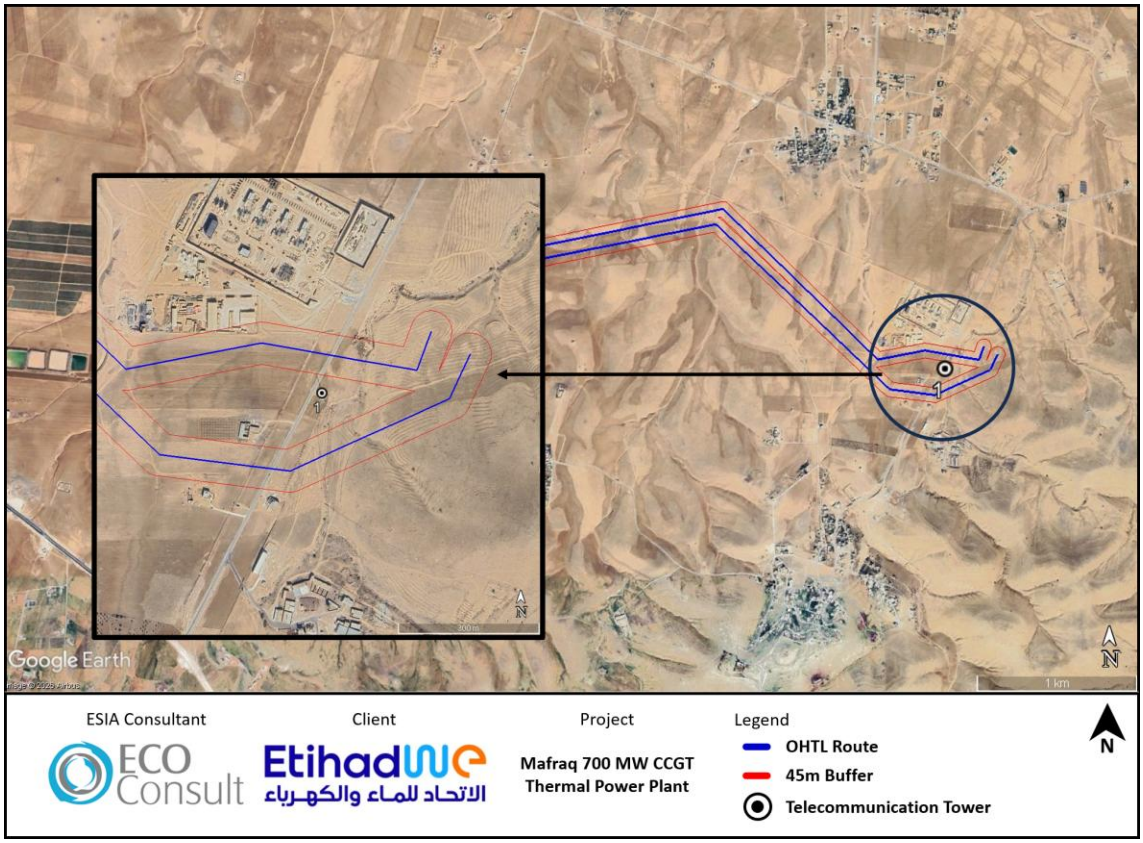


Figure 94: Telecommunication Tower Outside the OHTL 45m Buffer Area



Figure 95: Telecommunication Tower Observed

6.9.9 Traffic and Transport

6.9.9.1 Administrative Setup

The Ministry of Public Works and Housing (MPWH), operating under the "Regulation of Organization and Management of the MPWH No. 55 of 1996", is the governmental authority responsible for the construction and development of the public road network in Jordan. The Ministry is also responsible for connecting cities, villages, and communities together in addition to maintaining the network in good technical conditions. Within the Mafraq Governorate, the Mafraq Public Works Directorate assumes the responsibility of the MPWH.

In relation to road safety and security (including traffic accident management), this is managed through the Traffic Police, under the Public Security Directorate (PSD) which is under the Ministry of Interior.

6.9.9.2 General Conditions

The site is well accessible and is connected by major roadways to the national highway. The surrounding network comprises a combination of arterial, collector, and local streets that facilitate access to and from the site, connecting the development to key urban, commercial, and tourism destinations within Irbid and Mafraq cities in particular.

The road network in Mafraq is of low – moderate density, and few roads exist in the vicinity of the Project's area. This is mainly due to the fact that the Project's area is currently not widely inhabited and is mainly rural residential area. The figure below shows the main roads surrounding the Project.



Figure 96: Main Roads Surrounding the Project

The followings are descriptions of the four main roads located in the study area as defined in "Chapter 3.3.1" and its relevance to the Project. Together, these four roads create an integrated transportation network that supports both regional and local mobility within the study area. Highways 35 and 25 accommodate higher traffic volumes and longer-distance travel, while the Khanasri and Buraiqa local roads provide essential access to residential communities.

Highway 35

Highway 35 is one of the primary transportation corridors within the study area and plays a significant role in supporting regional traffic movement. The highway consists of three lanes in each direction separated by a median barrier, with a posted speed limit of 80 km/hr. It mainly serves north–south traffic flow and provides high-capacity connectivity between different parts of the region. In addition, the highway intersects with several highways and collector roads and includes multiple exit ramps that provide access to surrounding residential, commercial, and educational areas.



Figure 97: Sections of Highway 35

Highway 25

Highway 25 is another major roadway that supports west–east traffic movement within the study area. The highway consists of two lanes in each direction with a median separator and has a posted speed limit of 70 km/hr. Highway 25 connects several local and collector roads and serves as an important access route to nearby districts and developments. The presence of multiple exit ramps enhances accessibility and contributes to the efficient distribution of traffic throughout the surrounding areas.

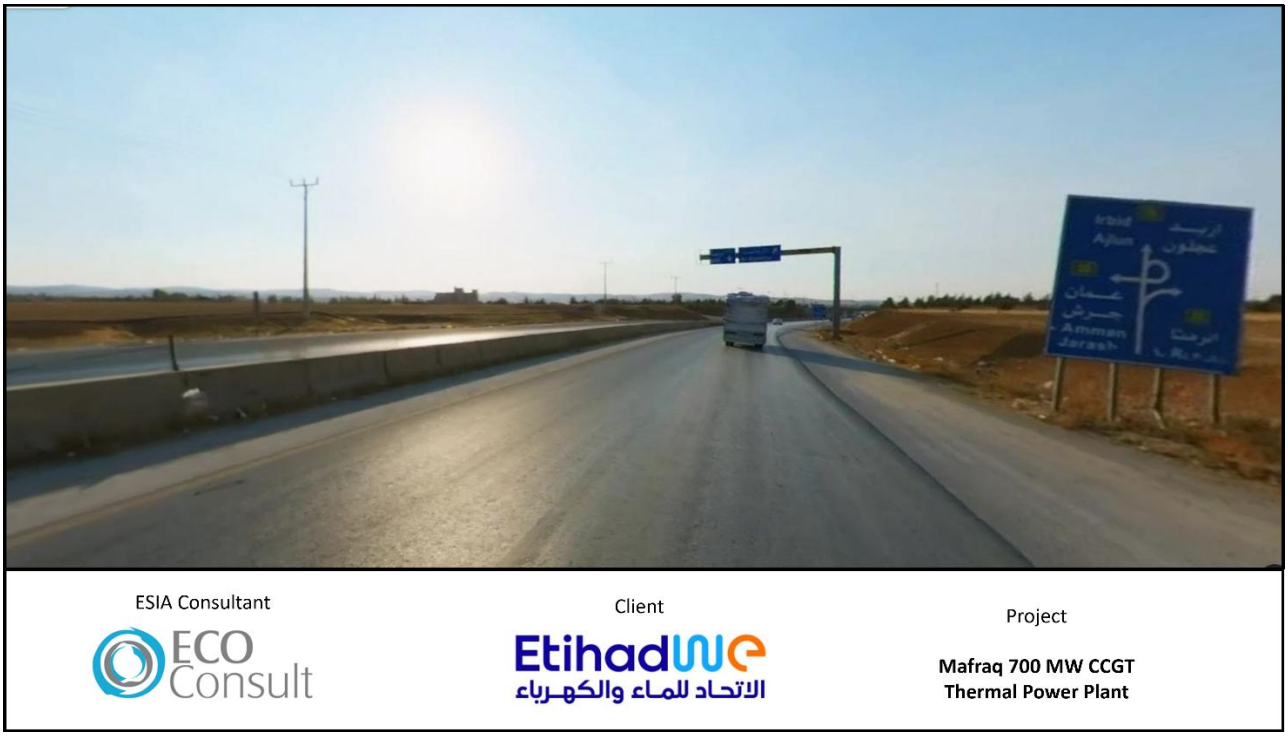


Figure 98: Sections of Highway 25

Khanasri and Buraiqa Local Road

Khanasri Local Road and Buraiqa Local Road are local roads that mainly serve residential neighborhoods within the study area. Each road consists of one lane in each direction without a median separator and operates at lower posted speed limits ranging from 40 to 50 km/hr. These roads are designed to accommodate low traffic volumes and provide direct access to the residential districts including the local communities identified earlier. Their function is primarily local circulation rather than regional traffic movement. The figure below shows a section of Buraiqa local road.



Figure 99: Sections of Buraiqa Local Road

6.9.9.3 Intersections within the Study Area

There are three main intersections within the study area. The figure below illustrates the locations of these intersections.



Figure 100: Location of intersections within the study area

The following provides a description of the main intersections located within the study area.

<u>INT #1: Highway 35 and Highway 25 Interchange</u>

Highway 35 and Highway 25 Interchange is the primary grade-separated interchange within the study area and represents a major connection point between the north–south and west–east traffic corridors. The interchange is designed as a full cloverleaf configuration, allowing continuous traffic movement between Highway 35 and Highway 25 through a series of loop ramps and directional connections. This design minimizes traffic conflicts and reduces delays by eliminating direct crossing movements. Due to its strategic importance, the interchange accommodates high traffic volumes and provides efficient regional connectivity to surrounding highways, collector roads, and nearby developments. The figure below illustrates traffic movements and the location of the INT #1.



Figure 101: Highway 35 and Highway 25 Interchange

INT. #2: Highway 35 and Buraiqa Intersection

Highway 35 and Buraiqa Intersection is a signalized at-grade intersection that facilitates traffic movement between the major highway corridor and the local Buraiqa Road. The intersection is controlled by traffic signals to manage vehicle movements safely and efficiently, particularly during peak traffic periods. Highway 35 carries relatively high traffic volumes at higher operating speeds, while Buraiqa Road serves local residential traffic with lower volumes. The signalized control improves traffic organization, enhances pedestrian safety, and provides controlled access between regional and local transportation networks. The figure below illustrates traffic movements and the location of the INT #2.



Figure 102: Highway 35 and Buraiqa Intersection

INT. #3: Buraiqa and Khanasri Intersection

Buraiqa and Khanasri Intersection is a three-legged unsignalized intersection serving local traffic circulation within the residential districts. The intersection consists of a priority-controlled layout where vehicles on minor approaches yield to the main traffic stream. Due to the relatively low traffic volumes and lower operating speeds on both roads, traffic signals are not required at this location. The intersection primarily supports access to residential areas in Basiliyah and Khanasri and plays an important role in maintaining local connectivity and neighborhood accessibility. The figure below illustrates traffic movements and the location of the INT #3.



Figure 103: Khanasri and Buraiqa Intersection

6.9.9.4 Access to the Project

Vehicles approaching the site from the northern and southern areas of Mafraq access the network via Highway 35 (Northern & Southern Approach), or Highway 25, Buraiqa Road (Western & Eastern Approach), to reach the Khanasri Road intersections. From these intersections, traffic can continue along Khanasri Road (Northern & Southern Approach) where access to the project is provided through the main designated site entrances.



Figure 104: Project Access – Traffic from North, West and South Mafraq

6.9.9.5 Egress from the Project

To exit the site in any direction, vehicles must use the designated access point to connect to Khanasri Road (Northern & Southern Approach). From there, vehicles can turn left at any intersection along Khanasri Road, and continue along Buraiqa road until reaching INT #2, where they can either turn right onto the Highway 35 (Northern Approach) to head north, or turn left to INT #1 to continue south or west.



Figure 105: Project Egress – Traffic heading North, West and South Mafraq

6.9.9.6 Traffic Survey

A comprehensive primary traffic data collection was obtained for the Project. Baseline traffic conditions within the study area were established using recent traffic count data obtained from MPWH traffic count stations located in and around the Project area. The available data included Automatic Traffic Count (ATC) records and traffic movement Counts (TMC) at key intersections surrounding the Project site.

This aimed to capture current traffic conditions, travel patterns, and operational characteristics of the road network in the Project vicinity. The collected data forms the baseline for assessing existing traffic performance and forecasting the impacts of the proposed development within the impact section later.

The primary traffic data collection was designed to achieve the following objectives:

- **Traffic Volume Assessment**: Measure traffic volumes at intersections, road segments, and site access points.

- **Peak Hour Identification**: Determine AM and PM peak periods and evaluate peak hour traffic flows for accurate modelling.
- **Operational Performance Evaluation**: Identify congestion points, critical turning movements, traffic composition, and delays in the existing network.
- **Support for Trip Generation and Assignment**: Provide the data necessary for estimating trips, distributing traffic, and assigning flows in the traffic model.

The key outputs of the ATC surveys include the determination of daily and peak-hour traffic volumes, and the assessment of variations in travel demand. The ATC system also captured ongoing on-site activities, such as construction-related traffic and user vehicles operating on road segments equipped with ATC counters.

All traffic volumes were converted into Passenger Car Units (PCU) for standardized comparison. Data were recorded at 15-minute intervals over a continuous 24-hour period.

The figure below low illustrates the average daily traffic pattern, highlighting multiple peak periods throughout the day—primarily during the morning and evening hours, and reflecting the average global peak across all ATC stations.

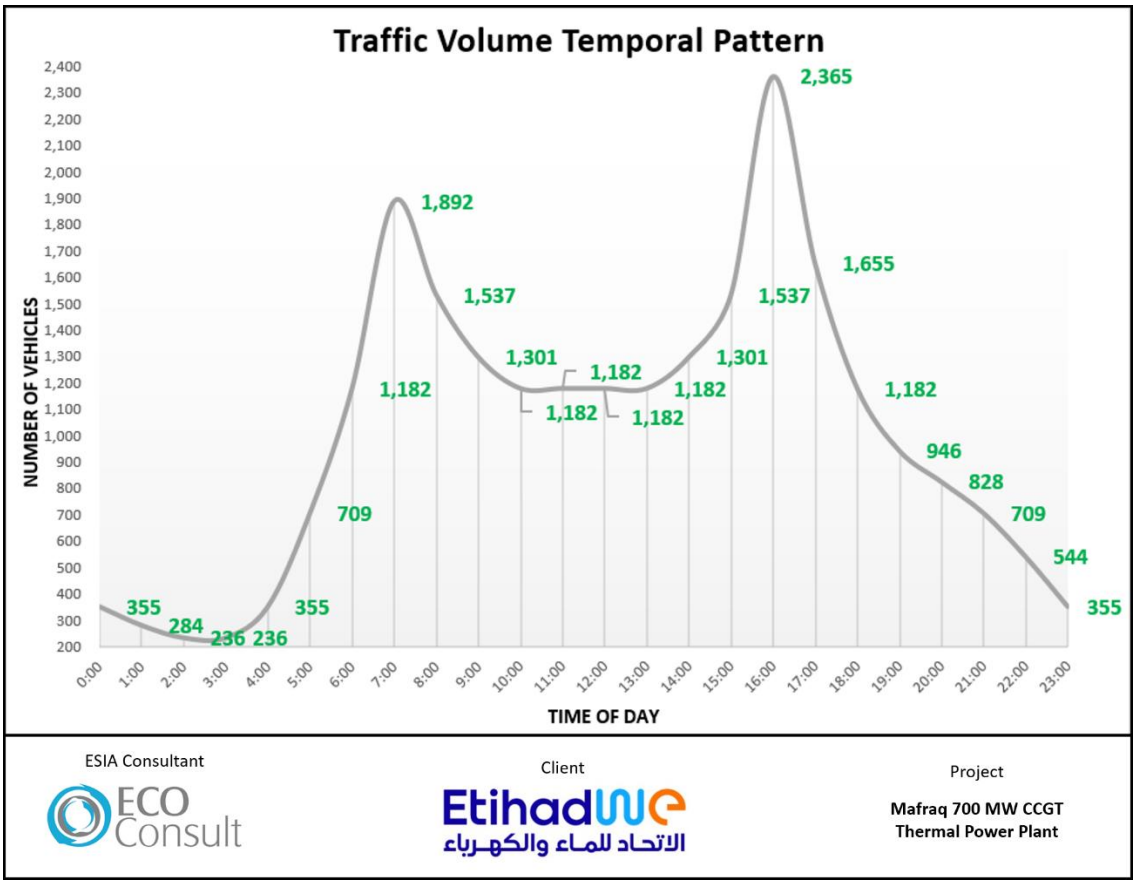


Figure 106: Average Traffic Pattern During the Day for All ATC's

The analysis of the ATC data, as presented in the figure above, indicates that morning peak period occurs between 07:00 and 08:00 AM, corresponding primarily to workforce arrival and the commencement of

industrial operations. The evening peak period, observed between 16:00 and 17:00 PM, aligns with shift changes and end-of-day departures from industrial and offices facilities.

Unified peak hours have been determined, as presented in the table below. The peak hours will be utilized to compute the peak hour volumes for each direction of travel and evaluate the current traffic conditions along the survey sites.

Table 65: The Traffic Count Peak Period.

Peak	Hours
AM Peak	07:0 - 08:00
PM Peak	16:00 - 17:00

Peak hour traffic demonstrates directional flow patterns consistent with workforce travel toward and away from the project facilities. The traffic volumes for all stations in both directions during the AM and PM peak periods are illustrated in the figures below.

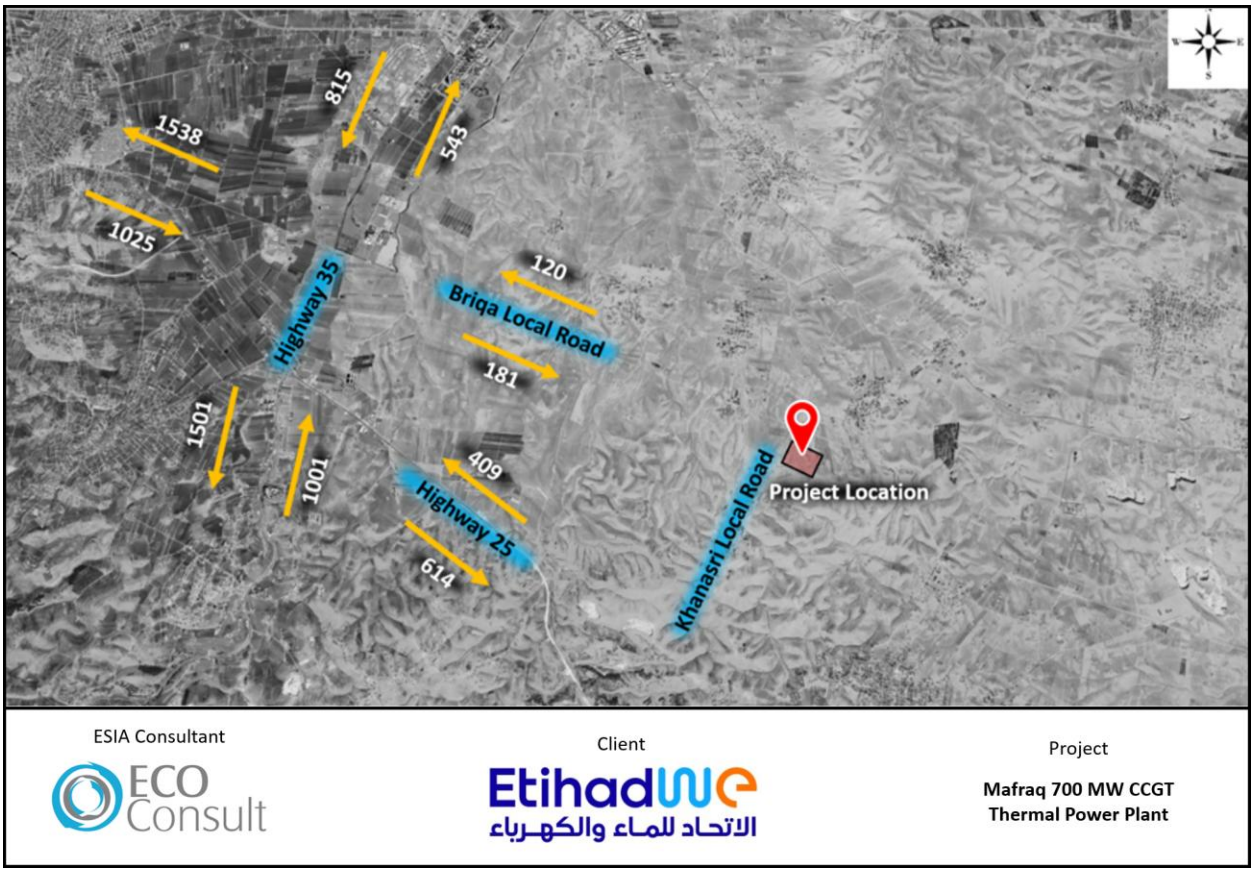


Figure 107: Traffic Volumes for all Stations in Both Directions During the AM

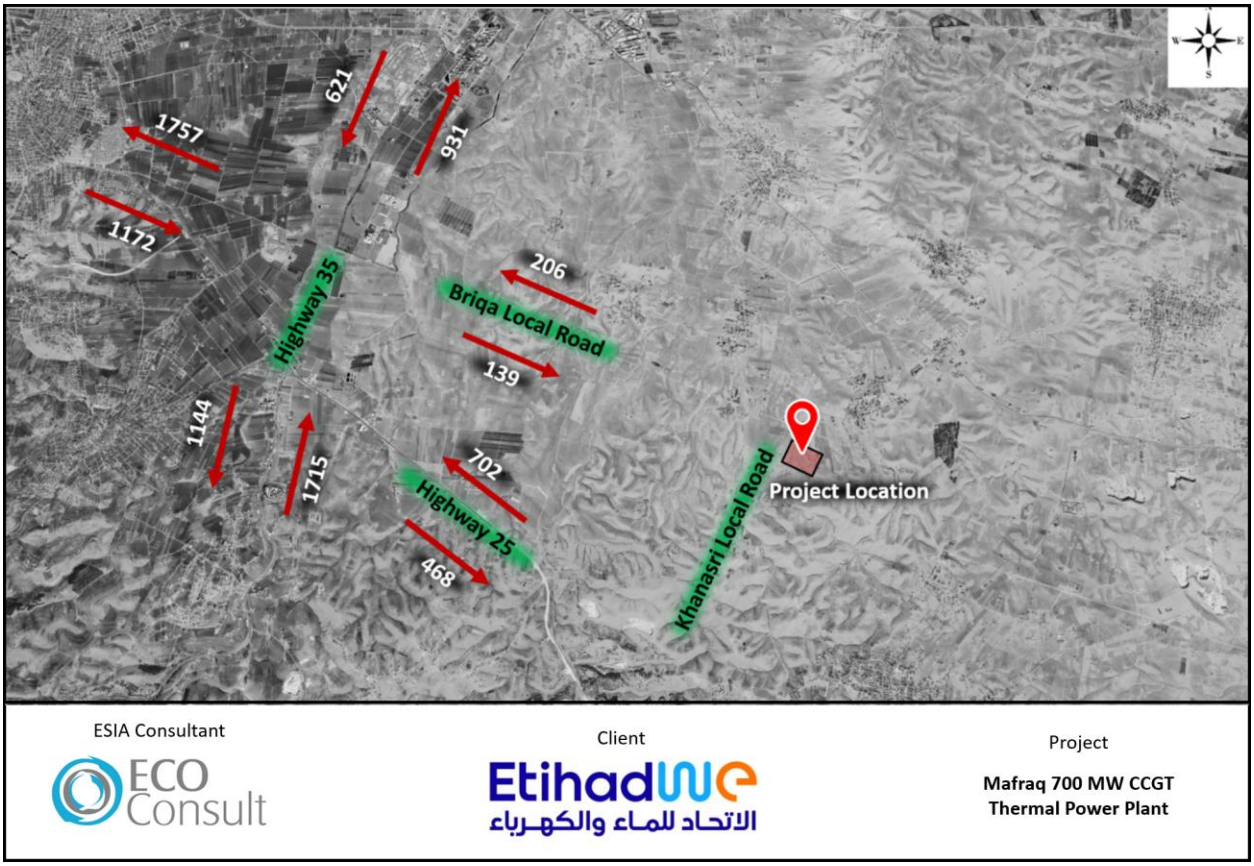


Figure 108: The Traffic Volumes for all Stations in Both Directions During the PM

The data at the road junctions was collected manually/ Turning Movement Counts (TMC). Data was efficiently collected through volume counts and turning movements at specified locations within the study area. MTCs were performed at one key intersection surrounding the Project, as shown in the figure below.



Figure 109: Traffic Count Locations

The highest traffic volume was observed at MTC #1 during the weekday peak periods specifically, the AM peak from 07:00 to 08:00, and the PM peak from 16:00 to 17:00. These periods represent the global peak for the entire network. Consequently, the identified peak hour has been selected as the critical period for the subsequent traffic analysis, serving as the basis for evaluating network performance, capacity requirements, and potential operational improvements.

The MTC results, depicted in the figures below, represent the peak hour traffic volume at the AM and PM peak hour for the intersection. While the AM peak is typically identified as the critical period, the trip generation calculations for this Project indicate a higher number of trips during the AM peak, necessitating its use as the basis for the simulation analysis.

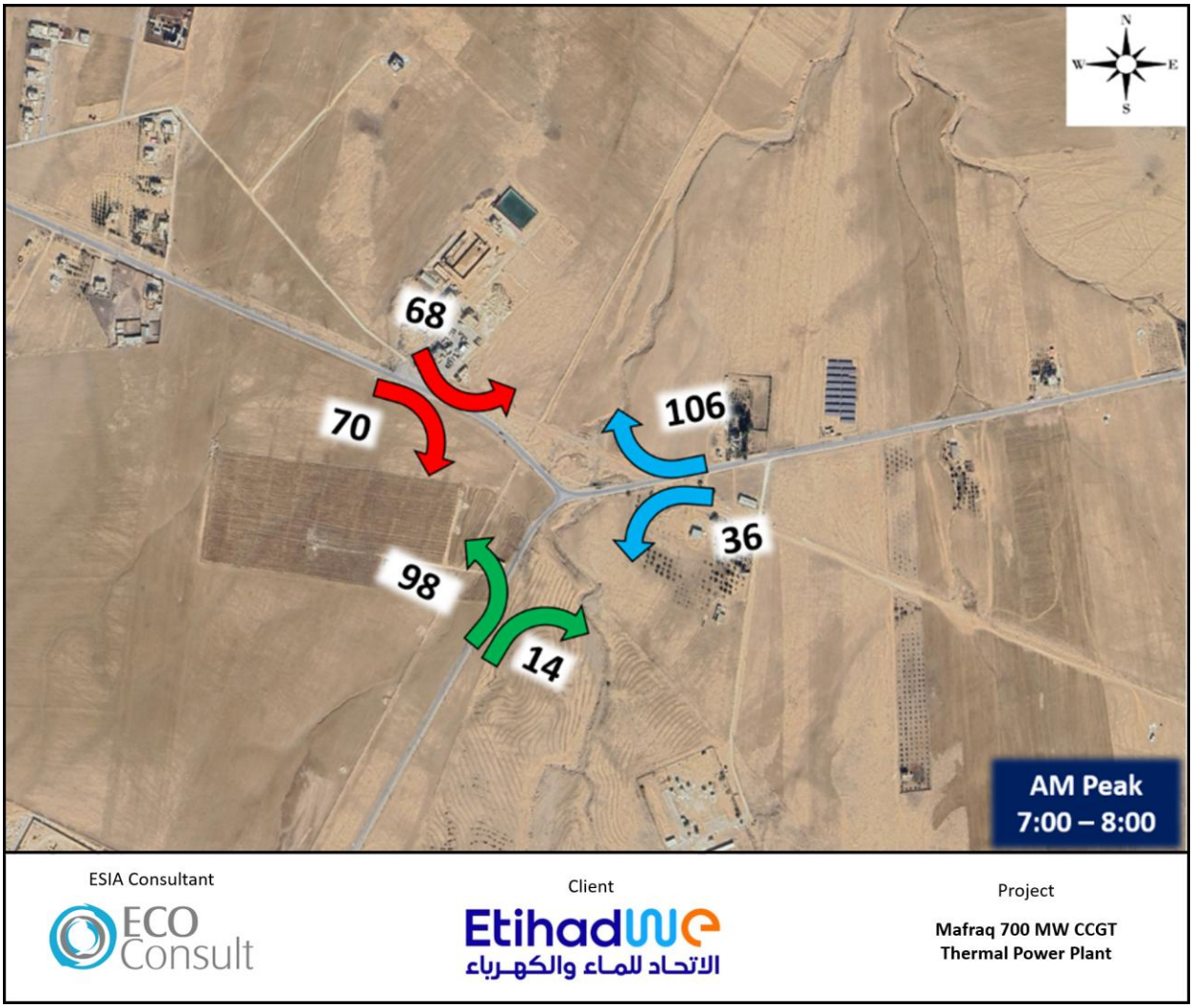


Figure 110: Exiting Traffic Volumes for PM Peak - Weekday at MTC #1

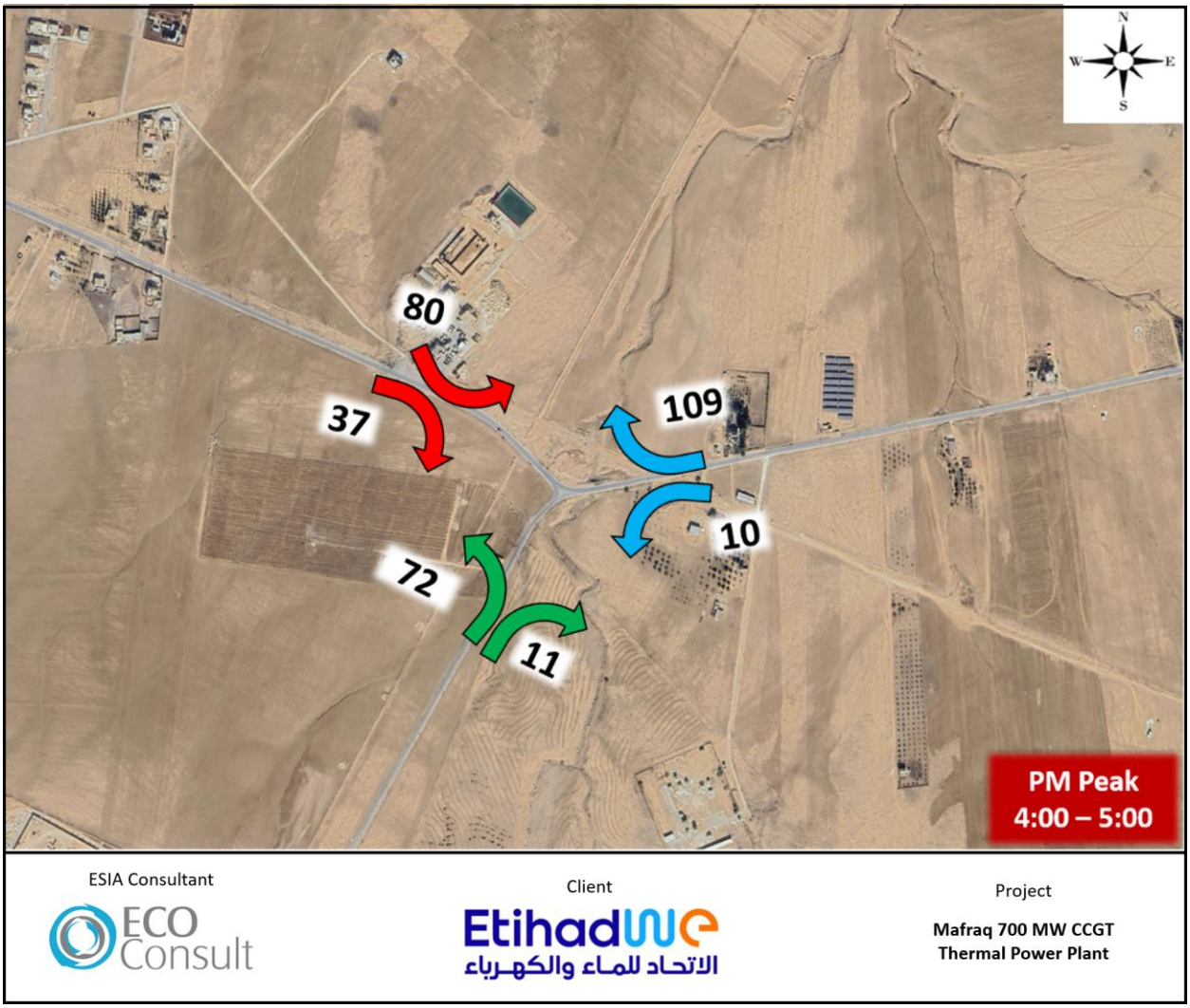


Figure 111: Exiting Traffic Volumes for PM Peak - Weekday at MTC #2

6.9.9.7 Safety and Accidents

The proposed Project is located in Al-Khanasri, along the regional highway connecting Irbid and Mafraq Governorates, which is an important interurban corridor serving passenger vehicles, freight transport, agricultural traffic, and public transport. Due to its function as a regional highway, the road is characterized by relatively high operating speeds and mixed traffic conditions, making road safety an important consideration for the proposed development.

According to the "Jordan Annual Traffic Accidents Report 2025", issued by the PSD, 187,213 traffic accidents were recorded nationwide during 2025. These crashes resulted in 510 fatalities and 17,146 injuries, including 909 serious injuries, 6,357 moderate injuries, and 9,880 minor injuries. A total of 11,680 crashes involved human injuries. Compared with 2024, the total number of traffic accidents decreased by 1.6%, while traffic fatalities decreased by 6.1%, indicating continued improvement in national road safety performance.

The report indicates that collision crashes accounted for 56.8% of all reported crashes, followed by pedestrian crashes (37.5%) and rollover crashes (5.7%). Among crashes involving casualties, 47.4% resulted in minor injuries, 41.8% in moderate injuries, 6.8% in serious injuries, and 4.0% were fatal crashes. These statistics demonstrate that collision-related crashes remain the dominant crash type in Jordan and emphasize the importance of minimizing conflict points through appropriate access design and traffic management.

Although the 2025 annual report presents accident statistics at the governorate level, it does not provide detailed crash data for the Al-Khanasri section of the Irbid–Mafraq Highway. Therefore, no site-specific accident rate can be directly derived for the Project location. Nevertheless, given the characteristics of the highway, the proposed development should incorporate appropriate road safety measures, including adequately designed access and egress points, sufficient stopping sight distance, advance warning signs, pavement markings, roadway lighting where necessary, and compliance with the geometric design requirements of MPWH.

7. STAKEHOLDER CONSULTATIONS AND ENGAGEMENT

7.1 Introduction

The Developer is committed to a technically and culturally appropriate approach to consultation and engagement with all stakeholders affected either directly or indirectly by the Project. The consultation program for the Project is based on informed consultation and participation in line with good international practice requirements with affected people and is designed to be both fair and inclusive. Consultation activities have been an ongoing process since the commencement of the Project development in April 2026 and have included:

- Targeted consultations with key national, regional and local governmental entities, Non-Governmental Organizations (NGOs), academic and research institutions and other; and
- Focus Group discussions (FGD) with local communities.

Stakeholder mapping was initially completed based on understanding of the Project activities, siting, impacts and other as presented below.

The consultations described in this section relates to activities undertaken to inform both the scoping phase of the Project and to collect data and input for the ESIA development.

7.2 Stakeholder Identification and Analysis

This section includes the identification of stakeholders that are relevant to the Project and provides stakeholder mapping as well.

7.2.1 Stakeholder Identification

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

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

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

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

Table 66: Identified Groups of Stakeholders

Stakeholder Group	Description	Relevance to the Project
Stakeholders Who May Be Directly or Indirectly Affected by the Project		
Local Communities	The local communities identified within the Project area of influence include: ▪ Faa', approximately 0.76 km northeast of the Project; ▪ Al-Harsh, approximately 1 km northwest of the Project; ▪ Al-Khanasri, approximately 1.2 km southwest of the Project; ▪ Buraiqa, approximately 3.5 km northwest of the Project; ▪ Hosha, approximately 3.83 km northeast of the Project; ▪ Umm Al Lulu, approximately 2.76 km southeast of the Project; ▪ Deir Al Waraq, approximately 3.1 km south-southwest of the Project site; and ▪ Manshiyet Bani Hassan, approximately 3.2 km south-southeast of the Project site.	The following groups within the local communities have a specific interest in or may be affected by the Project: ▪ Community members may benefit from employment opportunities and may also experience potential impacts such as worker influx, noise and changes in air quality. ▪ Community leaders are socially active and recognized local representatives who may support communication and engagement with community members. ▪ Local businesses and subcontractors may benefit from procurement and subcontracting opportunities, including civil works and the provision of food, accommodation and other services.
	▪ Owners of the land parcels impacted by the OHTL and gas pipeline ▪ Persons who use land for agriculture along the OHTL ▪ Bedouins who use the land for grazing along the OHTL	Those will be impacted directly or indirectly through the land acquisition process or the construction and operation activities*.
Stakeholders Who May Participate in Project Implementation		
Investors / Lenders	Entities that may provide financing for Project development and implementation.	They have an interest in ensuring that the Project is developed and implemented in accordance with their applicable environmental and social requirements and standards. They may also monitor the Project's compliance with those requirements.
Stakeholders Who May Influence Project Decisions or Have an Interest in the Project		
National Institutions and Ministries		
Ministry of Environment (MoEnv)	The national authority responsible for environmental protection, environmental assessment, permitting and regulatory compliance.	Regulates the environmental clearance process, including approval of the Project location, screening of environmental assessment requirements, review and approval of the ESIA, and issuance of the environmental permit. MoEnv also reviewed the air quality and noise monitoring methodology and provided relevant baseline monitoring data.

Stakeholder Group	Description	Relevance to the Project
Ministry of Energy and Mineral Resources (MEMR)	The governmental authority responsible for national energy policies, energy planning and regulation of the energy sector.	Owner of the Project and responsible for the Project's development, detailed design, tendering and appointment of the selected Contractor. MEMR is also involved in the allocation and acquisition of land required for the Project.
Ministry of Water and Irrigation (MWI) / Water Authority of Jordan (WAJ)	The national authorities responsible for water-resource planning, water-supply infrastructure and water-quality management.	Responsible for managing and securing water-supply infrastructure for the Project, assessing the availability of water resources, setting applicable discharge standards and conducting water-quality inspections, where relevant.
Ministry of Local Administration (MoLA)	The governmental authority responsible for supervising municipalities, local administration, municipal services and local-development activities.	Relevant to coordination with municipalities, land-use matters, municipal services, solid-waste management and prevention of public nuisances within the Project area.
Ministry of Agriculture (MoA)	The governmental authority responsible for agricultural development, grazing reserves, forests and agricultural resources.	Responsible for the management of the Al-Khanasri Rangeland Reserve. Its approval and coordination are required because part of the Project site is located within the reserve.
Ministry of Labour (MoL)	The governmental authority responsible for labor regulation, employment conditions and occupational health and safety.	Has overall responsibility for workers' rights, working conditions, occupational health and safety, and compliance with applicable labor requirements.
Ministry of Health (MoH)	The governmental authority responsible for public-health protection and the provision and supervision of health services.	Provides health services to local communities and Project workers and has overall responsibility for public health and safety.
Ministry of Interior (MoI)	The governmental authority responsible for internal security, local governance and coordination with governorates and security agencies.	Relevant to local governance, security, traffic coordination and the stable implementation of the Project through the relevant governorate and administrative authorities.
Ministry of Public Works and Housing (MoPWH)	The governmental authority responsible for public roads, transport infrastructure, road maintenance and road safety.	The Project must consider MoPWH requirements relating to public roads, traffic management, road crossings, transportation, road safety and Project access.
Ministry of Transport	The governmental authority responsible for national transport policies and transport-infrastructure planning.	Consulted regarding the proposed railway corridor near the Project area, including its alignment, development status, safety setbacks and requirements for Project infrastructure crossing or approaching the railway right-of-way.
Department of Antiquities (DoA)	The national authority responsible for protecting, conserving and managing archaeological and cultural-heritage resources.	Conducted a survey of the Project site, gas pipeline and OHTL corridor and confirmed that no known archaeological or cultural-heritage sites would be affected. It will also oversee the implementation of chance-find procedures.

Stakeholder Group	Description	Relevance to the Project
Department of Lands and Survey (DLS)	The governmental authority responsible for land registration, cadastral records, landownership information and official parcel mapping.	Requested to provide landownership, parcel, basin, cadastral and legal-encumbrance information for land intersected by the proposed OHTL corridor.
Social Security Corporation (SSC)	The national institution responsible for administering social-security insurance and employee-benefit schemes.	Requires employers during construction and operation to register workers, pay the required contributions and provide applicable social-security coverage.
Jordan Standards and Metrology Organization (JSMO)	The national authority responsible for issuing, approving and monitoring standards and technical regulations.	Relevant to national standards applicable to the Project, including ambient air quality, stationary-source emissions, wastewater discharge and drinking-water quality.
National Electric Power Company (NEPCO)	The national electricity-transmission company responsible for operating and developing Jordan's transmission network.	Provides information on the OHTL route, design, schedule and alternatives and is involved in the land-acquisition and compensation process for the transmission line.
Water Authority of Jordan / National Water Carrier	The national entities and infrastructure program responsible for supporting and securing Jordan's water supply.	Relevant to existing and future water-supply conditions, regional water demand and the potential implications of Project water consumption.
Jordan Hejaz Railway Authority	The national authority responsible for managing the Jordan Hejaz Railway infrastructure and railway rights-of-way.	Consulted regarding the proximity of existing and planned railway infrastructure, applicable safety setbacks, right-of-way requirements and potential lease arrangements.
Jordanian Civil Aviation Regulatory Commission (CARC)	The national aviation regulator responsible for civil-aviation safety, navigational obstacles and aviation clearances.	Responsible for reviewing the height and location of Project structures, stacks, transmission towers and construction cranes. CARC will determine aviation-lighting, marking and plume-assessment requirements and issue the required No Objection Certificate.
Jordan Armed Forces	The national military institution responsible for defense facilities and military land uses.	Relevant to the relocation of the active military shooting range from the Project footprint and to clearance, safety verification and remediation of the affected land.
Regional Institutions		
Mafraq Governorate	The principal regional administrative authority responsible for coordination between governmental entities, districts, municipalities and local communities within Mafraq Governorate.	Supports stakeholder engagement, facilitates official correspondence, coordinates with local administrative authorities and provides socioeconomic information. It is also relevant to employment coordination, emergency preparedness and management of community expectations.
Hosha Sub-District Directorate	The local administrative authority responsible for governance and coordination within Hosha Sub-District.	Supports public consultation activities, coordination with municipalities and community leaders, communication of employment opportunities and management of local security and administrative sensitivities.

Stakeholder Group	Description	Relevance to the Project
Al-Basiliyah Municipality	The municipality responsible for providing municipal services and local administrative functions within Al-Basiliyah.	The Project site is located within its administrative boundaries. The Municipality is relevant to consultation arrangements, local employment communication, municipal services and procedural coordination.
Yarmouk Water Company	The regional water utility responsible for water-supply and wastewater services in northern Jordan.	Relevant to the proposed water-pipeline connection, water-supply availability, pipeline specifications and assessment of potential effects on local water supply and demand.
Research Institutions		
Al-Khanasri Animal Research Station	An agricultural and livestock research station operating within the Al-Khanasri Rangeland Reserve.	Uses and manages parts of the reserve for rotational cultivation, grazing, livestock and beekeeping. Consultation is required to verify existing land use and confirm that Project land allocation will not adversely affect the Station's activities or users.
Non-Governmental Organizations		
Royal Society for the Conservation of Nature (RSCN)	A national organization responsible for biodiversity conservation, wildlife protection and the management of nature reserves and environmentally sensitive areas.	Relevant to the protection and management of wildlife, biodiversity, natural reserves and areas of critical environmental concern. RSCN is also BirdLife International's partner in Jordan.
BirdLife International	An international conservation organization specializing in the protection of birds, habitats, Important Bird and Biodiversity Areas and Key Biodiversity Areas.	Consulted regarding the Irbid–Mafraq Plains IBA, threatened bird species, bird-electrocution risks, sensitive flora and the required scope and timing of bird surveys.
Gas Facility Operators		
Jordanian Egyptian Fajr for Natural Gas Transmission and Supply Company	The company responsible for operating natural-gas transmission infrastructure connected to the Egyptian–Jordanian gas network.	Operates gas infrastructure adjacent to the Project and is relevant to the proposed gas connection, gas-supply arrangements, operational safety, emissions, emergency planning and cumulative-impact assessment.
Others		
Media (Newspapers, Television and Internet)	Media organizations and communication platforms that disseminate information to the public and influence public awareness and perceptions.	Relevant to the disclosure of Project information, consultation announcements and communication of significant Project developments to the wider public.

***Note**: Reasonable efforts were made to identify stakeholders affected by the Associated Facilities. Information on registered landowners could not be obtained by the E&S Consultant as the Department of Lands and Survey (DLS) would not provide such information to the consultant but rather only for the developing entity (i.e. NEPCO). The E&S Consultant requested such information through NEPCO since April 2026, but had not been received to date. In addition, multiple site visits were undertaken to identify such land users as well as other potential informal and seasonal users. However, some users, including that potentially cultivating barley along the OHTL corridor, could not be identified.*

7.2.2 Stakeholder Mapping

Further to the above, a preliminary stakeholder analysis is undertaken below to clarify stakeholders' interest in the Project and their ability to influence the Project's development. Accordingly, a priority contact list is identified.

High rating for priority contact list indicates importance of continuous and regular consultation and engagement. On the other hand, medium rating for priority contact list does not reduce the importance of the entity as a stakeholder but indicates that their engagement is required at specific stages or milestones of the Project (i.e. when the involvement of these entities is triggered for a specific purpose such as obtaining a specific service).

Table 67: Preliminary Stakeholder Analysis and Priority Contact List for the Project

#	Stakeholder Group	Priority
1.	**Stakeholders who may be directly or indirectly affected by the Project**	
	Nearby local communities, including Faa', Al-Harsh, Al-Khanasri, Buraiqa, Hosha, Umm Al Lulu, Deir Al Waraq and Manshiyet Bani Hassan	**High**
	Community members within the nearby settlements	**High**
	Community leaders and other recognized local representatives	**High**
	Local businesses, suppliers and potential subcontractors	**High**
2.	**Stakeholders who may participate in the implementation of the Project**	
	Investors and lenders	**High**
3.	**Stakeholders who may influence or make decisions regarding Project implementation and/or have an interest in the Project**	
	National government and permitting authorities	
	Ministry of Environment (MoEnv)	**High**
	Ministry of Energy and Mineral Resources (MEMR)	**High**
	Ministry of Water and Irrigation (MWI) / Water Authority of Jordan (WAJ)	**High**
	Ministry of Local Administration (MoLA)	**Low**
	Ministry of Agriculture (MoA)	**High**
	Ministry of Labour (MoL)	**Medium**
	Ministry of Health (MoH)	**Medium**
	Ministry of Interior (MoI)	**Low**
	Ministry of Public Works and Housing (MoPWH)	**Medium**
	Ministry of Transport	**Medium**
	Department of Antiquities (DoA)	**Low**
	Department of Lands and Survey (DLS)	**High**
	Social Security Corporation (SSC)	**Low**
	Jordan Standards and Metrology Organization (JSMO)	**Low**
	National Electric Power Company (NEPCO)	**High**
	Jordan Hejaz Railway Authority	**High**
	Jordanian Civil Aviation Regulatory Commission (CARC)	**Medium**
	Jordan Armed Forces	**High**
	Regional and local government and service authorities	
	Mafraq Governorate	**High**
	Hosha Sub-District Directorate	**High**
	Al-Basiliyah Municipality	**Medium**
	Yarmouk Water Company	**High**
4.	**Research institutions**	
	Al-Khanasri Animal Research Station	**High**
5.	**Infrastructure and Utility Operators**	

	Jordanian Egyptian Fajr for Natural Gas Transmission and Supply Company	**High**
6.	**Non-governmental organizations**	
	Royal Society for the Conservation of Nature (RSCN)	**Medium**
	BirdLife International	**Medium**
7.	**Other interested parties**	
	Media, including newspapers, television and online media	**Low**

7.3 Targeted Consultations

Targeted consultations were undertaken with various stakeholder groups including:

- National governmental entities;
- Regional governmental entities;
- Non-Governmental Organizations (NGOs);
- Gas Facility Operators;
- Academic and Research Institutions; and
- Local communities.

During the targeted consultations, a handout was provided in advance in local language (mainly in Arabic language) which included information on the Project, its location, Project components, the overall ESIA process, key impacts anticipated during the various Project phases and the E&S Team's contact details to obtain further information if required.

Table 68: Key Outcomes of Targeted Consultations

Entity	Date	Key Outcomes
National Governmental Entities in Jordan & Governmental Entities in Mafraq Governorate		
Mafraq Governate	12 May 2026	▪ Mafraq Governorate confirmed its support for the Project and committed to facilitating the work of the 'E&S Team' through the issuance of the necessary official correspondence to the northwestern Badia Directorate, including Hosha Sub-district and Manshiyat Bani Hassan District. ▪ The importance of maintaining continuous engagement with local stakeholders and conducting public consultation sessions throughout the ESIA process was emphasized. ▪ It was highlighted that the Project area falls within the jurisdiction of multiple municipalities, including Basiliya Municipality, Hosha Municipality, and Manshiyat Bani Hassan Municipality, which should be engaged during stakeholder consultations. ▪ The Governorate emphasized the importance of prioritizing local employment opportunities and ensuring that recruitment processes are transparent and coordinated with the relevant administrative authorities and municipalities. ▪ It was recommended that employment opportunities be clearly communicated to local communities to manage expectations and avoid potential social tensions. ▪ The Governorate highlighted the need to assess potential E&S impacts associated with the Project, including risks related to emergency situations such as leaks and fires. ▪ It was agreed that the findings of the ESIA would determine the significance and extent of potential impacts and inform the development of appropriate mitigation and response measures. ▪ Mafraq Governorate expressed its willingness to support the Project by providing available socio-economic studies, data, and relevant documentation that may assist in the ESIA process. ▪ Several reference documents and information sources were provided to the E&S Team for review and consideration as part of the baseline assessment. ▪ The Governorate noted the importance of transparently communicating the actual number and types of jobs expected to be generated by the Project to avoid unrealistic employment expectations among local communities.

Al-Basiliyah Municipality	12 May 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities ▪ The Project site falls within the Municipality's administrative boundaries but not its regulatory planning boundaries. Building and construction permits accordingly fall under the jurisdiction of the Municipal Engineering Directorate. ▪ The AlBuwaidah area was confirmed as excluded from the Project scope to avoid jurisdictional overlap between Mafraq and Irbid governorates. ▪ The Mayor declined any direct role in organizing community consultation sessions or participating in employment committees, citing a prior negative experience with a gas Project in which the municipality was accused of monopolizing job opportunities and expressing concern that direct involvement could generate community tensions. ▪ The Executive Director of the Municipality indicated willingness to cooperate on a procedural basis in arranging and organizing community consultations, provided a formal official letter is issued by the Sub-district (Qadaa') as cover for the municipality's participation. ▪ Two separate consultation sessions organized by population clusters were proposed to improve engagement effectiveness, please refer to “Chapter 6.8” below. ▪ On employment, the Municipality recommended that job vacancies be advertised through a dedicated online link and a neutral interview committee, without involving the Municipality in the selection process. A direct recruitment mechanism through the Developer's own channels was agreed as the preferred approach. ▪ The Municipality requested that any available socioeconomic studies for the area be shared by the ‘E&S Team’ and expressed willingness to share relevant studies held by the Municipality in return. ▪ Potential risks associated with negative employment related activity in the municipality and administrative and tribal sensitivities noted and measures to manage these risks through close co-ordination with relevant authorities identified..
Hosha Sub-District Directorate	12 May 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ Hosha Sub-district Directorate confirmed its willingness to support and facilitate future stakeholder engagement and public consultation activities related to the Project. ▪ It was agreed that the public consultation session should be held in Al-Harsh due to its central location and the availability of a suitable venue with adequate capacity. ▪ Coordination with Basiliya Municipality and local community leaders was recommended to facilitate invitations and participation in the consultation process. ▪ The importance of establishing transparent and fair recruitment procedures was emphasized to manage local employment expectations and avoid potential social tensions. ▪ It was recommended that local municipalities play a role in communicating employment opportunities and nominating candidates based on transparent criteria. ▪ Concerns were raised regarding the potential exclusion of local labor by subcontractors, highlighting the need for adequate oversight of recruitment practices during Project implementation.

		▪ The 'E&S' Team was advised to consider administrative and tribal sensitivities within the area of influence, particularly in relation to communities located near governorate boundaries. ▪ It was recommended that the Project clearly defines its AoI in the public consultation sessions and carefully consider engagement approaches for communities located outside Mafraq Governorate (if required). ▪ Hosha Sub-district Directorate committed to sharing any available socio-economic studies and relevant information that could support the ESIA process. ▪ Potential security risks during the construction phase were highlighted, and the implementation of appropriate site security measures was recommended. Which includes, potential theft of Project assets during construction, to be managed through perimeter CCTV monitoring and local security guards, and potential tension due to the overlap between Mafraq and Irbid Governorates and tribal links between AlBuwaidah and Hosha, to be managed through close coordination with Hosha Sub-district. ▪ The need for effective management of public consultation sessions was emphasized to ensure constructive participation and avoid potential disruptions.
Department of Antiquities (DoA)	6 April 2026 & 12 April 2026	▪ The Project description and ESIA methodology was presented, including its components including the Project site, OHTL and Gas Pipeline, location, buffer zones and anticipated construction and operation activities. ▪ The DoA conducted a site survey which covered the Project site, Gas Pipeline and the OHTL along with a buffer zone of 100 m from both sides. ▪ The DoA confirmed that following the field survey of the Project area, it was concluded that the Project site does not conflict with, intersect, or fall in proximity to any archaeological or cultural heritage sites, and accordingly raised no objection to the commencement of Project works. ▪ The DoA stipulated that the Project must coordinate with the Director of the Mafraq Antiquities Directorate throughout all Project phases, and that all excavation works must cease immediately upon the discovery of any archaeological features or finds. In the event of any such discovery, a DoA representative must be present on site.
Ministry of Environment (MoEnv)	14 April 2026	▪ The Project description and the proposed ESIA methodology were presented to the Ministry, including details on the Project components, location, area of influence, applicable buffer zones, and the anticipated activities during the construction and operational phases. ▪ The MoEnv reviewed and approved the proposed air quality and noise monitoring methodology. During the consultation meeting, MoEnv requested the inclusion of ozone (O_3) as an additional air quality monitoring parameter, which was incorporated into the monitoring program. ▪ To support the air dispersion modeling assessment, MoEnv provided monitoring data from the nearest ambient air quality monitoring station to the Project site, enabling the development of representative baseline conditions and annual modeling scenarios. ▪ MoEnv conducted a site inspection as part of the environmental permitting process, following which the site approval was issued for the proposed Project location.
Department of Lands and Survey (DLS)	21 April 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ A letter was submitted to the Director General of the Department of Lands and Survey requesting land ownership and cadastral information for parcels falling within the proposed OHTL corridor. ▪ Information requested included the names of landowners (private, state, or

		forestry), parcel numbers, basin references, and cadastral map sheets along the OHTL alignment, as well as any registered legal encumbrances or existing land acquisitions on the relevant parcels. ▪ A response from the Department of Lands and Survey is pending.
Jordan Hejaz Railway Authority	12 May 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ The E&S Team submitted a letter to the Director General of the Jordan Hejaz Railway Authority requesting information on the proximity of planned railway infrastructure to the Project site, including alignment data, safety setback requirements, and conditions applicable to any Project infrastructure crossing or adjacent to the railway right-of-way. ▪ The Jordan Hejaz Railway Authority confirmed in its response that the Project site is located approximately 16 km from the Jordan Hejaz Railway alignment. Accordingly, no direct conflict with the railway corridor was identified. ▪ The Authority noted that if any Project infrastructure or associated facilities are located within the railway right-of-way, a lease agreement with the Railway Authority would be required. ▪ With respect to any planned railway lines in proximity to or adjacent to the Project area, the Authority advised that the E&S Team should contact the Ministry of Transportation directly for further information which was done accordingly. ▪ The Authority required that the Ministry of Transport should be contacted in the case a lease agreement is to be issued.
Jordanian Civil Aviation Regulatory Commission (CARC)	12 May 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ Requirements for aviation safety clearance in relation to the proposed CCGT plant and associated 7 km OHTL was requested. ▪ CARC confirmed that any structure exceeding 40 meters in height is classified as an aviation obstacle, requiring the installation of aviation warning lighting and specialized markings. Emission stacks must feature alternating red and white banding. ▪ CARC confirmed that aviation warning lighting is mandatory for all structures, with specific configurations to be determined based on final structural heights. Taller structures require higher-intensity and multi-layered lighting systems. ▪ A dedicated exhaust and thermal plume assessment is mandatory, covering both simple cycle and combined cycle operating modes and specifying the types, chemical composition, and vertical dispersion heights of emissions. ▪ Specific aviation safety requirements apply to the 7 km OHTL, including mandatory installation of high-visibility aerial warning spheres on transmission towers and, depending on final tower heights, full line-marking systems. ▪ All construction cranes deployed during the construction phase require independent CARC approval and must be fitted with certified aviation warning lighting. ▪ A formal No Objection Certificate (NOC) is required to be obtained by the Developer prior to the commencement of construction and applies to both permanent structures and temporary construction equipment once all design data is available. ▪ To initiate the formal review process, the following documentation must be submitted to CARC: official coordinates and site elevations certified by the Royal Jordanian Geographic Center (RJGC); land registration documents and site plan; detailed structural and engineering plans; an exhaust and thermal plume

		assessment study; and a completed Navigational Obstacles Study Request form. Applicable fees range between 300 and 400 JOD depending on whether a physical site inspection is required. ▪ CARC advised that if the Project site is in proximity to Al-Albayt University, a military airbase operates in the area and mandatory approval from the Royal Jordanian Air Force would be required. Data on restricted military airspace and prohibited zones must be obtained directly from the Royal Jordanian Air Force. ▪ Maximum allowable height limits for structures will be confirmed by CARC following formal submission of the Navigational Obstacles Study Request and review of the exact Project coordinates and elevations.
Military Shooting Range Officer	13 May 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ The military shooting range is located within the Project footprint. MEMR will acquire the land as part of the Project, and the shooting range will be relocated as a direct result of the Project. ▪ The shooting range is currently operational and in active use throughout the year.
Armed Forces Representative	18 May 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ The representative confirmed awareness of the Project and noted that they were contacted regarding the relocation of the Military Shooting Range currently located within the Project site. ▪ The representative confirmed that the Military Shooting Range will be relocated to another nearby location outside the Project site. ▪ It was further confirmed that the Military Shooting Range will be removed, and the land will be cleared and remediated as required.
Ministry of Transportation	21 May 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ A letter was submitted to the Minister of Transportation requesting information on a proposed railway corridor believed to be located in proximity to the Project site as this was mentioned during the Public Scoping Session conducted on the 21st of May 2026, please refer to Chapter 7.4 below, given the importance of coordinating national infrastructure Projects. ▪ The E&S requested confirmation of whether a planned railway line exists adjacent to or near the Project area, its current development stage (feasibility, design, or construction), and the railway corridor alignment in KMZ or Shapefile format. ▪ Information was also requested on required safety setback distances between the railway corridor and Project components, any applicable restrictions or conditions, and requirements for the OHTL or other Project infrastructure that may cross or run near the railway right-of-way. ▪ The Ministry of Transportation provided a response indicating that there is railway within the area and provided specific requirements that should be taken into account and considered.
Ministry of Agriculture (MoA)	April – July	▪ The Project description and ESIA methodology were presented, including the Project components, location, buffer zones, and anticipated construction and operation activities. ▪ A letter was submitted to the Ministry of Agriculture regarding the portion of the Project site that falls within the boundaries of the AlKhanasri Rangeland Reserve. ▪ The E&S Team requested confirmation of the Ministry's non-objection to allocating the portion of reserve land located within the Project footprint for

		Project development. ▪ Confirmation was also requested on whether all individuals currently utilizing the reserve land are employees of the Ministry of Agriculture and/or the AlKhanasri Animal Research Station affiliated with the National Agricultural Research Center (NARC). ▪ The E&S Team further requested confirmation that no Ministry employees or reserve users would be adversely affected by the allocation of part of the reserve land to the Project. ▪ The request was submitted to support the land use assessment being undertaken as part of the ESIA and to verify potential impacts on existing land users. ▪ A response from the Ministry of Agriculture is pending.
NEPCO	April – July	▪ Discussion to obtain information on the OHTL to include route, design details, schedule and other. Information as obtained from NEPCO has been included within 'Chapter 5'. ▪ Discuss alternatives considered for the Project site location as well as OHTL routing. Information as obtained from NEPCO has been included within 'Chapter 4'. ▪ Obtain information on the land compensation process that will be followed for the OHTL. Information as obtained from NEPCO has been included within the LAF.
Yarmouk Water Company	July 2026	▪ Obtain details on the water pipeline connection to include route, specifications, etc. ▪ Obtain details, concerns, and requirements on water supply and demand within the area including potential impacts of water resources from water supply. This is presented and discussed in 'Chapter 6'
Water Authority of Jordan / National Water Carrier	July 2026	▪ Obtain details, concerns, and requirements on water supply and demand within the area including potential impacts of water resources from water supply. This is presented and discussed in 'Chapter 6'
NGOs		
BirdLife International	17 May 2026	▪ The Project description and ESIA methodology were presented, including Project components, location, buffer zones, and anticipated construction and operational activities. ▪ The Irbid–Mafraq Plains IBA (JO188) was confirmed to be located approximately 2 km from the Project site and represents a material biodiversity consideration for the ESIA. BirdLife International confirmed that no KBAs or IBAs are located within the Project site itself. ▪ Eastern Imperial Eagle (Vulnerable) (*Aquila heliaca, Vulnerable*) and Steppe Eagle (Endangered) (*Aquila nipalensis*) were confirmed as present or potentially present within or adjacent to the Project area. Eastern Imperial Eagle is confirmed present in the wider area and could potentially be present within the Project site. If chicken farms are present in the area, the likelihood of Eastern Imperial Eagle presence increases and should be assessed accordingly. The farm at the end of the OHTL corridor should be checked as part of the field survey. ▪ *Iris bostrenisis* (Endangered) was identified as a sensitive botanical species requiring documentation during flora surveys. Flowers and associated flora should be recorded during field surveys. Marble Polecat (*Vormela peregusna*) was not confirmed present at the site. Chalcium Strenia (*Chalcides ocellatus*) was noted as a species of interest. ▪ Electrocution of Eastern Imperial Eagle on transmission infrastructure is a documented risk. If any source of water or waste is located near the Project area or along the OHTL corridor, appropriate measures should be taken as these features may attract sensitive species. Water pools at the corner of the OHTL should be checked during field surveys.

		▪ Hunting within the Project area and wider site vicinity is confirmed as illegal. BirdLife International confirmed that no hunting programs or activities are recorded in Mafraq or within the Project area. ▪ VP bird surveys were recommended at 2 designated viewpoints (1 within the Project site, 1 on the OHTL corridor), covering a minimum of 5% of each survey season. Surveys are required for Spring (April, during the operational phase only), Autumn, and Winter. It was explained that there is an ongoing VP survey study being undertaken by EBRD around <5 km from the Project related OHTL route. It was stated that should information be obtained from this study then this would be sufficient as secondary data. The 'E&S Team' explained the Biodiversity methodology approach and it was deemed sufficient.
Royal Society for the Conservation of Nature (RSCN)	17 May 2026	▪ The Project description and ESIA methodology were presented. RSCN was consulted as the national conservation authority on IBA/KBA designation, threatened species, and survey methodology requirements. ▪ RSCN confirmed that no breeding birds were identified within the Project area. ▪ White Stork (*Ciconia ciconia*) was confirmed as present in the Al Ekader area during winter. While the species is not classified as threatened, it poses an electrocution risk on transmission infrastructure, with documented electrocution incidents recorded in the Al Ekader area. ▪ RSCN noted that the ecological condition of the Mafraq area has deteriorated between 2000 and 2026, increasing pressure on remaining habitats in the wider Project region. ▪ RSCN noted that appropriate insulation measures was applied by themselves to the Al Ekader substation, given its proximity to habitats attracting birds, particularly White Stork during winter. ▪ No formal buffer zone provisions were required, consistent with historical survey precedent throughout the years. ▪ A review of the online hunting schedule confirmed that no hunting activities were recorded in Mafraq or within the Project area. ▪ It was also confirmed that IBA/KBA boundaries and designation status have been recently updated where the closest IBA (Irbid-Mafraq Plains) is located around 10 km. The data has been shared with the E&S Team to be taken into account as discussed in "Chapter 6.3 above.
Gas Facility Operators		
Jordanian Egyptian Fajr for Natural Gas Transmission and Supply Company	3 June 2026	▪ The 'E&S Team' conducted a consultation with the HSE Supervisor of the Jordanian Egyptian Fajr for Natural Gas Transmission and Supply Company. The consultation sought to gather information on the existing gas compression station adjacent to the Project site, given that the CCGT Project is expected to connect to the existing natural gas pipeline originating from Egypt. ▪ The existing facility currently operates as an emergency isolation station, with separation points located approximately every 30 km along the pipeline. ▪ A new gas compression station is currently under construction, designed to receive natural gas and increase pressure in accordance with the requirements of the transmission network and NEPCO. ▪ Civil works have been completed, with mechanical, electrical, and commissioning activities ongoing with operation is expected to commence in by the end of year. ▪ The EIA document for the Gas Compression Facility is confidential due to inclusion of operational and technical information and may be obtainable through MEMR. ▪ The primary source of emissions from the station will be combustion of natural gas within four gas turbines (Solar Turbines, approximately 12 MW each; two operating, two on standby). ▪ Relevant pollutants include NOx, SOx, PM_{10}, and $PM_{2.5}$, regulated under

		Jordanian Standard JS 1189/2006. No significant process emissions are expected from gas handling operations. ▪ The station is designed to operate using cold venting, with no routine gas venting expected under normal conditions. Gas releases would only occur under exceptional circumstances such as emergencies, major shutdowns, or maintenance depressurization. Natural gas leak detection systems will be installed as part of operational safety requirements. ▪ Diesel generators may be used temporarily only in exceptional circumstances, such as interruption of gas supply. ▪ No landownership disputes or concerns were reported. Land acquisition for the Project and pipeline corridor designation fall under the responsibility of the Ministry of Energy. ▪ Community stakeholder consultations were previously conducted, with primary concerns relating to local employment opportunities and hiring from nearby communities. Challenges were encountered in recruiting local workers with the required qualifications. Noise impacts and general environmental concerns were also raised during community engagement. ▪ An additional meeting with E&S Team will take place in the upcoming period for further consultation to further investigate potential cumulative impacts as well as facilitating sharing information.
Academic and Research Institutions		
AlKhanasri Animal Research Station under the National Agriculture Research Center	12 April 2026 & 26 April 2026	▪ The Project description and ESIA methodology was presented, including its components, location, buffer zones and anticipated construction and operation activities. ▪ The Head of the Station confirmed that the land allocation has been transferred from the MoA to the MEMR in relation to the Project. ▪ The total reserve area is approximately 4,000 dunums, of which around 400 dunums are allocated to the Project. ▪ They indicated that this represents a small portion of the land and does not affect their operations. MoA will provide an official no-objection letter regarding this matter. ▪ The Head of the Station explained that the land is cultivated on a rotational basis, with the Project area typically planted as pasture in September and used for grazing until May. ▪ The Project site was last planted in the 2019–2020 season. ▪ The herders that use the land are employees of the station and the land is only used on a rotational basis as scheduled by the station itself. ▪ The Station plants the land exclusively for herding purposes, with herds sourced from the National Agricultural Research Center. The reserve supports livestock holdings of approximately 1,200 sheep, 200 goats, and 70 camels, with a grazing season running from February to June. ▪ Boreholes have been drilled within the area for geotechnical purposes of the Project. ▪ Beehives are present within the reserve and managed on a rotational basis. Water harvesting systems are also operational within the reserve. ▪ No groundwater wells or other land uses were identified within the area. Livestock present in the area include sheep, goats, and camels. ▪ Four (4) rangers/security guards are stationed at the site to prevent trespassing and unauthorized access. ▪ The Center Director provided a detailed tribal and demographic map of the surrounding area, covering Manshiyet Bani Hassan, Al Hursh, Al-Fa'a, Al-Khanasri, Hosha, and Buraiqa. ▪ It was proposed that the map is reviewed with the Administrative Governor to

		support the design a fair employment plan and avoid tribal disputes during construction and operation. ▪ A public safety risk was identified due to the proximity of a military shooting range to the Project site. Urgent coordination with the relevant military authorities is required to confirm the safety of Project coordinates relative to the shooting range.

Consultation with Nearby Households

The E&S Team conducted a site visit to identify and consult with households located within a 1 km buffer of the Project site, as shown in the figure below. During the site visit, a Project information handout was distributed to residents, and community members were invited to attend the public scoping sessions scheduled to be held in Mafraq.

A total of 34 households/structures were identified within the 1 km survey area. These included occupied permanent residential structures, rented accommodation, houses under construction, abandoned or apparently unused structures, storage areas, and structures where no occupants were present at the time of the visit.

Household-level information was available for several of the identified structures, while for others consultation could not be completed because no one was present, the structure was locked or appeared abandoned, the owner was not available, or the occupant declined to respond. Where information was obtained, most households were owner-occupied, with one rented household recorded. The majority of consulted household representatives were male, although female household representatives were also identified. Household sizes varied, with some larger extended-family households recorded.

The main occupations reported included government employment, work at the nearby gas facility, retirement, unemployment, and other unspecified occupations.

Land use associated with the identified households varied. Some households reported crop cultivation and/or livestock keeping. A limited number of households reported trade-related land uses. Several residential structures were also recorded as being under construction or not currently occupied.

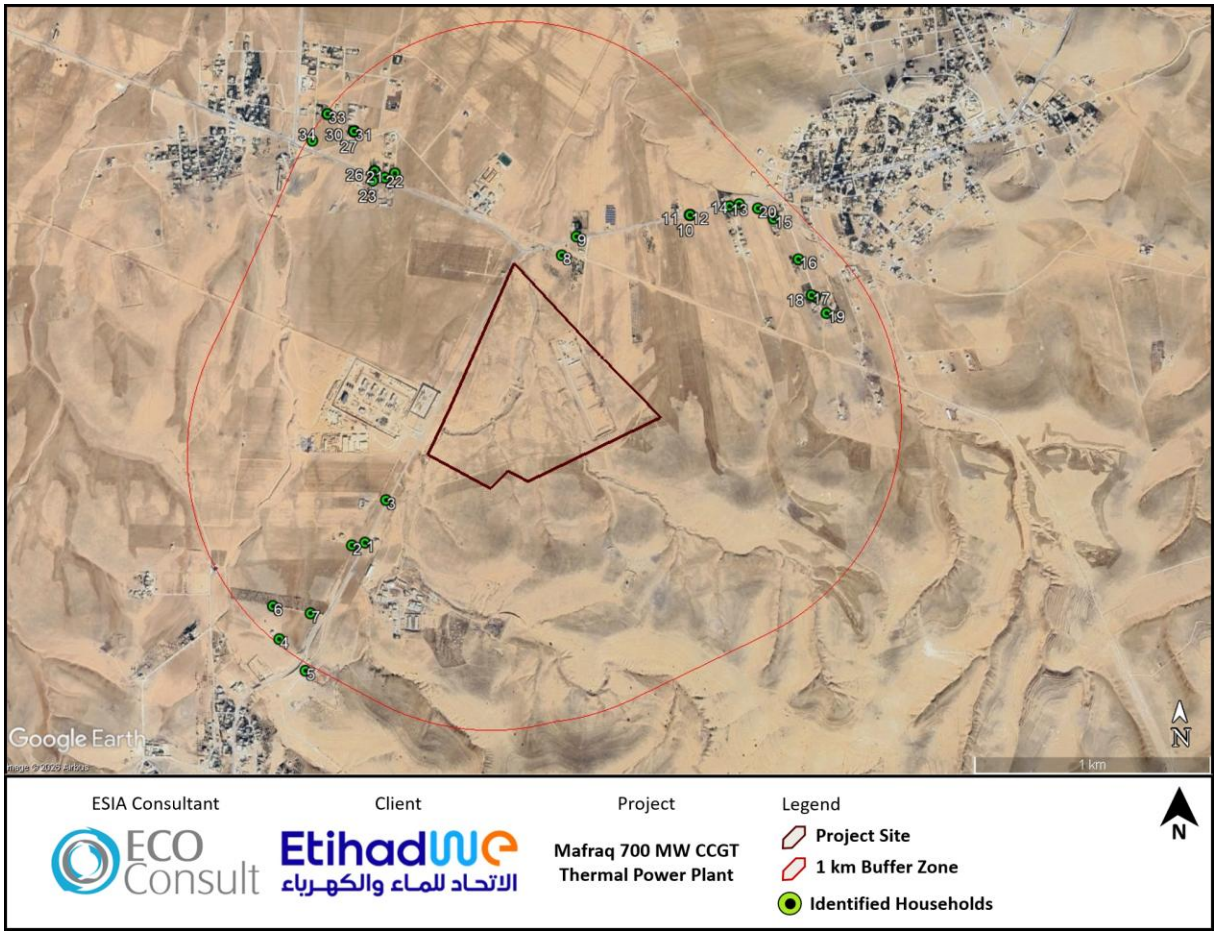


Figure 112: Identified Households within a 1 km Buffer

7.4 Focus Group Discussions (FGD)

Public Scoping Session

In accordance with requirements of "Environmental Classification and Licensing Regulation No. (69) of 2020", a public scoping session was held in Amman, Jordan at the Intercontinental Hotel (venue) on the 21st of May 2026. The objectives of the public scoping session included the following:

- Introduce the Project to stakeholders (location, components, activities, etc.);
- Present the methodology and study outlines of the Project;
- Identify key anticipated impacts; and
- Allow interested stakeholders to comment on the scope of work undertaken, key issues identified and any other issues of concern they might have.

The full session agenda is provided in the figure below.



Al Mafraq 700MW CCGT Power Plant
Environmental and Social Impact Assessment (ESIA)

Scoping Session Agenda
21 May 2026 – Intercontinental Hotel, Amman

10:00 – 10:30	Registration
10:30 – 10:35	Welcoming Speech *Ministry of Environment*
10:35 – 11:00	Project Concept and Components *Etihad Water & Electricity*
11:00 – 11:30	Discussion on Project Concept and Components *Facilitated by ECO Consult / Etihad Water & Electricity*
11:30 – 12:00	Coffee Break
12:00 – 12:30	ESIA and Potential Impacts of the Project *ECO Consult*
12:30 – 13:00	Discussion on ESIA and Potential Environmental Impacts *Facilitated by ECO Consult*
13:00 – 14:00	Lunch Break

Figure 113: Public Scoping Session Agenda

Announcement and Advertisement of the Session

The public scoping session was held on the 21st May 2026 at the Intercontinental Hotel, all invitations were sent to key stakeholders by the MoEnv. The list of invitees includes: (i) central, regional and local governmental entities, (ii) Non-Governmental Organizations (NGOs), (iii) academic and research institutions; (iv) local community representatives. In coordination with the MoEnv, all invitees were notified on the date and location of the public consultation session.

Participating Parties

The public scoping session was attended by a total of 17 registered participants, in addition to representatives of the Developer and the E&S Team. The session was facilitated by the 'E&S Team', with

a welcoming address delivered by MoEnv.

Attendees represented a broad range of governmental ministries, regulatory bodies, professional associations, and civil society organizations. A summary of the participating entities which included eight (8) males and nine (9) females is provided in the table below.

Attendance	**No.**
Ministry of Environment	2
AlKhanasri Animal Research Station	1
Ministry of Transportation	1
Ministry of Water and Irrigation	1
Ministry of Public Works and Housing	1
Ministry of Labor	1
Ministry of Industry	1
Ministry of Local Administration	1
Energy and Minerals Regulatory Commission (EMRC)	1
Jordan Standards and Metrology Organization (JSMO)	1
Royal Society for the Conservation of Nature (RSCN)	1
Royal Directorate for Environmental Protection	1
Jordan Engineers Association	1
Khalifeh & Partners (Legal)	2
Total	**17**

The public scoping session commenced with opening remarks delivered by MoEnv, which welcomed all participants and emphasized the importance of stakeholder engagement as a core component of the ESIA process for nationally significant energy Projects.

The Developer then presented an overview of the Project concept, components, location, and development phases, including the plant's combined cycle configuration, key infrastructure elements, and anticipated construction and operational activities.

The E&S Team subsequently delivered a detailed presentation on the ESIA scoping framework, the methodology adopted for the study, and an overview of the anticipated environmental and social impacts of the Project. The presentation addressed key impact areas including air quality and emissions, land use, hydrology and flood risk, water supply and wastewater management, biodiversity, hazardous materials, transportation, and community health and safety.



Figure 114: Photos from the Public Session

Following the presentation, an open discussion was held, during which attendees were given the opportunity to comment and raise concerns. The table below provides a summary of the key issues raised and the corresponding responses.

Table 69: Key Outcomes and Responses of the Public Scoping Session

E&S Attribute	Comment	Response	Issue Resolvance
Air Quality and Emissions	Participants raised concerns regarding the potential impacts of air emissions on the surrounding environment, including effects on the nearby agricultural research station, vegetation, and local communities. It was recommended that air quality be maintained during both construction and operation phases, and that the thermal impact of plant operations on the surrounding climate and environment be studied.	It was confirmed that a dispersion modeling study will be undertaken to assess pollutant dispersion under varying meteorological conditions and identify sensitive receptors. Air quality monitoring will be conducted at two locations approximately 1.0–1.2 km from the Project site, covering PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, and O_3. All potential air quality impacts will be assessed in accordance with Jordanian regulatory requirements and applicable international standards. If any mitigation measures are required to ensure such standards are met, those will be identified within the ESIA. In addition, there will be monitoring program to ensure that such impacts are within allowable limits at all times.	Air Quality Monitoring and dispersion modeling was undertaken. “Refer to Chapter 8.2” for additional details.

Climate Change and GHG Emissions	Participants requested that a climate change assessment be included within the ESIA scope, covering the Project's vulnerability to climate variability and long-term climate change impacts.	It was confirmed that a climate change vulnerability assessment will be conducted as part of the ESIA. Annual GHG emissions will be calculated and benchmarked against a defined baseline year using diesel consumption data as the reference scenario.	A Climate Change Risk Assessment has been undertaken. Refer to "Chapter 9.4"
Land Use — Military Shooting Range	Participants raised questions regarding the measures to be taken with respect to the existing military shooting range located within the Project footprint.	It was confirmed that the existing shooting range is planned to be relocated to an alternative designated location and a replacement facility developed in full coordination with the Armed Forces.	A Prime Ministry Decision Letter and Land Deed which states the land will be transferred to MEMR has been provided. Refer to "Chapter 6.7.2"
Land Use — Rangeland and Grazing	The Director of the AlKhanasri Animal Research Station noted that the Project site falls within the Al-Khanasri rangeland reserve. Concerns were raised regarding: (i) land allocated will affect availability of grazing areas and activities currently undertaken within the reserve; (ii) required compensation for agricultural activities within the Project affected plot and indicated that they have some elements within the land allocated for the Project such as water collection points. It was also noted that rangeland vegetation has been affected by declining rainfall, and that national rehabilitation initiatives are ongoing. Concerns were additionally raised regarding a privately owned strip of land between the Project site and the road, and required that these plots are acquired.	It was clarified that the Project site covers approximately 400 dunums, representing approximately 10% of the total Al-Khanasri reserve area of 4,000 dunums. The site has been officially allocated through a Prime Ministerial decision following review by the relevant licensing committee, which included representation from the MoA. It was also explained that previous discussions undertaken with AlKhanasri Animal Research Station specifically indicated that the 400 Dunums would not impact the current operations and that there are no infrastructure elements or activities currently within this area. It was explained that further discussions will be held with MoA and its representatives on this issue to investigate such issues further. Land use and biodiversity baseline surveys are being conducted as part of the ESIA to confirm site conditions.	A Prime Ministry Decision Letter and Land Deed which states the land will be transferred to MEMR has been provided. Refer to "Chapter 6.7.2"

		Coordination with municipalities and DLS will be undertaken to manage future land-use planning and will include specific measures around the strip between the Project and the road as required.	
Hydrology and Flood Risk	Participants highlighted that one or more wadis traverse or are located in proximity to the Project site, raising concerns about flash flooding and surface water flow risks during the operational phase.	It was confirmed that a detailed flood risk assessment incorporating climate change considerations and flood return period analysis will be conducted based on approximately 100 years of rainfall data. The Project design requires that critical infrastructure is designed to be elevated above ground level or protected through engineered flood mitigation measures. A geotechnical investigation will also be carried out by the contractor as part of the Project scope.	A flood risk assessment has been conducted for the Project site, and appropriate mitigation measures have been integrated. Refer to "Chapter 6.4.3".
Transportation and Infrastructure	A member of the Jordan Engineers Association recommended that the traffic study address the full transport route from the port to the Project site, that the port's capacity to handle large generator components be assessed, and that pollution from fuel transport trucks be evaluated. It was further noted that temporary shutdown or de-energization of overhead transmission lines may be required during the transport of large or oversized equipment.	It was confirmed that a transportation impact assessment will be conducted, covering the size, weight, and transport methodology of major equipment, and identifying required operational controls and mitigation measures. Coordination with NEPCO will be undertaken regarding OHTL requirements during equipment transport.	A Traffic and Transport Impact Assessment has been conducted. Refer to "Chapter 6.9.9"
Railway Infrastructure	A representative from MoT noted that a proposed new railway line may pass through or near the Project area and recommended that the Project team seek clarification from MoT regarding any land acquisition or setback requirements associated with this matter.	The E&S Team acknowledged the concern and confirmed that a formal inquiry has been submitted to the MoT requesting confirmation of the proposed railway alignment, its current development stage, required setback distances, and any applicable restrictions relevant to Project components including the OHTL, gas pipeline, and access roads.	A response was provided by MoT which was subsequently accounted for in the ESIA. Refer to "Chapter 6.9.7"

Wastewater Management	Participants raised questions regarding wastewater generation and management, and specifically requested assurance that no effluent would be discharged into nearby wadis or natural drainage channels.	It was confirmed that the plant is being designed to operate on a Zero Liquid Discharge (ZLD) principle, whereby no process water or effluent is released to the external environment. All wastewater and oily water streams are collected, treated, and resulting effluent directed to evaporation ponds. No discharge of process water or effluent into wadi channels or surrounding surface water systems is permitted under the Project design.	N/A
Water Supply	Participants raised questions regarding the Project's water requirements and potential impacts on local water availability.	It was confirmed that a water supply agreement has been signed with Yarmouk Water Company, providing an allocated supply of approximately 600 m^3 per day. All raw water will be treated on site prior to use in the steam cycle and fogging systems. The Project design aims to minimize overall water consumption.	N/A
Hazardous Materials	Participants raised concerns regarding the storage and handling of chemicals on site and potential risks to the surrounding environment.	It was confirmed that chemical use on site is minimal and primarily associated with the HRSG steam cycle. All chemicals are planned to be stored in armored tanks on reinforced concrete pads with secondary containment bunding, ensuring full containment in the event of any leakage. Chemicals will be stored and handled in accordance with applicable safety and environmental requirements.	Hazardous Materials Management have been addressed. Refer to “Chapter 8.5.2”
Operational Risk — Proximity to Gas Infrastructure	Concerns were raised regarding potential operational and safety risks associated with the proximity of the Project site to an existing gas facility located around 90 m away.	MoEnv confirmed that a detailed risk assessment and cumulative impact assessment will be undertaken as part of the EIA process in accordance with Jordanian Environmental Protection Law No. 97 and applicable Environmental Classification and Licensing Regulations.	A cumulative risk assessment has been undertaken. Refer to “Chapter 8.13”

		The Project has been reviewed by the Energy and Minerals Regulatory Commission (EMRC) for compliance with applicable technical and safety requirements. The proximity to existing gas infrastructure may also provide operational advantages, including reduced cost and complexity associated with the gas pipeline connection.	
Biodiversity	MoEnv's Licensing Department raised the importance of biodiversity assessment as part of the Project approval process. The Jordan Standards and Metrology Organization (JSMO) recommended compensating for vegetation removal through tree planting to increase vegetation cover in the area.	It was confirmed that a biodiversity inventory and ecological value assessment will be conducted as part of the ESIA baseline studies, consistent with the requirements of the Project licensing committee, which includes representation from the MoA.	This was undertaken as part of the biodiversity baseline assessment. Refer to "Chapter 6.3".
Written Comments and Recommendations	The following written recommendations were submitted by participants: ▪ prioritize local employment and transparent recruitment during construction and operation; ▪ maintain air quality and mitigate environmental impacts during all Project phases; ▪ cooperate with the local community to improve standards of living and environmental quality; ▪ establish procedures and criteria for subcontractor selection to maximize safety and reduce accident rates while creating local opportunities; ▪ engage youth representatives in future consultations; and ▪ coordinate with other Projects in the area to activate community CSR plans and address community needs.	All written comments and recommendations have been documented and will be incorporated into the ESIA and the Project's Environmental and Social Management Plan (ESMP). The Developer will consider the full range of recommendations raised in developing the Stakeholder Engagement Plan, Recruitment Plan, and Social Development Plan for the Project.	N/A

Local Communities

As part of the targeted interviews that were conducted on the 20th and 21st of May, two (2) Focus Group Discussions (FGD) were held in Mafraq at the following village locations. The FGD aimed to ensure all impacted communities as identified within "Chapter 5.2" earlier are included within such engagements.

- Manshyet Bani Hassan Community on the 20th of May 2026. This session was targeted for the following communities: (i) Manshyet Bani Hassan, (ii) Umm Al Lulu, and (iii) Deir Al Waraq; The session was attended by a total of 12 participants, comprising seven (7) males and five (5) females; and
- AlHarsh Community on the 21st of May 2026. This session was targeted for the following communities: (i) AlHarsh, (ii) Faa', (iii) Buraiqa, (iv) AlKhanasri, and (v) Hosha. The session was attended by a total of 22 participants, comprising 15 males and seven (7) females.
- Accordingly, both FGD sessions included participation from both male and female community members, with a total of 34 participants across the two sessions, including 22 males and 12 females.

At the beginning of each session, a presentation on the Project was first provided along with a handout on the following key topics. Description of the Project location along with maps;

- Description of key Project components along with figures and illustrations;
- Description of the key activities anticipated in each key phase of the Project (planning, construction and operation);
- Description of ESIA study and its key components and requirements;
- Explanation of key anticipated E&S impact under each phase of the Project; and
- Explanation of the methodology and scope of work that will be undertaken for the ESIA.

Upon completion of the above informative session, each group was separated for general discussions as well as discussion on any comments or key issues of concern on the overall Project and/or the ESIA process in particular. Key discussions were undertaken in relation to the following key aspects:

- Economic activities and livelihood strategies
- Land use activities
- Community quality of life
- Perceptions toward the Project
- Community structure (ethnic and tribal groups, religion, ethnic minorities, etc.)
- Cultural and Heritage sites

The presentation and handouts were provided in the Arabic language, as well as the delivery of the presentation.

Announcement and Advertisement of the Session

Both sessions were announced one (1) week in advance and widely distributed through coordination with the respective local municipal authorities and community networks. Invitations were extended through

the following channels:

- The Manshyet Bani Hassan Municipality's official website and social media platforms;
- Physical notices posted at high-footfall community locations, including mosque entrances and the premises of local civil society associations within the municipalities and surrounding areas;
- Direct outreach to community leaders, local representatives, and representatives of relevant community sectors in both areas; and
- Direct outreach to the community members during the household consultations.

Both sessions were open to all interested community members and stakeholders. In addition to the public announcements, targeted invitations were extended to key stakeholder groups. Invitees included representatives of the Mafraq Governorate, Manshyet Bani Hassan and AlHarsh sub-districts (Qadaa'), the respective municipalities, local research and agricultural institutions, community leaders, civil society organizations, and representatives of the agricultural, women, and youth sectors. All invitees were notified of the session dates, times, and locations in advance, in coordination with the 'E&S Team'. Copies

of the session invitations and public advertisements are provided in the figures below.



Figure 115: Announcement Poster for Manshyet Bani Hassan FGD


دعوة حضور جلسة التشاور الخاصة بمشروع محطة توليد الطاقة الحرارية
(مشروع محطة المفرق)

اشارة الى موافقة رئاسة الوزراء بتاريخ 7 نيسان 2026، على تطوير مشروع محطة المفرق لتوليد الطاقة الحرارية بنظام الدورة المركبة (CCGT) بقدرة 700 ميجاواط.

و حيث تم اختيار شركة الاتحاد للطاقة والمياه لتطوير المحطة و التي قامت بتعين شركة ECO Consult للقيام بدراسة تقييم الأثر البيئي والاجتماعي للمشروع وفقاً لمتطلبات وزارة البيئة وأفضل الممارسات العالمية.

يشرفنا دعوة ابناء المجتمع المحلي في قضاء حوسًا لحضور جلسة التشاور الخاصة بالمشروع و التي تنفذها شركة ECO Consult و المنوي عقدها يوم الخميس الموافق لتاريخ 2026/5/21 الساعة 11 صباحا في قاعة جمعية سيدات الحرش الواقعة في قرية منطقة الحرش/ قضاء حوسًا

حضوركم يشرفنا

ESIA Consultant | Project: Mafraq 700 MW CCGT Thermal Plant | Client: Etihad Water & Power الاتحاد للماء والكهرباء

Figure 116: Announcement Letter for AlHarsh FGD

The table below presents an overall summary of the outcomes of these Focus Group Discussions (FGDs) for each community.

Table 70: Key Outcomes of FGDs

Community	Date	Key Outcome	Issue Resolvance
Manshyet Bani Hassan	20 May 2026	The Project description, ESIA methodology, and anticipated environmental and social impacts were presented to local community members, municipal representatives, community leaders, and civil society representatives.	N/A
		Participants recommended that wind direction data spanning at least 20 years be obtained from the Jordan Meteorological Department to ensure accurate dispersion modeling in the ESIA.	N/A
		Concerns were raised regarding carbon emissions, greenhouse gases, localized dust accumulation on agricultural land and residential properties, and gas-associated odors. Continuous air quality monitoring at nearby residential receptors was requested throughout the Project lifecycle.	Air Quality Monitoring and dispersion modeling was undertaken. “Refer to Chapter 8.2” for additional details.
		A request was made to include a long-term assessment of climate change implications, rainwater patterns, and hydrological impacts within the ESIA scope, covering a 20-year scenario.	A Climate Change Risk Assessment has been undertaken. Refer to “Chapter 9.4”
		The community noted that a wadi dam in the area experienced an overflow event last year and requested that	A flood risk assessment has been conducted for the Project site, and appropriate mitigation measures

		Project design account for flash flood management and surface runoff.	have been integrated. Refer to "Chapter 6.4.3".
		Community members questioned the rationale for selecting a gas-fired plant over renewable energy alternatives, citing lower emissions and greater economic efficiency of solar and wind technologies.	N/A
		They also raised concerns regarding site selection in proximity to residential areas rather than open desert locations and requested that a clear Analysis of Alternatives be included in the ESIA.	Analysis of Alternatives was conducted. Refer to "Chapter 3.1"
		Residents expressed concern that the distance between the Project site and the municipality may limit local access to employment. Participants requested that local hiring be prioritized during construction and operation phases, that a defined local employment quota be established, and that a dedicated employment committee be formed through the municipality to manage recruitment transparently.	This has been taken into consideration. Refer to "Chapter 8.11"
		Tangible community benefits were emphasized as a prerequisite for community acceptance, with participants noting that perceived negative impacts currently outweigh anticipated benefits in the absence of mitigation measures and community benefit programs.	N/A
		The area surrounding the Project site is used as a seasonal recreational and outdoor space, particularly during spring, and as a hunting area. Concerns were raised regarding visual impacts, landscape modification, and potential restrictions on public access once the Project becomes operational.	A Landscape and Visual Impact Assessment has been conducted which took this concern has been addressed. "Refer to "Chapter 8.6"
		Possible CSR Projects include establishing a public park or green area.	A CSR is advised to be developed as part of the ESMS. Refer to "Chapter 10.2
		The Project is located in proximity to a local research center ecosystem. Stakeholders requested specific ecological monitoring and mitigation measures for this area, and proposed that any protected or sensitive flora affected by construction be relocated where feasible.	This was undertaken as part of the biodiversity baseline assessment. Refer to "Chapter 6.3".
		Concerns regarding potential impacts of industrial emissions on community health, including long-term exposure to particulate matter, dust, and operational noise, were raised. Stakeholders also requested clear definition of safety buffer zones around Project infrastructure.	Air Quality & Noise Monitoring and dispersion modeling was undertaken "Refer to "Chapter 8.2 and Chapter 8.3" for additional details.
		The community requested that Project waste management protocols be aligned with local municipal capacity and infrastructure, and that pollution control systems be communicated transparently.	This has been addressed in the infrastructure and utilities chapter. Refer to "Chapter 6.9"
AlHarsh Community	21 May 2026	The Project description, ESIA methodology, and anticipated environmental and social impacts were presented to local community members, municipal representatives, and community leaders from the Al Hursh area.	N/A
		Participants referenced prior experience with existing industrial developments in the area, including the gas station and cement operations, and expressed concern regarding cumulative impacts from successive industrial development.	A cumulative risk assessment has been undertaken. Refer to "Chapter 8.13"

		No community consultation was conducted for the gas station Project.	
		Community members noted that locals have historically received limited employment from nearby industrial facilities. Participants requested guaranteed employment targets, a minimum local hiring percentage, access to technical and management positions for qualified locals, and involvement of local committees in candidate nomination.	This has been taken into consideration. Refer to "Chapter 8.11"
		Participants requested that a recruitment plan and job vacancies be announced prior to construction, with community members trained to fill Project roles in advance.	This has been taken into consideration. Refer to "Chapter 8.11"
		Al Harsh was described as underserved with limited economic opportunities. Participants emphasized the need for tangible and sustained community benefits from the Project.	A CSR is advised to be developed as part of the ESMS. Refer to "Chapter 10.2
		Concerns were raised regarding construction traffic impacts on local road networks. Participants requested rehabilitation of roads and infrastructure affected by Project activities, and noted the need for improved connectivity with surrounding developments including Cyber City.	A Traffic and Transport Impact Assessment has been conducted. Refer to "Chapter 6.9.9"
		Environmental concerns which include GHG emissions, air quality impacts, and effects on human health, vegetation, and fauna. Detailed information on expected emissions, monitoring measures, pollution control systems, and daily fuel transport volumes was requested.	This has been considered in detail in Chapter 8.
		Participants raised concerns regarding the Project's water requirements and potential impacts on local water availability and requested assurance that wastewater would not be discharged into nearby wadis. Participants also questioned whether the Project would drill new water wells.	This has been addressed in the infrastructure and utilities chapter. Refer to "Chapter 6.9"
		Concerns were raised regarding privately owned land near the Project site, including potential restrictions on future development and reductions in land value.	It was explained that the proposed CCGT is not expected to result such reductions as the project will be located within an existing fenced grazing reserve used primarily for research purposes,. The wider area is already characterized by major infrastructure and restricted land uses, including a gas compression facility, OHTLs, a substation and a military shooting range. The CCGT would therefore represent an incremental addition to an established energy and infrastructure landscape rather than the introduction of an incompatible land use. Given the project will entail appropriate controls for noise, emissions and visual impacts, any incremental effect on surrounding land values is expected to be negligible.

		The area is used seasonally for recreation and hunting. Concerns were raised regarding public access restrictions and visual impacts during operations.	A Landscape and Visual Impact Assessment has been conducted which took this concern has been addressed. “Refer to “Chapter 8.6”
		Participants proposed scholarships, university support, technical training, and skills development initiatives. Establishment of a health center or support for the existing healthcare system was also requested as a community benefit.	A CSR is advised to be developed as part of the ESMS. Refer to “Chapter 10.2
		Requests were made for ongoing and transparent engagement with municipalities and local communities throughout all Project phases.	This has been taken into consideration. Refer to “Chapter 8.11”
		Several participants expressed concern that the consultation was purely procedural given the Project's existing Cabinet approval. Some indicated outright opposition, while others conditioned acceptance on implementation of mitigation measures and community benefits.	N/A



Figure 117: FGD with Manshyet Bani Hassan Community



Figure 118: FGD with Al-Hursh Community

8. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT, MITIGATION AND MONITORING

8.1 Introduction

This Chapter of the ESIA presents the assessment of E&S impacts associated with the construction and operational phases of the Project as described within 'Chapter 5' of this ESIA.

Scoping was initially undertaken to identify the potential interactions between the Project and potential receptors, and the most significant impacts anticipated. Assessment of these potential impacts has been undertaken, considering the predicted magnitude of effect and receptor sensitivity, and the significance of the impact has been ranked in line with the impact assessment methodology presented in 'Chapter 3'.

Mitigation has then been identified to determine the measures to be implemented to further manage and/or reduce impacts (where identified as adverse) and the stage at which these measures should be implemented, i.e. prior to detailed design, at the commencement of construction, during construction, and prior to and during operations. Impact rankings are then re-evaluated post-mitigation to determine the significance of the remaining residual impacts, with justification provided for changes to the ranking.

Where relevant, the monitoring and reporting activities to confirm that mitigations are implemented and effective are also provided. The mitigations form commitments for the Project to be implemented through the Environmental and Social Management and Monitoring Plan (ESMMP) and associated supporting plans and procedures, and through the Environmental and Social Management System (ESMS) as relevant, discussed in further detail in 'Chapter 10'.

8.2 Air Quality and Dust

8.2.1 Scoping

Construction activities with the potential to affect air quality will include:

- Use of construction plant and equipment to undertake:
  - Site preparation, excavation, civil and mechanical works to construct the CCPP and supporting facilities within the Plant Area, including flood protection measures
  - Levelling and grading across the temporary laydown area
  - Preparation, excavation, civil and mechanical works to construct the substation within the substation area
  - Site preparation and levelling along the OHTL route, including at tower locations and laydown areas
  - Vegetation clearing and topsoil stripping, grading, trenching and backfilling along the construction corridor of the gas and water pipeline tie-ins
- Earthworks and soil movements associated with the formation of temporary construction and future permanent access roads to the Project site and the Associated Facilities
- Soil movements associated with the reinstatement of the areas disturbed during construction

Operational activities will include:

- Operation of the CCPP turbines, under both routine and non-routine conditions, to generate electricity.

Potential impacts on air quality associated with the use of the black start generators during operations are scoped out on the basis of the anticipated very limited and short-term use over the Project's 25-year lifetime. Potential dust impacts are limited to the construction phase, arising from earthworks and soil movements.

The preliminary Area of Influence (AoI) for air quality impacts was defined as an area of 5 km radius, encompassing the Project site, the OHTL, and gas and water pipeline tie-ins, based on professional judgment and experience from similar projects. A subsequent screening-level assessment focused on operations indicated that maximum ground-level concentrations were anticipated within 1-2 km of the Project emission sources; the 5 km AoI has, however, been retained for the purposes of assessment and is considered conservative.

8.2.2 Air Quality and Dust Impacts

This assessment focuses on air quality and dust impacts associated with:

- Use of construction plant and equipment to undertake construction activities across the Project Site (Plant Area, Substation Area and Temporary Laydown Area) and Associated Facilities based on indicative plant and equipment types and numbers, including trucks and buses used for transportation

- Generation of dust associated with site preparation, earthworks and spoil movement across the Project Site and along the OHTL and gas and water pipeline tie-ins routes
- Use of the CCPP turbines during the operations phase

8.2.2.1 Receptor Sensitivity

The key receptors sensitive to changes in air quality due to the Project comprise the communities and properties located within the AoI, where changes to concentrations of pollutants during the operational phase are anticipated to occur, with communities closer to the Project Site and Associated Facilities (within 1-2 km) potentially most affected by changes in air quality and also by the generation of dust due to construction works. The towns and villages located within 5 km of the Project Site include (refer to 'Chapter 5' for locations):

- Faa', AlHarsh, AlKhanasri, Buraiqa Hosha within Northwestern Badia District.
- Umm Al Lulu, Deir Al Waraq and Manshyet Bani Hassan within Qasabet Al Mafraq District.

The closest receptors to the Project site comprise residences to the southwest, northwest and north (at approximately 500m, 715m and 525m from the Project site boundary, respectively).

Baseline monitoring results recorded at the nearest long-term monitoring station at Al Mafraq / Al Khalediah, as presented in 'Chapter 6' of this ESIA, indicate that while applicable limit values for NO_2 and SO_2 are routinely met, the PM_{10} limit values are frequently exceeded. Exceedances are known to result from spikes during sandstorms, which can last several days and affect entire regions. The long-term results are supported by the short-term baseline survey results for the two (2) locations selected to be representative of the nearest communities where concentrations of SO_2, CO and NO_2 were recorded at between 17.4 and 29.4% of the relevant annual air quality standards, while PM_{10} and $PM_{2.5}$ were recorded at between 61.6% and 90.7% of the annual standards for these parameters.

The results from both long-term monitoring and survey monitoring indicate generally good air quality, typical of the semi-rural environment, with PM_{10} and $PM_{2.5}$ levels characteristic of the arid environment.

Both air quality and dust are key areas of concern within the communities consulted as part of the stakeholder consultation process (refer to 'Chapter 7)', particularly with respect to their potential to affect human health and create a nuisance. Indirect impacts on livelihoods due to adverse air quality affecting livestock were also raised as an area of concern during scoping. There are no widely adopted air quality standards for livestock; however, it is recognized that animals are sensitive to particulate matter and dust, which can have respiratory effects. Dust may also affect grazing, depending on the potential for deposition in livestock grazing areas. 'Chapter 8.8' below discusses land use in the vicinity of the Project Site and Associated Facilities, noting that the Project Site itself is located on an allocated development plot within the wider Khanasri Grazing Reserve, an area managed by the MoA and restricted to external grazers. Outside of the reserve, the area is known to be used by local grazers. Smallholdings and local farms are present across the wider area and within Mafraq Governorate, where agriculture and livestock rearing represent a relatively significant part of the local economy (see 'Chapter 6' for further detail). No agricultural holdings have been identified in the immediate vicinity of the Project Site, with properties along the OHTL and pipeline tie-in routes limited to a poultry-farming area adjacent to the OHTL route.

The sensitivity of receptors to changes in air quality and nuisance associated with dust is assessed as **Medium Negative** with the following justification:

- Value, vulnerability and presence:
  - Potential for minor to moderate deterioration in air quality and moderate potential for nuisance at receptors, particularly residential properties within approximately 1 km of Project activities and grazing areas within and adjacent to the Grazing Reserve.
- Resilience
  - For the construction period, increases in pollutants and creation of dust will be temporary in nature, short to medium term, and reversible; the effect on the receptors will not continue once construction works have ceased.
  - During operations, while increases in pollutants will occur over the period of operations, current air quality is considered good, and concentrations of key pollutants are well below applicable air quality standards except for particulate matter which is heavily influenced by natural dust levels due to the arid environment.

8.2.2.2 Magnitude of Effect

With regard to construction impacts, emissions from fuel combustion will arise from the operation of construction plant and equipment including excavators, graders, rollers, dozers, dump trucks etc. as well as temporary diesel generators for the period of the construction works. While the precise number and type of equipment has not yet been determined the spread is expected to be of a similar scale and plant types as was assessed for the Above Ground Installation (AGIs) elements of the proposed Aqaba-Amman Water Desalination and Conveyance Project[43] where the footprint affected and construction activities are analogous Screening studies undertaken for the proposed Aqaba-Amman Water Desalination and Conveyance Project AGIs indicated that in areas of good air quality, the operation of construction plant would not result in air quality impacts of greater than negligible significance at distances of 30-45m from the construction area, assuming all plant in operation. On this basis, no measurable impact to air quality is anticipated for the receptors closest to the Project Site, and very minor temporary changes only in air quality along the pipeline and OHTL routes.

Dust refers to both suspended and deposited particulate matter up to 75 microns (µm) in diameter and has the potential to create a public nuisance through deposition. PM_{10} and $PM_{2.5}$ are defined as particulate matter with aerodynamic diameters of less than 10 and 2.5 microns (µm), respectively, and result from a combination of man-made (construction work) and natural processes, such as the wind entraining particles during periods of extended dry weather. While limit values exist for both PM_{10} and $PM_{2.5,}$ there are no national or international standards or objectives for dust. As such, industry best-practice guidance is adopted to assess the potential for dust impacts, taking into account potential health impacts associated with PM_{10} and $PM_{2.5}$, as well as nuisance due to dust soiling.

The Project will involve site preparation and stripping, trenching, excavations, and soil movements at the Project Site and in the vicinity of the Associated Facilities. On this basis, and given the inherently dusty nature of the environment, it is considered that all stages of construction work are likely to pose an elevated risk of dust emissions. This is further supported by the baseline air quality data presented in 'Chapter 6' for PM_{10} and $PM_{2.5,}$ as well as by reported observations of frequent dust storms across Jordan.

[43] Jordan: Aqaba-Amman Water Desalination and Conveyance Project (AAWDCP) Environmental and Social Imapact Assessment

To assess operational air quality impacts, an air quality dispersion modeling study was undertaken using internationally recognized AERMOD software to estimate the predicted increases in key pollutants from the operation of the CCPP turbines during both routine and non-routine conditions and to compare the predicted concentrations with the applicable Project air quality standards. The assessment was based on inputs including three (3) years of meteorological data, a digital terrain model, Project layout and building dimensions, and key operating parameters provided by the Project, including anticipated fuel specifications, stack dimensions, exit temperatures, and flow rates. The four scenarios considered in the assessment comprised:

- Scenario 1: 3 x Gas Turbines in Combined Cycle configuration running on natural gas
- Scenario 2: 3 x Gas Turbines in Simple Cycle configuration running on natural gas
- Scenario 3: 3 x Gas Turbines in Combined Cycle configuration running on diesel
- Scenario 4: 3 x Gas Turbines in Simple Cycle configuration running on diesel

It should be noted that Scenario 1 represents routine operations, while Scenarios 2, 3, and 4 represent non-routine operations when either combined-cycle operation or gas supply is unavailable. With respect to Scenario 2, this represents the first year of operation, during which simple-cycle operation is expected for the duration of the year.

The model predicted maximum ground level increases in pollutant concentrations across a gridded receptor domain of 50 km by 50km and at specific locations representative of the nearest receptors to the Project Site (see Figure 119). The predicted increases were combined with background air quality concentrations derived from a short-term air quality monitoring survey as described in 'Chapter 6', supplemented with long-term monitoring station results to compare the predicted results with the applicable Project air quality standards[44].

[44] In line with IFC guidance, applicable air standards comprise the national Jordanian standards. These are specified within JS 1140 Ambient Air Quality of 2024. Refer to Chapter 2 for further details.



Figure 119: Location of Sensitive Receptors Included Within Operational Air Quality Modeling Study

A summary of the results is provided below, with the full air quality assessment study presented within Annex III of this ESIA.

For Scenarios 1 and 2 (combined and simple cycle operation where natural gas is the fuel source), the modeling estimated that Project contributions (specifically for NO_2 and CO[45]) are anticipated to be well below the applicable air quality standards with no exceedances predicted either in isolation or in combination with existing background levels and significant headroom between the predicted concentrations and the standards. For Scenarios 3 and 4 (combined and simple-cycle operation where diesel is the fuel source), contributions were modeled for NO_2, CO, PM_{10}, and SO_2. The modeling found that for NO_2, CO and PM_{10} Project contributions are anticipated to be below the applicable air quality standards, with no exceedances predicted either in isolation or in combination with existing background levels. For SO_2, modeling was initially undertaken conservatively, assuming a worst-case sulfur content of 1% by mass in the supplied diesel fuel, which indicated potential exceedances of the applicable 1-hour SO_2 standard, albeit for the anticipated short diesel operation (no more than 14 days per year). Sensitivity modeling undertaken assuming a sulfur content of no more than 0.5%, which aligns with the anticipated content indicated by suppliers, eliminated the potential predicted exceedances.

[45] Emission rates of SO_2 and PM are negligible for the natural gas scenarios due to the gas composition hence these parameters were modelled for Scenarios 1 and 2

In general, the assessment found that, for combined cycle operations, both for gas and diesel scenarios, the use of the HRSG results in a reduction in exhaust parameters, specifically exit temperatures, meaning a reduction in plume rise and dispersion as compared to simple cycle operations.

A summary of the predicted results at the three selected receptors for the four modeling scenarios is provided in Table 71 below (based on the more realistic 0.5% SO_2 diesel content for Scenarios 3 and 4).

Table 71: Summary of Predicted Air Quality Concentrations at Selected Receptors SR1, SR2 and SR3 for Scenarios 1-4

			Scenario 1			Scenario 2			Scenario 3			Scenario 4		
			SR1	SR2	SR3	SR1	SR2	SR3	SR1	SR2	SR3	SR1	SR2	SR3
NO2	Annual Average	Increase in NO2 concentration (µg/m³)	0.2	1.2	0.7	0.1	0.4	0.3	0.4	2.8	1.6	0.2	1.1	0.9
		% of air quality standard	0.2%	1.3%	0.7%	0.1%	0.4%	0.3%	0.4%	3.0%	1.7%	0.2%	1.2%	0.9%
		% increase above background concentration	0.8%	4.5%	2.6%	0.4%	1.5%	1.1%	1.5%	10.5%	6.0%	0.8%	4.1%	3.4%
	24 Hour	Increase in NO2 concentration (µg/m³)	3	8.8	4.4	1	3.4	2	7.2	20.8	10.3	2.7	9.6	5.6
		% of air quality standard	2.0%	5.9%	2.9%	0.6%	2.2%	1.3%	4.8%	13.8%	6.9%	1.8%	6.4%	3.7%
		% increase above background concentration	5.6%	16.6%	8.3%	1.9%	6.4%	3.8%	13.6%	39.2%	19.4%	5.1%	18.1%	10.5%
	1 Hour	Increase in NO2 concentration (µg/m³)	28.5	36.7	33.7	11	17	18.6	62	86.4	78.5	32.6	47.6	46.4
		% of air quality standard	7.2%	9.3%	8.5%	2.8%	4.3%	4.7%	15.7%	21.9%	19.9%	8.3%	12.1%	11.8%
		% increase above background concentration	53.7%	69.1%	63.5%	20.7%	32.0%	35.0%	116.8%	162.7%	147.8%	61.4%	89.6%	87.4%
CO	8 hour	Increase in CO concentration (µg/m³)	5.3	14.7	8	1.7	5.6	3.6	4.1	11.7	6	1.6	5.4	3.3
		% of air quality standard	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.1%	0.0%
		% increase above background concentration	0.2%	0.6%	0.3%	0.1%	0.2%	0.1%	0.2%	0.5%	0.2%	0.1%	0.2%	0.1%
	1 hour	Increase In CO concentration (µg/m³)	17.1	22	20.2	6.6	10.2	11.2	12.6	17.5	15.9	6.6	9.6	9.4
		% of air quality standard	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
		% increase above background concentration	0.3%	0.4%	0.4%	0.1%	0.2%	0.2%	0.2%	0.3%	0.3%	0.1%	0.2%	0.2%
SO2	Annual Average	Increase in SO2 concentration (µg/m³)	n/a			n/a			0.7	4.8	2.75	0.25	1.85	1.5
		% of air quality standard							1.4%	0.7%	4.6%	2.6%	0.2%	1.8%
		% increase above background concentration							6.8%	3.4%	23.2%	13.3%	1.2%	8.9%
	24 Hour	Increase in SO2 concentration (µg/m³)							13.95	41.65	20.1	7.2	19.25	10.15
		% of air quality standard							7.6%	3.8%	11.4%	5.5%	2.0%	5.2%
		% increase above background concentration							67.6%	33.8%	100.8%	48.7%	17.4%	46.6%
	1 Hour	Increase in SO2 concentration (µg/m³)							106.7	148.75	135.05	56.1	81.95	79.85
		% of air quality standard							27.1%	13.6%	18.9%	17.2%	7.1%	10.4%
		% increase above background concentration							516.5%	258.2%	360.2%	327.0%	135.8%	198.4%
PM10	Annual Average	Increase in PM10 concentration (µg/m³)							0	0.1	0.1	0	0	0
		% of air quality standard							0.0%	0.1%	0.1%	0.0%	0.1%	0.0%
		% increase above background concentration							0.0%	0.2%	0.2%	0.0%	0.0%	0.0%
	24 Hour	Increase in PM10 concentration (µg/m3)							0.2	0.7	0.3	0.1	0.3	0.2
		% of air quality standard							0.2%	0.6%	0.3%	0.1%	0.3%	0.2%
		% increase above background concentration							0.2%	0.8%	0.3%	0.1%	0.3%	0.2%

Overall, the magnitude of impact to air quality as a result of construction activities is assessed as **Low,** and the magnitude of impact associated with dust is **Medium,** with the following justification:

- Construction activities associated with the Project site, Associated Facilities and within temporary Project areas, e.g., laydown areas, storage areas, will occur over periods of months.
- No exceedances of air quality limits are anticipated at any locations as a result of the use of construction plant and equipment including temporary generators.
- Embedded routine construction controls that contribute to minimizing emissions from the use of construction plant include:
  - All machines in intermittent use shall be shut down in the intervening periods between work or throttled down to a minimum. Lorry engines will be switched off when vehicles are stationary.
  - 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 applicable standards in 'Chapter 2'.
  - 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.
  - Fixed combustion equipment selected for use in construction activities (including temporary construction camp diesel generator where required) shall meet relevant emission source limits as stipulated within national legislation.
- With respect to dust, there is potential for short- to medium-term increases in dust deposition and PM (PM_{10} and $PM_{2.5}$) concentrations at all locations adjacent to the construction activities, lasting for the duration of the construction activities.

With regard to operational impacts, based on the modeling assessment undertaken, the magnitude of impact to air quality as a result of operational activities is assessed as **Low,** with the following justification:

- No exceedances of air quality limits for NO_2, CO, SO_2 or PM_{10} are predicted at any location for the operational scenarios assessed, which represent the full range of anticipated operations.
- Under routine operations (combined cycle using natural gas) and for the simple cycle operations using natural gas (anticipated for the first year of operation), the modeling predicts increases in pollutant concentrations that are less than 25% of the Project standards with no measurable contribution to SO_2 or PM concentrations.
- Under non-routine operations using diesel, while increases in pollutant concentrations are greater, particularly for SO_2, no exceedances of the applicable air quality standards are predicted (assuming diesel with a sulphur content of 0.5% or lower).
- Aspects included within the design basis that contribute to the control of emissions include:
  - Turbine operations using diesel are restricted to occasions when natural gas is not available and to periods of less than 14 days per year.
  - The gas turbines (GTs), HRSG and auxiliary boiler will be equipped to continuously monitor and record NOX, SOX, CO and O2 emissions using a continuous emissions monitoring system (CEMS).

- The gas turbines shall utilize dry low NOx technology for abatement of NOx emissions.
- A series of test points shall be arranged in the exhaust ducts at positions such that the distribution and temperature of the exhaust gas can be determined, and the exhaust gas sampled in accordance with the agreed test code.
- Gas and diesel fuel systems will incorporate analysers and metering to confirm flow rates and fuel characteristics, including composition.

8.2.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation (taking into account receptor sensitivity and magnitude of effect ranking), the impact significance of air quality for both construction and operation is considered to be **Minor Negative,** and the impact significance of dust during construction is considered **Moderate Negative.**

Mitigation to reduce the potential impact significance associated with air quality and dust impacts is defined below:

- Construction planning, to be completed prior to construction:
  - Incorporate the following dust management measures within the Air Quality and Noise Management Plan prior to the commencement of works:
    - Identification of dust-generating construction activities and identification and classification of potentially affected sensitive receptors
    - Review and evaluate dust management practices for minimizing dust impacts to residents, occupants, and animals, and minimize the potential for sedimentation of watercourses/water bodies due to dust. Practices may include, but are not limited to:
      - 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
      - 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
      - Where wet suppression techniques are considered, an evaluation will be required to provide suitable justification, including the proposed source of water (with preference for reclaimed water use)
    - Protocols for engagement with residents and local land users to provide advance warning of works taking place where relevant, including the duration and likely dust impacts. In the case of work required in response to an emergency, the local residents and land users shall be advised as soon as reasonably practicable that emergency work is taking place.
    - Dust monitoring program to include:

- Location, frequency, and approach for undertaking onsite and offsite visual inspections during construction activities to confirm the effectiveness of dust control measures and the need, if required, for additional dust reduction measures and management practices to adequately control dust emissions
- Records of inspections and findings to be kept and maintained
- Triggers for increasing the frequency of site inspections, e.g. when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions
- Reporting and communication process related to dust visual monitoring results

- Ensure the Project Grievance Mechanism includes the process for handling and responding to dust complaints, including requirements associated with conducting reviews of dust management practices and dust monitoring in response to complaints.

- Construction Phase:
  - When storage, transport, and handling of bulk materials are made in the open air and exposed to the wind, the necessary dust abatement measures shall be implemented.
  - All dust-generating materials transported to and from the construction worksites shall be covered by sheeting.
  - The following shall be implemented to the extent possible/practicable:
    - Minimize the storage time of spoil stockpiles
    - Align stockpiles to the prevailing wind to minimize surface area exposed to wind erosion
    - Minimize stockpile height and use gentle slopes and compact stockpile surfaces
    - Store materials away from the site boundary and downwind of sensitive receptors
    - Minimize the height and fall of excavation materials during handling
  - Plan construction layouts so that machinery and dust-causing activities are located away from receptors, as far as is possible
  - Consider the feasibility of erecting solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site
  - Where possible/practicable, fully enclose site or specific operations where there is a high potential for dust production and the site is expected to be active for a prolonged period with adjacent receptors
  - Keep site fencing, barriers, and scaffolding clean using wet methods (where feasible to do so)
  - Remove materials that have the potential to produce dust from site as soon as possible unless being reused on site
  - Cover, seed, or fence stockpiles to prevent wind whipping
  - Prohibit bonfires and burning of waste materials

- Where applicable, revegetate earthworks and exposed areas/soil stockpiles to stabilize surfaces as soon as practicable. Use Hessian, mulches, or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable
- Only remove the cover in small areas during work, and not all at once
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery
- For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust
- Use dust sweepers on the access and local roads (water-assisted where feasible to do so)
- Avoid dry sweeping of large areas

- At the detailed design stage, relevant emission source limits will be defined within equipment specifications to ensure that relevant point source emission standards and air quality limits in 'Chapter 2' are met
- Air Quality and Noise Management Plan will be developed and will include measures to ensure air quality impacts during operations are minimized, including the need to operate and maintain combustion equipment pursuant to the manufacturer's specifications, managing complaints, conducting air quality monitoring (where necessary) in response to complaints and undertaking operational emission monitoring and reporting, including monitoring via CEMS, manual stack emission sampling and fugitive emissions monitoring.

With the application of the mitigation incorporated into a Project ESMS with verification and reporting, the residual impact is considered **Minor Negative.** The justification for the reduction in impact significance associated with dust is due to:

- Reduction in magnitude of impact due to the use of dust management practices and controls.

8.3 Noise

8.3.1 Scoping

Construction activities with the potential to generate airborne noise will include:

- Use of construction plant and equipment to undertake:
  - Site preparation, excavation, civil and mechanical works to construct the CCPP and supporting facilities within the Plant Area, including foundation piling
  - Levelling and grading across the Temporary Laydown Area
  - Preparation, excavation, civil and mechanical works to construct the substation within the Substation Area
  - Site preparation, levelling and foundation piling along the OHTL route, including at tower locations and laydown areas
  - Vegetation clearing and topsoil stripping, grading, trenching and backfilling along the construction corridor of the gas and water pipeline tie-ins

Operational activities will include:

- Operation of the CCPP to generate electricity

Potential noise impacts associated with the use of the black start generators during operations are scoped out on the basis of the anticipated very limited, short-term use over the Project's 25-year lifetime. Potential vibration impacts associated with the construction phase piling are scoped out due to the distance between the activity and the nearest receptors (more than 500 m). Typically, ground-borne vibration travels no more than tens of meters from the source, and hence the potential for impact at the nearest receptors is expected to be negligible.

The AoI for noise impacts was defined as an area of up to 2 km radius, encompassing the Project site, the OHTL, and gas and water pipeline tie-ins, based on professional judgment and experience from similar projects, which includes an understanding of the extent to which sound propagates within the environment.

8.3.2 Noise Impacts

This assessment focuses on noise impacts associated with:

- Use of construction plant and equipment to undertake construction activities across the Project Site (Plant Area, Substation Area and Temporary Laydown Area) and Associated Facilities based on typical plant and equipment types and numbers
- Operation of the CCPP during the operations phase

8.3.2.1 Receptor Sensitivity

The key receptors sensitive to changes in noise due to the Project comprise the communities and properties located within the AoI, where the changes in noise levels due to the Project are anticipated to occur, with communities closer to the Project Site and Associated Facilities (within 1-2 km) potentially most affected. The closest receptors to the Project site comprise residences to the southwest, northwest and north (at approximately 500m, 715m and 525m from the Project site boundary, respectively).

To establish background noise levels, a baseline noise survey was undertaken, as presented in 'Chapter 6', at two (2) locations selected to be representative of the nearest communities. The survey results indicated average daytime LAeq values of 48.1 dB(A) and 53.8 dB(A) at the two locations, below the applicable daytime limit value of 55 dB(A) and indicating a relatively quiet daytime acoustic environment. During nighttime however average LAeq values of 49.7 dB(A) and 53.1 dB(A) were recorded at the two monitoring locations, which is above the applicable nighttime limit value of 55dB(A). In general noise levels were considered to be typical of the predominantly rural area where the Project is located, which is characterized by the nearby industrial activities associated with the gas compression facility to the west, road traffic noise and general background noise including low levels of human activity, agricultural activities, grazing-related activities, and natural sources such as wind.

Noise was raised as an area of concern by the communities consulted as part of the stakeholder consultation process (refer to 'Chapter 8)', particularly with respect to the potential increased noise levels during operations.

The sensitivity of receptors to noise is assessed as **High** with the following justification:

- Value, vulnerability and presence:
  - Potential for minor to moderate increases in noise levels at receptors, including residential properties within approximately 1 km of Project activities. Noise levels specifically at nighttime already exceed applicable noise limits hence receptors are considered sensitive to noise in terms of potential nuisance
- Resilience
  - For the construction period, increases in noise levels will be temporary in nature, short to medium term, and reversible; the effect on the receptors will not continue once construction works have ceased
  - With regard to operations, while daytime limits are currently met, exceedances of nighttime noise limits have been recorded. There is potential for further exceedances as a result of the Project for the duration of operations without adequate mitigation and noise control.

8.3.2.2 Magnitude of Effect

With regard to construction impacts, while intermittent increases in noise levels would be anticipated at the receptors closest to the Project site (at a minimum distance of 500m) these increases would be temporary in nature and reducing as construction activities progress across the site, with the highest sound levels associated with groundworks and excavation. Given the distance between the activities and

the receptors and the temporary nature of the impacts, magnitude of impact, in line with best practice guidance[46], is considered low

To assess operational noise impacts, a noise modeling study was undertaken using internationally recognized noise modeling software 'SoundPLAN' version 9.1 to estimate the predicted increases in noise levels due to the operation of the CCPP during the operational phase and compare the predicted noise levels to the applicable Project noise standards as specified in 'Chapter 2'. The assessment was based on inputs including Project layout, physical site characteristics (e.g. parameters relating to ground effects, screening due to buildings or obstacles, meteorological conditions) and the sound power spectrum for the plant equipment, representing the major noise sources using empirical data and reasonable worst-case assumptions in the absence of vendor noise data. The equipment modeled included:

- Gas turbines, considering both the intake and exhaust, and steam turbine.
- Transformers including generator step-up transformers (GSUTs) and unit auxiliary transformers (UATs).
- Heat Recovery Steam Generator (HRSG).
- Pumps, including those associated with condensate, boiler feedwater, cooling water and other process services.
- Fans associated with the air-cooled condenser (ACC) and fin fan cooling systems.

Modeling was undertaken for routine operations, assuming all major noise-emitting equipment was in use 24 hours a day, 7 days a week. The model predicted the expected contribution to noise levels at the plant boundary and at the specific locations representative of the nearest receptors to the Project Site. These comprise the same receptor locations assessed for the air quality (see Figure 119). The predicted increases were combined with background noise levels derived from the noise monitoring survey, as described in 'Chapter 6', to compare the predicted results with the applicable Project day-time and night-time noise standards. A summary of the results is provided below, with the full noise assessment study presented within Annex IV of this ESIA.

The boundary noise modeling results indicated that modeled noise levels of 70dBA or less were predicted at the 20 selected locations along the site boundary, with a noise level of 71dBA predicted in a single location. These noise levels were compared to the IFC industrial noise criterion of 70 dB(A) LAeq,1hour. This criterion is considered appropriate as the Project boundary is located within an industrial facility and does not represent a noise-sensitive receptor location. The results therefore indicate a marginal exceedance of the criterion in 1 of the 20 locations, with noise levels meeting the criterion in all other locations.

With regard to sensitive receptors, the modeling predicted the contribution to noise levels based on the operation of the major noisy equipment items at the three nearest receptor locations and compared these to the Project daytime and nighttime noise limits of 55dBA and 45dBA respectively. The modeling predicted the following noise levels (in the absence of background noise levels):

- SR1: 50dBA
- SR2: 46dBA
- SR3: 51dBA

[46] BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites

These results show that, based on the indicative noise source data included within the modeling, compliance with daytime limit values was predicted at all receptors, with exceedances predicted for the nighttime limit of between 1 and 6dBA.

Combining the modeled noise levels with measured background noise levels gave an overall prediction of noise levels at the three selected receptors of between 52.2 and 54.5 dB (A) during daytime and 52.9 and 53.9 dB (A) at nighttime. The results indicate that the Project is predicted to increase existing ambient noise levels by between 0.7 and 4.7 dB(A) at the assessed SRs. At SR2, the predicted increase is less than 1 dB(A) during both the daytime and night-time periods, representing a negligible impact magnitude based on best practice guidance[47]. At SR 1 and SR3, the predicted increases range from 3.2 to 4.7 dB(A), corresponding to a Low impact magnitude. The highest increase is predicted at SR 3 during the daytime period, where the Project is predicted to increase the existing ambient noise level by 4.7 dB(A).

Overall, the magnitude of impact to noise as a result of construction activities is assessed as **Low- Medium,** with the following justification:

- Construction activities associated with Project site, Associated Facilities and within temporary Project areas e.g., laydown areas, storage areas, will occur over periods of months
- Intermittent increases in noise at receptors will be experienced for the duration of the construction works but the magnitude of impact, given the separation distance between the works and receptors and the temporary nature of the disturbance is expected to be low
- Embedded routine construction controls that contribute to minimizing noise from the use of construction plant and equipment include:
    - Equipment shall be used and construction and transport methods adopted in order not to generate noise levels in excess of values set out in applicable standards in 'Chapter 2'
    - To the extent possible, heavy vehicles shall not be used at night between 22:00 and 06:00
    - Standard noise abatement equipment shall be fitted to equipment used and maintained in accordance with manufacturers' instructions, e.g., all vehicles and mechanical plant will be fitted with effective exhaust silencers and be maintained in good, efficient order
    - All machines in intermittent use shall be shut down in the intervening periods between work or throttled down to a minimum. Lorry engines will be switched off when vehicles are stationary
    - Normal working hours in or close to residential areas shall be respected, and in general, night-time working shall be kept to a minimum near those areas. Materials for night-time working shall be delivered during normal hours of working hours and be placed as close as possible to the work area for which they are required
    - Construction camp specifications for plant and equipment to be procured to support camp operation shall include relevant noise source specifications as stipulated within national legislation. The procured plant and equipment shall be operated and maintained in accordance with manufacturers' instructions and shall be fitted with appropriate noise abatement as required

[47] I. o. E. M. a. Assessment, "Guidelines for Environmental Noise Impact Assessment (Version 1.2)," 2014.

With regard to operational impacts based on the modeling assessment undertaken, the magnitude of impact to noise as a result of operational activities is assessed as **Low to Moderate,** with the following justification:

- Compliance with boundary noise limits at all but one location along the Project site boundary with the one exceedance by 1dBA and hence marginal
- No exceedances of daytime noise limits at the three nearest sensitive receptors, but exceedances of the nighttime limits at all modeled receptors with a marginal exceedance at the most distant location
- When considered against the existing ambient noise environment, the Project is predicted to increase ambient noise levels by between 0.7 and 4.7 dB(A), corresponding to Low impact magnitude at worse

8.3.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation (taking into account receptor sensitivity and magnitude of effect ranking), and taking a precautionary approach, the impact significance of noise for construction and operation is considered to be **Moderate Negative**

Mitigation to reduce the potential impact significance associated with noise impacts is defined below:

- Before the completion of the detailed design:
  - Undertake detailed far-field noise modeling incorporating vendor-specific acoustic data and identifying noise controls and specifications to be included in the detailed design where required to ensure compliance with the applicable Project noise limits (daytime and night-time). Controls to be specified within the design will include, but are not limited to, acoustic enclosures, silencers (e.g. for inlet and exhaust systems), optimized equipment layout and/or lower noise equipment. Acoustic data to be included within vendor guarantees.
- Construction planning, to be completed prior to construction:
  - Develop an Air Quality and Noise Management Plan aligned with the applicable Project standards in 'Chapter 2' that includes all feasible and reasonable methods to limit noise emissions and minimize the noise impact on people/properties in the vicinity of the Project site and Associated Facilities. The plan shall include at a minimum:
    - Estimation of the frequencies, duration, days of the week, planned working hours, and predicted noise levels anticipated within the vicinity of the Project construction activities.
    - Protocols for engagement with residents to provide advance warning of works taking place where relevant, including the duration and likely noise impacts. In the case of work required in response to an emergency, the local residents shall be advised as soon as reasonably practicable that emergency work is taking place.
  - Ensure the Project Grievance Mechanism includes the process for handling and responding to noise complaints, including requirements associated with conducting noise monitoring in response to complaints. This should include consideration for an accelerated process to handle and respond to critical construction-related noise grievances.

- Incorporate consideration of noise impacts in the detailed planning for the construction camps and temporary project facilities to inform siting, layout, equipment selection, and noise abatement measures (where required).

- Construction Phase:

  - During construction, the contractors shall implement the Air Quality and Noise Management Plan.

  - Temporary noise barriers shall be used to reduce noise levels where appropriate and practicable. Such measures can be particularly appropriate for stationary or near-stationary plant such as compressors. Barriers shall be located as close to the plant as possible and, in order to provide adequate attenuation, shall have a mass per unit area of at least 7 kg/m^2. The screens may include soil mounds, site offices, site huts, acoustic sheds, or partitions.

  - All compressors and generators used during construction activities shall be "sound reduced" models and fitted with properly lined and sealed acoustic covers, which shall be kept closed whenever the machines are in use, and all pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers.

  - High noise-generating works (e.g., piling) shall be planned in line with national regulations and respect maximum ambient noise levels at the nearest receptors.

  - Stationary equipment (such as temporary generators and compressors) shall be located as far as possible from nearby receptors (e.g., communities). Equipment known to emit noise strongly in one direction, whenever possible, shall be oriented so that the noise is directed away from any sensitive receptors.

  - Where reasonably practicable, fixed items of construction plant shall be electrically powered in preference to diesel or petrol-driven.

  - All ancillary plant, such as generators and pumps, shall be positioned so as to cause minimum noise disturbance, and, if necessary, acoustic enclosures should be provided.

- Operations Phase:

  - Operations Phase Air Quality and Noise Management Plan will be developed as part of the Operational ESMS and will include measures to ensure noise impacts during operations are minimized, including the need to operate and maintain equipment pursuant to the manufacturer's specifications, community relations management, managing complaints and conducting noise monitoring in response to complaints and specify requirement for dedicated point of contact to manage complaints.

  - Operational logistics (e.g. deliveries to Project sites) to be planned to minimize noise impacts to communities.

  - Noise survey to be carried out at the boundary of the Project site in the first year of stable operations to confirm the need for subsequent surveys in the event of a grievance, and if noise exceedances are recorded.

With the application of the mitigation incorporated into a Project ESMS with verification and reporting, the residual impact from both construction and operation is considered **Minor Negative**. The justification for the reduction in impact significance is due to:

- Reduction in magnitude of impact due to the use of construction phase noise controls, including siting of equipment, use of noise barriers, selection of the quietest equipment and community engagement to manage grievances.
- Reduction in the magnitude of impact for operational noise due to the integration of detailed noise modeling results using vendor-specific data and appropriate noise controls as required into the detailed design to ensure applicable Project noise limits are met.

8.4 Biodiversity

8.4.1 Scoping

Construction works will occur at the Plant Area, Temporary Laydown Area, Substation Area, along the OHTL route, and in the gas and water pipeline tie-in construction corridors. Construction activities with the potential to affect biodiversity will include:

- Movement of vehicles, equipment, and personnel
- Construction of CCPP facilities and substation, including site clearance, temporary and permanent drainage controls and creation of new access roads
- Preparation of the gas pipeline tie-in working strip and OHTL tower footprints (topsoil removal, vegetation clearance)
- Backfilling and reinstatement of the gas and water pipeline trenches and temporarily disturbed land from construction
- Construction and operation of temporary facilities (laydown area and camp)
- Currently, the location of the construction camp (if applicable) has not been confirmed, but it is anticipated to be within the vicinity of the Project site and will accommodate up to 1,500 persons for the duration of the construction period
- The operation and maintenance phase will include the movement of vehicles, equipment, and personnel, and operation of the CCPP and the Associated Facilities, including the OHTL

Potential impacts associated with ground preparation for the water pipeline tie-in have been excluded because the route follows an existing pipeline that is already stripped of vegetation.

The Area of Influence (AoI) for biodiversity impacts is defined as the immediate footprint of the Project site (including the Plant Area, Substation Area, and Temporary Laydown Area) and the route of the OHTL, gas and water pipeline tie-ins, and their associated working widths/temporary areas disturbed during construction activities.

8.4.2 Biodiversity Impacts

This assessment focuses on biodiversity impacts associated with:

- Construction impacts associated with site clearance, construction work, reinstatement of temporary areas at the Project site (including the Plant Area, Substation Area and Temporary Laydown Area) and along the OHTL and pipeline tie-in routes
- Operational impacts associated with the OHTL

The operational impact of the CCPP is also assessed, considering potential disturbances and air quality impacts arising from its operations.

8.4.2.1 Receptor Sensitivity

The key receptors that will change due to the construction and operational activities comprise the affected habitats, flora, and fauna present in the affected area. As described in 'Chapter 6' of this ESIA, the Project Site and the OHTL route were surveyed in May 2026 to determine the types of habitats present and record flora and fauna. In addition, land use, features and recent activity on site were established through walkover surveys and stakeholder consultation. Flora and fauna survey methodologies included the use of line transects to record flora and reptile presence, Sherman traps (for small mammals), camera traps (for medium and large mammals), bat detection using Anabat walkabout and a rapid point count survey for birds, with the latter augmented with 4 months of spring survey counts from an ongoing avifauna survey to inform a nearby OHTL project, under NEPCO's responsibility.

The results of the surveys and consultation are presented in full within 'Chapters 6' and 'Chapter 8' and can be summarized as follows:

- The Project Site is located within the Khanasri Grazing Reserve and lies partly within an area of the reserve that is managed as part of the Al Khanasri Animal Research Station under the National Agriculture Research Center. The remainder of the Project Site, not under the Research Station's responsibility, is currently occupied by a fenced military shooting range (see land use across the Project Site in 'Chapter 6').
- Land within the Khanasri Grazing Reserve is cultivated on a rotational basis. The area where the Project site is located is typically planted with pasture in September and used for grazing until May. The area where the Project Site is located was last planted in the 2019–2020 season. No grazing activities were observed within the Project Site area at the time of the walkover survey (however grazing was recorded during camera traps), and the Site was observed to have been extensively disturbed through earlier cultivation and plowing.
- The Project Site itself is composed of a sand-and-gravel surface over limestone bedrock and a shallow wadi bed, which runs through the western portion of the site and remains dry for much of the year, only becoming active during major rainfall events. The site is considered highly degraded, including the wadi system, which has relatively large number of shrubs but still considered to be disturbed. The majority of the site was recorded as barren with no vegetation cover. The route of the OHTL was found to comprise vegetation typical of arid Irano-Turanian habitats, dominated by *Anabasis syriaca,* with parts of the route under cultivation
- Habitat across the Project Site is classified as modified (agricultural or grazing) (approximately 90%), with the area occupied by the shooting range classified as modified (urban) (approximately 10%).
- Nine species of flora were recorded across the Project Site, comprising common species of desert shrubs such as *Anabasis syriaca* (Syrian Saltwort), designated as Least Concern on the Jordan Red List. Seven species of flora were recorded along the OHTL route, including desert shrubs and thistles, as well as large areas cultivated with barley (*Hordeum vulgare).* No observations of *Iris bostrensis* were recorded during the survey; this species (listed as Endangered on the IUCN Red List) was highlighted by BirdLife International as a particular species of interest (if encountered) as part of stakeholder consultation.
- No bats or small mammals were recorded during the survey. Larger mammals captured on the camera traps were predominantly domestic animals, with a Red Fox *(Vulpes vulpes)* recorded on each of the three camera traps.

- Five species of reptiles were recorded during the survey. The Bridled Skink, *Trachylepis vittata,* was the most common species. Both adult and young specimens were observed. Individuals of spur-thighed tortoises (*Testudo gracea)* were recorded in three locations within the Project Site. This species is listed as Vulnerable according to the IUCN Red List and has a wide distribution, extending from southern Europe to North Africa and the Middle East. Spur-thighed tortoises are active during March, with the highest peak in April and May, followed by a second, lesser peak in September before hibernation in November.

- A rapid single-day bird survey was undertaken at three locations within the Project Site and two locations along the proposed OHTL route. The survey recorded a number of desert-adapted and resident bird species of no conservation significance, as well as numbers of invasive species, such as the common Myna. Additional data were obtained from ongoing bird surveys conducted for the NEPCO Grid Upgrades Project between March and June 2026. These surveys undertaken along the route of the proposed OHTL recorded seven bird species, all listed as Least Concern (LC) on the IUCN Red List. At the vantage point nearest to the proposed OHTL route (VP16), and within habitat most comparable to that occurring along the route, species recorded included the Black Kite (Milvus migrans), Western Marsh Harrier (Circus aeruginosus), Common Kestrel (Falco tinnunculus), Hooded Crow (Corvus cornix), Steppe Buzzard (Buteo buteo vulpinus), Booted Eagle (Hieraaetus pennatus), and Montagu's Harrier (Circus pygargus). Raptor species that follow the Rift Valley/Red Sea flyway during spring and autumn migrations are known to be attracted to sites with food and water. White Storks (Ciconia ciconia) are also known to migrate through the region and have been recorded in the Al Ekader area during the winter months, approximately 10 km north of the Project site. Winter surveys to establish the likely presence of storks in the Project vicinity have yet to be undertaken; hence, a precautionary approach is undertaken in accordance with the Royal Society for the Conservation of Nature (RSCN)'s advice; see mitigation measures.

On the basis of the surveys to date and secondary data analysis discussed above, the sensitivity of terrestrial biodiversity is assessed as **Medium** with the following justification:

- Value

    - Neither the Project Site nor the associated OHTL overlaps with any protected areas or Key Biodiversity Areas (KBAs); the nearest IBA is the Irbid–Mafraq Plains KBA, located approximately 10 km to the northwest.

    - No breeding birds or birds of conservation importance have been recorded at the Project Site through survey and via stakeholder conservation with Birdlife International and RSCN, and no suitable habitat was recorded on site.

    - The Project Site is degraded and disturbed, with past cultivation and plowing activity recorded across the site. It is not considered to be located in an area of critical habitat; no triggering species have been recorded that qualify as critical habitat. The shallow wadi that runs through the western part of the Project Site supports relatively high vegetation cover but is still considered to be disturbed; no flora of conservation importance were recorded.

    - No bird species of importance have been recorded within 30 km of the proposed OHTL from the rapid Project-specific survey and the NEPCO OHTL bird survey; these surveys were undertaken during the spring season and during dry conditions. Species recorded included the Black Kite (Milvus migrans), Western Marsh Harrier (Circus aeruginosus), Common Kestrel (Falco tinnunculus), Hooded Crow (Corvus cornix), Steppe Buzzard (Buteo buteo vulpinus), Booted Eagle (Hieraaetus pennatus), and Montagu's Harrier (Circus pygargus).

- A chicken farm, which may attract raptors, has been recorded along the proposed OHTL route. The presence of White Stork (*Ciconia ciconia*) (listed as IUCN Red List Least Concern), known to be present in the Al Ekader area during winter, could not be confirmed given the seasonality of surveys to date.

- One species of reptile, *Testudo gracea*, listed as Vulnerable (IUCN Red List) was recorded at the Project Site. Other reptile species recorded were of no conservation significance.

- Vulnerability, presence, and resilience:

  - Flora vulnerability: The flora recorded during the survey comprises shrubs and subshrubs, all of which are associated with arid habitats and are of no conservation importance, designated as Least Concern on the Jordan Red List. Nevertheless, they provide an ecosystem service by attracting insects, providing shelter for the faunal species present (particularly reptiles). All of the recorded flora species are perennial and, as such, have stable locations where they occur regularly. This makes all of these species vulnerable to direct impacts of construction, particularly the pre-excavation clearance operations and the flood mitigation works that will affect the existing wadi (see Physical Terrestrial Impacts below).

  - Reptile fauna vulnerability: The Spur-thighed tortoise (*Testudo graeca*) has been recorded across the Project Site. This species breeds above ground, with eggs buried in shallow nests that are vulnerable to mechanical disturbance and destruction. Individuals may also be vulnerable to open excavations and to the movement of plant and machinery across the Project Site. There have been many similar projects globally in the regions where this species is found, in which the species has been encountered and successfully translocated prior to construction, thus avoiding potential impacts.

  - Avifauna vulnerability: At the Project Site, bird species recorded were limited to common bird species that forage on the ground in the sparse vegetation desert habitat. No breeding birds were recorded, and the potential for breeding birds on site is considered low to negligible. Impacts on birds would be associated with disturbance to and loss of vegetation and habitat due to the presence of the permanent facilities, and with temporary disturbance (e.g., from light, noise, and movement of plant and machinery) during the construction works. Similar construction impacts are also anticipated along the OHTL associated with tower construction, with relatively small areas of permanent habitat lost within the towers' footprints. The proposed OHTL is located more than 10 km from the Irbid–Mafraq Plains Important Bird Area (IBA), which lies within the Rift Valley/Red Sea migratory flyway. Field surveys recorded twelve (12) bird species, the majority of which are resident species known to breed locally in Jordan. None of the recorded species is of conservation concern, as all are classified as Least Concern (LC) on the IUCN Red List. Also, the NEPCO–EBRD bird survey recorded a total of 31 individual birds representing seven (7) species at Vantage Point 16 (VP16), located approximately 2 km from the proposed OHTL alignment. All seven species are classified as Least Concern (LC) on the IUCN Red List, as further discussed in Section 6.3.4.but there were no records of raptors of conservation significance within 30 km of the Project Site. Avifauna, particularly migratory soaring birds (MSB) such as raptors using the Rift Valley/Red Sea migratory flyway, are vulnerable to the presence of the OHTL, with risks of collision being the key impact; see mitigation measures below. Along the gas pipeline route, disturbance impacts would also occur, although habitat loss would be minimal and temporary, given planned reinstatement following the pipeline installation works.

8.4.2.2 Magnitude of Effect

The construction of the CCPP facilities, the associated substation, and the bases of the OHTL towers will involve permanent land conversion across each footprint, stripping vegetation and surface soil, grading, excavation, and surfacing prior to the installation of the permanent facilities. New channels and embankments designed to divert seasonal floodwaters and prevent site flooding will divert water from the existing wadi on site. Along the gas and water pipelines, work will involve clearing a right-of-way, including removing surface material to provide stable ground that can support construction machinery. A typical right-of-way width of 45m has been assumed, with the surface material stockpiled in windows to reduce erosion and wind-induced remobilization. Subsequent stages of the pipeline construction will include excavation and trenching, lowering of the pipeline into the trenches and backfilling.

Key impacts associated with construction and operational phase activities that have the potential to impact terrestrial biodiversity include:

- Permanent land conversion at the Plant Site (including the existing wadi), Substation Site and at the bases of the towers along the OHTL route
- Temporary removal of vegetation and surface material within the water and gas pipeline rights-of-way, and across the Temporary Laydown Area, noting the rights-of-way and laydown area will be reinstated
- Temporary noise disturbance from the operation of construction plant and machinery and permanent noise disturbance from plant operation; noise impact to fauna is not considered to be material however given the lack of fauna present on site which is sensitive to airborne noise. Reptiles present may be sensitive to vibration during construction but with distances traveled by ground borne vibration limited to tens of meters
- Air emissions from vehicles and plant during the construction phase and from power generation during the operations phase; air quality impacts on vegetation are not considered material based on the air quality assessment presented in this Chapter
- Elevated dust affecting vegetation adjacent to the construction works
- Potential introduction of alien species at the Project Site and along the route of the pipelines and OHTL
- Wildlife entrapment within trenches, temporary excavations, and fences
- Collision with vehicles, with the majority of vehicle movements associated with the Project during construction
- Attraction of wildlife due to uncontrolled waste disposal
- Attraction of wildlife, particularly avifauna, during evaporation pond operations
- Avifauna electrocution risk from the OHTL: High-voltage transmission lines rarely have live and earthed components close enough for a bird to touch both at once, so electrocution risk is considered negligible.
- Avifauna collision risk from the OHTL
    - OHTL bird collisions are considered a risk to avifauna. The OHTL is located on the periphery of the Rift Valley/Red Sea migratory flyway, an important route for soaring birds, especially in Spring. Species of most concern are soaring birds, especially those of larger size and lower

maneuverability, such as storks. Although the flyway is used by thousands of soaring birds each Spring, it is not an aggregation site; most species do not stop and only cross at high altitudes. Bird surveys along an OHTL associated with the proposed Aqaba-Amman Water Desalination and Conveyance Project[48] indicated that most migratory soaring birds were recorded in a broad front, flying well above the power line height. Carcass searches along the existing parallel transmission line revealed very low mortality (only one *Quail Coturnix coturnix*). Fatality rates for the OHTL are therefore predicted to be very low.

- Species more at risk include the White Stork, *Ciconia Ciconia*. Smaller, more agile raptors such as falcons are considered to be at low risk because of their smaller size and high maneuverability. Post-construction fatality monitoring along transmission lines along Egypt's Red Sea Coast (the continuation of the same migratory flyway) reveals mortality among White Storks and Great White Pelicans (*Pelecanus onocrotalus*), but very low mortality among raptors. Stork and pelican mortality occurs mostly in discrete hotspots where individuals arrive at low altitude after crossing the Gulf of Suez
- Post-construction fatality monitoring will determine the significance of this impact and inform the need for adaptive management

Overall, the magnitude of impacts on terrestrial biodiversity is considered **Medium**. Assuming effective reinstatement of the temporary areas, the estimated total area permanently impacted (including the Plant and Substation Areas and permanent access routes) is approximately 35 hectares. This estimate excludes the OHTL; however, the footprint will be limited to the towers' concrete footings. Final estimates of the total area affected will be updated when detailed design details are available.

The duration of the impacts will range from weeks in some areas to the full duration of the construction program and the operational phase at the permanent facilities.

8.4.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation (taking into account receptor sensitivity and magnitude of effect ranking), the impact significance is considered to be **Moderate Negative.**

Mitigation to reduce the potential significance associated with biodiversity impacts is defined below:

- Before the completion of the detailed design:
  - Prepare a Biodiversity Management Plan (BMP) for construction and operation to include the following controls:
    - Develop and commit to a spur-thighed translocation plan that should include the following principles
      - Conduct a comprehensive survey for the Greek Tortoise (*Testudo graeca*) across the study site prior to commencement of any construction activities. Field clearances must be timed to coincide with the species' active periods, specifically during its primary peak in March, April, and May, or its secondary lesser peak in September. Given the project construction schedule, the survey should be

[48] Jordan: Aqaba-Amman Water Desalination and Conveyance Project (AAWDCP)

undertaken in the secondary peak in September. The main activity peak is during spring when temperatures are warm but not excessively hot and vegetation is abundant to do much of their feeding, growing amating and reproduction. They then aestivate during summer into deep soil and burrows where temperature and humidity is much more stable. Around late summer/early autumn temperatures fall again and humidity increases and the tortoises set a second feeding season to replenish their energy reserves and prepare for winter dormancy.

- All identified individuals of the Greek Tortoise must be translocated by a reptile expert out of the Project Area before construction begins. In direct coordination with the RSCN and the MoA, the tortoises must be safely relocated to a suitable, nearby habitat, such as the Al Khanasri Rangeland Reserve.

- As will be required by RSCN[49], specific requirements to ensure OHTL pylons are wildlife-friendly must be implemented, meaning that the distance between energized components is enough to prevent electrocutions and/or that these are appropriately insulated, following good international industry practice
- Specific requirements relating to the design of the evaporation pond to ensure measures to deter wildlife and avifauna are integrated into the design
- In accordance with the "Land Use Regulation for Area Outside of Organized Boundaries for 2026", commit to landscaping 25% of the total Project area. Given this requirement, and taking into account site conditions (heavily degraded and mostly modified), a No Net Loss (NNL) obligation is not required.

- Construction Phase:

  - Active monitoring for the Greek Tortoise must be maintained throughout the construction and excavation phases. Because this globally threatened species is highly vulnerable to road traffic, workers must exercise extreme caution during leveling and construction activities. Any tortoises observed within the active footprint must be immediately removed from the working area in accordance with the requirements above.
  - Demarcation of all areas where construction will occur to ensure that all earthworks will be strictly limited to the required areas and existing vegetation is retained as far as possible during site preparation

- Operations phase:

  - Developer will use best endeavors with NEPCO to incorporate a bird-safe design in the placement of the pylons and install Bird Flight Diverters (BFDs) and insulators along the entire length of the OHTL.
  - The developer will develop and implement a Post-Construction Fatality Monitoring (PCFM) program, based on GIIP, along high-risk areas of the OHTL, to monitor bird flight activity, assess

[49] This will be required and included within the OHTL EIA that is currently being undertaken by another EIA Consultant directly with NEPCO.

effectiveness of mitigation, and identify any further measures to be taken in line with an adaptive management approach.

- Implement the PCFM program for at least a two-year period, with semi-annual reporting and periodic strategic reviews, the duration of which may be extended depending on monitoring results.

With the application of the mitigation incorporated into a Project ESMS with verification and reporting, the residual impact from both construction and operation is considered **Minor Negative**. The justification for the reduction in impact significance is due to the integration of biodiversity site-specific mitigation within construction planning and within the operational design, to be informed through detailed surveys.

8.5 Physical Terrestrial Environment

8.5.1 Scoping

Construction works will occur at the CCPP Plant Area, Temporary Laydown Area, Substation Area, along the OHTL route and gas and water pipeline tie-ins construction corridors. Construction activities with the potential to affect the physical terrestrial environment will include:

- Construction of CCPP facilities and substation, including site clearance, temporary and permanent drainage controls and creation of new access roads
- Preparation of the gas pipeline tie-in working strip and OHTL tower footprints (topsoil removal, vegetation clearance) and subsequent backfill and reinstatement of the gas and water pipeline trenches
- Construction and operation of temporary facilities (laydown area and camp) and subsequent reinstatement
- Construction and operation phase waste and wastewater generation, and hazardous materials management
- The operations phase will include the operation and maintenance of the CCPP and the Associated Facilities, including the OHTL.

The Area of Influence (AoI) for physical terrestrial impacts is defined as the immediate footprint of the Project site (including the Plant Area, Substation Area, Temporary Laydown Area and the flood protection/drainage works) and the route of the OHTL, gas and water pipeline tie-ins and their associated working widths/temporary areas disturbed during construction activity. The wider Study Area, with regard to hydrology, encompasses the catchment area in which the Project Site is located, as defined by preliminary regional topography and hydrological flood risk modeling (see 'Chapter 6').

8.5.2 Physical Terrestrial Impacts

This assessment focuses on physical terrestrial impacts associated with:

- Construction impacts associated with site clearance, construction work, reinstatement of temporary areas at the Project site (including the Plant Area, Substation Area, Temporary Laydown Area and the flood protection/drainage works) and along the OHTL and pipeline tie-in routes
- Operational impacts associated with the CCPP facilities relating to improper waste management, wastewater handling, spill prevention and hazardous materials management

It should be noted that aspects associated with waste management and infrastructure are assessed within 'Chapter 8.9'. A summary of the flood risk assessment is provided in Chapter 6.

8.5.2.1 Receptor Sensitivity

The key receptors to change within the physical environment comprise soils, groundwater, and surface waters that may be affected by construction and operational activities, with pathways resulting in indirect

impacts on human and/or ecological receptors, e.g., through dust generation, contamination, or land degradation.

The sensitivity of the physical terrestrial environment is assessed as **Medium,** with the following justification:

- Value, vulnerability, presence, and resilience:
  - There are no permanent watercourses within the Study Area
  - Numerous seasonal wadis are present across the Study Area and form part of the overall drainage system within the wider catchment area. During rainfall events, runoff generated in upper catchment areas travels through the ephemeral wadis, minor channels and local runoff pathways toward lower parts of the basin, with drainage channels present across the Project Site, the water pipeline and the OHTL routes. These wadis are valuable from a biodiversity perspective for sustaining biodiversity (with floral and faunal species present that are tolerant of desert conditions and limited rainfall) and, where water collects either naturally or artificially, provide a drinking supply for fauna and support herding activities. Water derived from wadis is not used by communities as a potable water source. Evidence from site visits and consultations confirms that water harvesting has historically been undertaken on the Project Site through the Vallerani Micro Water Harvesting technique (refer to 'Chapter 6.7.2').
  - The Project Site is located within an area of land that forms part of the Khanasri Grazing Reserve, with the Site partially located on land managed as part of the Al Khanasri Animal Research Station under the National Agriculture Research Center. This area has historically been used for agricultural research. Subsequently, the Project Site has been allocated for the Project, and the Research station has confirmed no anticipated impact to grazing activities as a result of the Project (see 'Chapter 8.8'). Soil is not used as a resource anywhere in the Study Area.
  - Groundwater is an important water source across the wider Study Area, serving as a source of irrigation and potable water through wells. Quality and supply have, however, been severely affected by over-extraction, resulting in a strain on supply and increasing the value of this resource. Recharge rates are known to be low, with the depth at which groundwater may be encountered varying. There are a number of wells across the region used by local communities, with the nearest well located approximately 2.5 km from the site (which forms part of the official supply-well network connected to the pumping and distribution system serving households within the Yarmouk Water Company service area). The site is located in a 142–194m depth-to-groundwater zone). This represents the shallowest groundwater category encountered across the Study Area (refer to "Section 6.4.4). Considering recharge, depth, soil type and condition and topography, groundwater sensitivity and specifically the B2/A7 aquifer system across the Study Area, was ranked using the DRASTIC-based model as predominantly low across the Project Site and along the pipeline and OHTL routes.
  - Natural soil erosion and flooding events occur across the Study Area due to natural conditions, which include sandstorm events lasting days and concentrated storm rainfall, which can occur over a few hours. These events can lead to rapid change in the landscape and integrity.

8.5.2.2 Magnitude of Effect

The construction of the CCPP facilities, the associated substation, and the bases of the OHTL towers will involve permanent land conversion across each footprint, stripping vegetation and surface soil, grading, excavation, and surfacing prior to the installation of the permanent facilities. In addition, new channels and embankments designed to divert seasonal floodwaters and prevent flooding on site will be installed. Along the gas and water pipelines, work will involve stripping vegetation and surface soil along the designated right-of-way, with subsequent stages including excavation and trenching, lowering the pipelines into the trenches, and backfilling.

Key impacts associated with construction and operational phase activities that have the potential to impact the physical terrestrial environment include:

- Permanent land conversion at the Plant Site (including the existing wadi), Substation Area and at the bases of the towers along the OHTL route
- Temporary removal of vegetation and surface material within the water and gas pipeline rights-of-way, and across the Temporary Laydown Area, noting that the rights-of-way and laydown area will be reinstated
- Earthworks, including encountering 3rd party illegally disposed waste and contaminated land
- Disruption and changes to surface drainage:
    - The Study Area does not include any perennial watercourses. No natural areas of standing water were observed during the walkover in May 2026
    - All wadis are intermittent and flow only as a result of precipitation that falls over their catchment areas during the rainy season
    - Rainfall in the Project area is very low. Typically, annual rainfall is low (below 50 mm) and occurs for up to 15 days per year, most of which occurs in the winter. Significant rainfall occurs infrequently, with the highest extreme daily rainfall recorded in the area for the period 1968–2024 in the range 45-53 mm/day representing a storm event
- During construction:
    - The moving nature of the pipeline and OHTL construction activities may create a temporary and minor disruption to surface water flows; however, it is assumed that reinstatement leaves no permanent alterations to surface water flows or accumulation
    - The potential for impact exists at the drainage channels to be crossed along the pipeline and OHTL; however, these are not considered to be of high risk and can be managed through detailed design. Currently, detailed construction plans have not been developed, but will form part of the detailed design stage
    - It is assumed that construction plans will be developed to assess drainage risks during construction, promoting reduced exposure in periods where rainfall is most likely to occur, and evaluating the need for installing temporary water bypass channels, as well as scheduling the main Site drainage works such as to protect the site from seasonal flood risk through the overall construction program

- During operations:
    - Impacts to surface water flows will be restricted to the Project Site, specifically the Plant and Substation Areas, the design of which have yet to be finalized. The design will incorporate new drainage channels and embankments designed to divert runoff away from the site and to provide appropriate flood protection equivalent to a 1 in 100-year rainfall event (including a 20% climate change allowance). The detailed design of the drainage and flood protection system will include consideration of the Site access and egress and will be undertaken in consultation with the relevant competent authorities including the Ministry of Transport.
- Water abstraction from existing groundwater is currently not planned as part of the Project; it is assumed that all water for construction, commissioning, and operations will be from regulated sources, either from the existing network (through the Water Supply Agreement (WSA)) or via road tankers (refer to Community Health, Safety, Security and 3rd Party Infrastructure and Services below).
- Construction and operations phase drainage from the Project sites will include:
    - Rainwater systems, which will be designed to segregate rainfall from sources of contamination
    - Drainage from areas with hazardous materials, e.g., in areas where hazardous waste or fuel is stored. Drainage from these locations will either be handled as waste and disposed of by licensed facilities, treated on-site and recycled or sent to the evaporation pond
    - Accidental spills and incidents associated with the uncontrolled handling of waste and materials, including concrete, affecting soils and groundwater
    - Accidental spills to soils and groundwater associated with the evaporation pond due to loss of integrity during operations
- It is assumed that all construction waste will be managed from the point of generation to the final disposal site in accordance with applicable standards, and mitigation measures are provided

The Project has adopted a zero liquid discharge philosophy with regard to process wastewater and hence routine discharges are limited to uncontaminated surface water runoff. In addition, sewage and sanitary waste will be trucked off site for treatment and disposal and there will be no discharges of treated sanitary wastewater. The majority of the physical impacts associated with the Project relate to the potential for disruption to ephemeral surface water flows, the potential for mobilization of contamination, an increase in flood risk, and the potential for soil erosion. Typically, as described above, given the low intensity of rainfall in the region and the seasonal nature of the drainage systems, impacts to surface water quality due to drainage and runoff would be anticipated to be low but dependent on the composition of the runoff; while normally uncontaminated, there remains potential for a polluted release, e.g., in the event of a spill. The design of the permanent and temporary facilities is ongoing and includes drainage systems and flood risk considerations; these details are not currently available. The design of the evaporation pond, which may also present a risk, particularly to groundwater in the event of a loss of integrity, is also part of the ongoing detailed design.

Overall, taking a precautionary approach, the magnitude of terrestrial physical impacts is considered to be potentially **Medium.**

The duration of the impacts will range from weeks in some areas to the full duration of the construction program and the operational phase at the permanent facilities.

8.5.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation (taking into account receptor sensitivity and magnitude of effect ranking), the impact significance is considered to be **Moderate Negative.**

Mitigation to reduce the potential impact significance associated with physical terrestrial impacts is defined below:

- Before the completion of the detailed design and finalization of the construction plans and schedule:
  - Undertake a review of potential spill risks covering construction and operations phases. The outcome of these studies will be used to complete a spill risk assessment and document the safeguards, e.g., engineering, process, procedural, etc., and be integrated into the Pollution Prevention Management Plan
  - Prepare a Pollution Prevention Management Plan which includes:
    - Assessment of contamination risk at the Project Site using a risk-based approach, This should include an assessment of UXO risk given the presence of the firing range within the Project Site.
    - Hazardous materials (selection, management, and use), drainage, wastewater (including all camp and construction site wastewater), and surface water discharges to comply with applicable standards in 'Chapter 2' and avoid the risk of pollution
    - Specific requirements relating to the design and maintenance of the evaporation pond to ensure measures to minimize potential for contamination to soils and groundwater, e.g. due to a spill or loss of integrity, are integrated into the design, including ongoing monitoring requirements
    - Sludge from the evaporation pond will be disposed at approved areas with the closest being the Ekaider Landfill.
  - Prepare a Water Management Plan that details water required during construction and commissioning (demand and quality), how it will be sourced, describing and assessing the treatment, reuse, and discharge activities, ensuring avoidance of pollution and erosion, as well as management of wastewater and water reuse, e.g. for agricultural purposes. This will also include investigating the feasibility of constructing rainwater harvesting structures onsite.
- Construction planning, to be completed before construction:
  - In accordance with Article 5 of the "Instruction for Protection of Agricultural Sites No. (11) of the Year 2022", obtain an excavation permit for soil transport from Mafraq Directorate of Agriculture before commencement of excavation works and commit to separation of topsoil.
  - Groundwater risks will be assessed upon completion of the EPC contractor's geotechnical survey to inform the development of site-specific construction controls to minimize the potential for contamination through spills
  - Prepare a Erosion Control and Reinstatement Plan that will be included in the construction and installation contractor's specification. The plan will confirm:
    - The controls for the avoidance/reduction of impacts to biodiversity and soil erosion

- Topsoil/surface material storage and preservation
- Microhabitat disturbance management
- Defined terrestrial habitat restoration goals, including erosion controls
- Adaptive management requirements to respond to temporary construction works such as temporary storage of material, borrow pit for construction material, temporary access road routing, and usage.
- Monitoring and inspection protocols, including frequency of inspection
- KPIs to define compliance and performance monitoring and reporting requirements

With the application of the mitigation incorporated into a Project ESMS with verification and reporting, the residual impact from both construction and operation is considered **Minor Negative**. The justification for the reduction in impact significance is due to the integration of site-specific mitigation within construction planning and within the operational design, thus reducing the magnitude of impact.

8.6 Landscape and Visual Amenity

8.6.1 Scoping

The Project comprises an approximately 700 MW CCGT, together with its associated facilities, namely a new 400 kV substation and OHTL, a gas pipeline tie-in, and a water supply pipeline tie-in. The construction and operation of these components will introduce new built structures, large-scale earthworks and land clearance that will physically alter the site and change the views experienced by the surrounding communities and other visual receptors.

This section assesses the potential landscape and visual impacts of the Project during construction and operation, addressing both the physical changes to the landscape and the effects on views, and defines the measures required to avoid, minimize and manage adverse effects in line with Jordanian law and Good International Industry Practice, including the requirements of the Project's lenders.

The Project site and its surrounds comprise a predominantly arid landscape with generally flat topography at an elevation of approximately 650-680 m above mean sea level, with limited, scattered vegetation and largely barren ground showing evidence of previous plowing.

The main Plant Area and Substation Area lie within a fenced area of government-owned land under the ownership of the Government Treasury, previously allocated to the MoA, which is not designated or recognized for its visual importance, other than by local communities who report that the wider area is used recreationally.

The general setting includes existing infrastructure, comprising the road immediately west of the site and an adjacent gas compression facility currently under construction, as well an existing electricity networks comprising 132 kV and 400 kV. The land to the north of the site, outside the current fenceline, is used by nomadic grazers and contains a limited number of residential structures. The Associated Facilities, being the OHTL and the gas and water pipeline tie-ins, extend across the surrounding open plains, where typical views are characterized by open landscape with elevated terrain visible to the east. The gas and water pipelines are located within the bounds of existing infrastructure.

Construction activities with the potential to affect the landscape and views will include:

- Clearance of vegetation and topsoil, grading and earthworks across the Plant Area, Substation Area and laydown areas, together with re-routing of the wadi that currently crosses the Plant Area, altering the natural landform and surface drainage of the site
- Structural excavation and foundation works and the erection of the permanent plant, buildings, stacks, substation gantries and the evaporation pond, introducing large-scale vertical and industrial elements into an open, low-rise landscape
- Establishment of a construction right-of-way and temporary working strip along the OHTL route across the open plain, including foundation excavation, tower assembly and conductor stringing, introducing a line of steel lattice towers into open views
- Trenching, excavation and temporary working strips for water supply and pipeline connections, including associated above-ground ancillary infrastructure where required, creating temporary linear disturbance, spoil storage and localized visual effects within existing utility and road corridors
- The presence of temporary construction facilities, such as site offices, workshops, material storage and welfare facilities, together with a new permanent access road from the existing road to the west

of the site, adding visual clutter and activity to the setting

- The movement of construction plant, cranes, vehicles and machinery on and around the site and along access routes, and the use of night-time construction lighting, introducing movement and artificial light into a currently dark and sparsely developed landscape
- The generation of dust and the temporary storage of spoil and stockpiles, which reduce visual amenity due to settling on surrounding vegetation
- The reinstatement of temporary working areas on completion of construction, which will progressively reduce the construction-phase landscape and visual effects

Operational activities with the potential to affect the landscape and views will include:

- The permanent presence of the power plant, buildings, stacks, substation and evaporation pond as new industrial features on the previously open, fenced site over the 25-year operational life
- The permanent presence of the OHTL, comprising steel lattice towers and conductors across the open plain, together with the pipeline easements and the above-ground gas metering station, forming new linear and vertical elements in views
- Operational and security lighting of the plant, substation and site fencing, introducing a permanent source of night-time light into a currently dark landscape
- The occasional presence of maintenance vehicles and personnel along the OHTL and pipeline routes and at the substation
- The permanent change in the character of the site from open, arid land to an industrial power-generation facility

Based on the above, the potential landscape and visual impacts scoped into this assessment comprise the following.

During the construction phase, the potential impacts comprise:

- Physical alteration of landform and drainage (adverse): the clearance of vegetation and topsoil, grading and earthworks, and re-routing of the wadi that crosses the Plant Area, physically changing the natural landform and surface-water drainage of the site
- Temporary degradation of visual amenity (adverse): the presence of construction plant, cranes, stockpiles, spoil, laydown and welfare facilities, together with dust generation, temporarily reducing the visual quality of views from surrounding communities
- Introduction of night-time lighting (adverse): construction lighting introducing artificial light into a currently dark, sparsely developed rural landscape, affecting nearby residents and the character of the night sky
- Change to landscape character during construction (adverse): the progressive replacement of open, arid land with cleared ground, foundations and part-built structures, altering the local landscape character over the construction period
- Visual intrusion of the OHTL and linear works (adverse): the appearance of steel lattice towers, conductors and linear trenching and working strips across the open plain, visible from surrounding receptors

- Dust and deposition (adverse): wind-blown dust from clearance, earthworks and vehicle movements settling on surrounding vegetation and reducing local visual amenity
- Reversibility of temporary effects (positive): the opportunity, through reinstatement of temporary working areas, landform and vegetation, to progressively reduce and remove the construction-phase landscape and visual effects

During the operational phase, the potential impacts comprise:

- Permanent change to landscape character (adverse): the lasting conversion of an open, arid, fenced site into an industrial power-generation facility, changing the character of the local landscape over the operational life
- Permanent visual intrusion of built structures (adverse): the ongoing visibility of the plant buildings, stacks, substation and evaporation pond as prominent vertical and industrial elements in an otherwise low, open landscape
- Visual intrusion of the OHTL and pipeline infrastructure (adverse): the permanent presence of steel lattice towers, conductors and the above-ground metering station across the open plain, forming new linear and vertical features in views
- Operational lighting and night-time effects (adverse): permanent security and operational lighting introducing a continuous source of artificial light and sky glow into a dark rural setting
- Plume, emissions and movement (adverse): moving operational elements that draw attention in an otherwise static landscape
- Integration into the setting over time (positive): the opportunity, through sensitive design, color treatment, lighting control and reinstatement, to soften the appearance of the facility and integrate it into its setting over the operational life

The Area of Influence (AoI) for landscape and visual impacts is impact-based rather than defined by a fixed radius, and is set by the extent over which the Project's built elements are visible across the open, low-lying plain. It comprises the Plant Area, Substation Area, Temporary Laydown Area, the OHTL towers and conductors, the gas metering station and pipeline working strips, the new access road, and construction and operational lighting, together with the receptors from which these are seen:

- The surrounding settlements
- The scattered households and farmsteads outside municipal boundaries within approximately 1 km of the Project Site
- Land users and Bedouin herders using the open land
- Road users on routes with open views toward the Project Site and the linear Associated Facilities

8.6.2 Landscape and Visual Impacts

The assessment of landscape and visual impacts considers the sensitivity of the landscape resource and of the visual receptors potentially affected, the magnitude of potential effects during construction and operation, and the significance of the resulting impacts both prior to and following the application of mitigation measures.

8.6.2.1 Receptor Sensitivity

The receptors sensitive to landscape and visual impacts comprise the landscape resource of the Project site and its surrounds, as well as the visual receptors with views of the Project. The landscape is a predominantly arid, flat, sparsely vegetated plain that is not designated or recognized for its visual importance, other than recreational use of the wider area reported by local communities, and is already influenced by existing infrastructure. The visual receptors, as defined in line with the Guidelines for Landscape and Visual Impact Assessment (GLVIA), are limited to residents of surrounding communities and people engaged in outdoor recreation whose views contribute to the landscape setting.

Among the affected receptors, the following are considered to have a heightened sensitivity to landscape and visual impacts:

- Residents in the surrounding communities, in particular the closest settlements of Faa' (approximately 0.76 km north-east), AlHarsh (approximately 1 km north-west) and AlKhanasri (approximately 1.2 km south-west), together with Umm Al Lulu, Deir Al Waraq, Manshyet Bani Hassan, Buraiqa and Hosha within approximately 4 km of the site
- Nomadic and semi-nomadic grazers, and the limited number of residential structures to the north of the site, outside the current fenceline, whose experience of the open landscape would be altered
- People engaged in outdoor recreation in the wider area, whose attention and interest are likely to be focused on the landscape or particular views (to include recreational users from local communities as well as those within Tell Al Khanasri in particular)
- Communities where the open, arid views contribute to the landscape setting enjoyed by residents

Taking into account the low landscape value and the absence of any visual designation, the flat and open character of the site, the presence of existing infrastructure, including the adjacent road and the gas compression facility under construction as well as high voltage transmission networks (refer to 'Chapter 6.5.2' and 'Chapter 6.9.6'), and the proximity of a number of residential communities with open views toward the site, the sensitivity of receptors to landscape and visual impacts is assessed as **Medium**, with the following justification:

- Value:
    - The landscape is a common, arid, sparsely vegetated plain with no visual designation, already influenced by existing infrastructure, giving it a relatively low intrinsic landscape value
- Vulnerability and presence:
    - A number of residential communities and informal grazers lie within a few kilometers of the site, with open, unobstructed views across the flat terrain, and the currently dark, undeveloped setting is sensitive to the introduction of new lighting
- Resilience:
    - The open, flat landscape offers little natural screening, so new vertical and lit structures would be readily visible, although the existing road and nearby industrial development increase the landscape's capacity to absorb further change

8.6.2.2 Magnitude of Effect

With regard to construction impacts, the impact magnitude is assessed as **Medium** and predominantly adverse in the absence of mitigation, with the following justification:

- Construction requires extensive clearance of vegetation and topsoil, grading and earthworks, wadi re-routing and excavation, temporarily and, in places, permanently altering the landform and drainage of the site
- Cranes, plant, stockpiles, spoil, dust and temporary facilities would be visible across the open plain from nearby communities and grazers for the duration of construction
- Night-time construction lighting would introduce artificial light into a currently dark setting, extending visual effects beyond daylight hours
- The erection of steel lattice OHTL towers and part-built structures would begin to change the local landscape character
- Conversely, the flat, common landscape of low value, the presence of existing infrastructure and the temporary and reversible nature of many construction activities limit the magnitude of effect

Considering operational impacts, the impact magnitude is assessed as **Medium**, with the following justification:

- The permanent presence of the plant, buildings, stacks, substation and evaporation pond introduces new industrial structures into an open, low-rise landscape for the operational life of the Project
- The OHTL towers, conductors, and the above-ground metering station form permanent linear and vertical features across the open plain, readily visible in the absence of natural screening
- Permanent operational and security lighting introduces a continuous source of night-time light and sky glow into the surrounding dark landscape
- Conversely, these effects fall on a low-value, undesignated landscape already influenced by infrastructure, and can be softened, though not removed, by sensitive design, color treatment and lighting control

Embedded commitments already made by the Project that contribute to managing landscape and visual effects include:

- The siting of the main Plant and Substation Area within an existing fenced, government-owned area of low-value, undesignated landscape that is already influenced by adjacent infrastructure
- The commitment to reinstate all areas in temporary use to their pre-construction condition or better, including reinstatement of landform, drainage and vegetation disturbed during construction
- Ongoing route and layout refinement of the associated facilities to reduce their extent and visibility across the surrounding land
- The design of surface-water drainage and the wadi re-routing to limit the alteration of the natural landform and drainage pattern

8.6.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation, and taking into account the Medium sensitivity of receptors and the Medium magnitude of effects, the significance for landscape and visual impacts is assessed as **Moderate Negative** during construction and **Moderate Negative** during operation, reflecting the introduction of new industrial structures, lighting and linear infrastructure into an open, arid landscape viewed by a number of surrounding communities.

Mitigation to prevent and reduce these adverse effects is defined below.

- Construction planning, to be completed prior to construction:
  - Optimization of the layout, height and massing of the plant, buildings and structures to the extent possible to reduce visibility from the closest communities
  - Selection of recessive, non-reflective colors and finishes for large structures, stacks and the substation to reduce their contrast with the arid landscape
  - A lighting design that minimizes light spill and sky glow, using directional, shielded and appropriately controlled lighting consistent with safety and security requirements
  - Definition of topsoil and surface-material storage, and of stockpile siting and height limits, to reduce visual intrusion during construction
  - Dust suppression measures during clearance, earthworks and vehicle movements to protect visual amenity and surrounding vegetation
  - Landscape reinstatement goals, including reinstatement of landform, drainage and vegetation in temporary working areas on completion of construction
  - Continued engagement with the surrounding communities on the appearance and location of the Project facilities
  - Confirmation of the reinstatement approach for the wadi re-routing and temporary working areas prior to construction
- During construction:
  - Screening and siting: siting of laydown areas, stockpiles and temporary facilities to reduce their visibility from nearby communities, and use of temporary screening where practicable
  - Dust control: implementation of dust suppression during clearance, earthworks, stockpiling and vehicle movements by the EPC Contractor to protect visual amenity and surrounding vegetation (aligned within the Air Quality and Noise Management)
  - Lighting control: management of construction lighting to minimize light spill toward residential communities, using directional and shielded fittings and limiting night-time working where feasible
  - Progressive reinstatement: reinstatement of temporary working areas, landform, drainage and vegetation to pre-construction condition or better as soon as works are complete, with photographic records before and after works

- Stakeholder engagement and grievance redress: continued engagement with affected residents and local authorities on landscape and visual matters, with landscape, visual and lighting complaints handled through the Project Grievance Mechanism
- Monitoring and reporting: monitoring of landscape and visual mitigation within the ESMS, including reinstatement progress, dust and lighting complaints, and their resolution

- During operations:
  - Maintenance of the recessive color finishes, screening and any landscape planting established to soften the appearance of the facility
  - Management of operational and security lighting to minimize light spill and sky glow while maintaining safety
  - Occasional access to the OHTL, pipelines and substation for maintenance, managed to minimize disturbance to surrounding land and receptors
  - A post-construction review to confirm the reinstatement of temporary working areas and the effectiveness of screening and color treatment
  - Continuation of the grievance mechanism for any landscape, visual or lighting matters arising during operation

With the application of the above mitigation, embedded within the Project Environmental and Social Management System (ESMS) and supported by the mitigations, reinstatement, dust and lighting control, screening and monitoring, the residual landscape and visual impact is assessed as **Minor Negative** during construction and **Minor to Moderate Negative** during operation. The construction-phase effects are largely temporary and reversible on reinstatement, whereas the permanent presence of the plant, substation and overhead line means that operational landscape and visual effects can be reduced but not removed. Effectively implemented, sensitive design, color treatment, lighting control and reinstatement also deliver a **beneficial** outcome by integrating the facility into its setting and limiting its visibility to the surrounding communities.

8.7 Archaeology and Cultural Heritage

8.7.1 Scoping

Construction activities with the potential to affect archaeology and cultural heritage will include:

- Site preparation at the Plant Area, including vegetation clearing, levelling and grading, re-routing of the existing wadi, structural excavations for buildings, process plant, equipment, tanks, excavations for the evaporation pond, drainage and flood protection measures and trenching for underground services.
- Site preparation at the Substation Area, including levelling, grading and structural excavations.
- Site preparation and excavations for temporary flood protection and drainage at the Laydown area.
- Site preparation works, including levelling and grading for construction access and equipment laydown and assembly areas at the tower locations along the OHTL route, and structural excavations for foundations at each tower area.
- Vegetation clearing and topsoil stripping, grading, trenching and backfilling along the construction corridor of the gas and water pipeline tie-ins.
- Earthworks and soil movements associated with the formation of temporary construction and future permanent access roads to the Project site and Associated Facilities.
- Soil movements associated with the reinstatement of the areas disturbed during construction.

Potential impacts on surface archaeological and/or cultural heritage sites are scoped out, given that no such sites were identified during the baseline. However, given the potential presence of unknown subsurface archaeological and cultural heritage resources, the Area of Influence for archaeological and cultural heritage impacts is defined as the physical construction footprint of the Project site and Associated Facilities.

Potential impacts on archaeological/cultural heritage resources during the operations are also scoped out on the basis that any ground disturbance during these phases would occur within the construction footprint of the Project site and Associated Facilities.

The AoI for archaeology and cultural heritage is impact-based rather than radial, since the only credible pathway is physical ground disturbance. It is defined by the excavation and earthworks footprint, comprising the Plant Area, Substation Area and Temporary Laydown Area, the tower foundations, access and assembly areas along the OHTL, the trenching corridors of the gas and water pipeline tie-ins, and temporary and permanent access roads. The social receptors within this AoI are identified separately and comprise the local communities and households that attach cultural or commemorative value to features in the affected land, the farmers and other land users who work it, and the mobile and seasonal Bedouin herders whose camping grounds and water points may not appear in official records.

8.7.2 Archaeology and Cultural Heritage Impacts

This assessment focuses on archaeological and cultural heritage impacts associated with ground disturbance from site preparation, excavations, and civil works across the Project site and Associated Facilities.

8.7.2.1 Receptor Sensitivity

The physical baseline survey confirmed the absence of known surface archaeological or cultural heritage resources within the Project sites and that the Project site does not overlap, intersect, or lie in proximity to any known archaeological or cultural heritage sites. Secondary data review identified two archaeological records within the Project site and confirmed sufficient distance between the Project site and the Associated Facilities and potential archaeological resources in the wider area.

Receptor sensitivity is determined as **Low** based on the following justification:

- The construction footprint of the Project site and Associated Facilities is not characterized by the presence of archaeological or cultural heritage resources and is sufficiently distant from any such known resources
- While the presence of sub-surface archaeological/cultural resources within the construction footprint remains unknown, based on the current knowledge, any encountered archaeological/cultural heritage resource would not be of significant value or importance

8.7.2.2 Magnitude of Effect

Based on the baseline assessments undertaken, the magnitude of impact on unknown subsurface archaeological and cultural heritage resources as a result of construction activities is assessed as **Low,** with the following justification:

- Construction ground disturbance works may result in accidental damage to or loss of an unknown subsurface archaeological/cultural heritage resource.
- The effect of damage to or loss of an encountered archaeological/cultural heritage resource would be direct, long-term and irreversible. However, the likelihood of encountering and/or accidentally damaging or destroying an archaeological/cultural heritage resource of importance or value is low

8.7.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation (taking into account receptor sensitivity and the magnitude of the effect ranking), the significance of impact on archaeological/cultural heritage resources is considered to be **Minor Negative**.

Mitigation to reduce the potential significance associated with archaeology/cultural heritage impacts is defined below:

- Construction planning, to be completed prior to construction:
    - The EPC Contractor shall develop a Chance Find Procedure that takes into account the following:

- Stop Work Protocol: in the event that an archaeological/cultural heritage resource is encountered, the construction activities shall be suspended, and an area within a minimum 25-meter radius shall be secured with barriers, provided with warning signs in both Arabic and English languages and protected from excessive vibration, dust and other construction impacts. Where more chance finds in the vicinity are suspected or encountered, the protected area shall be expanded accordingly.
- Immediate notification to the Department of Antiquities (DoA) via formal communication.
- Notification to all construction personnel of the chance find and issuance of instructions prohibiting entry into the barriered area or disturbance of the chance find in any way.
- Suspension of the work at the chance find site until the DoA assessment has been concluded and a clearance to resume work has been granted.
- Permission for construction activities to continue at other parts of the site unless another chance find is encountered, in which case the same Stop Work Protocol shall apply.

- The site induction shall include a module on the requirements of the Chance Find Procedure. All EPC Contractor and subcontractor personnel shall receive training on worksite boundaries, recognizing potential archaeological/cultural heritage assets or sites, the Stop Work Protocol, and reporting requirements prior to the start of construction work on-site.
- The EPC Contractor shall select and appoint a sufficient number of qualified archaeologists to carry out a watching brief at all construction fronts across the Project site and Associated Facilities.

- Construction phase:
  - The EPC Contractor shall implement the Chance Find Procedure throughout the construction works at the Project site and Associated Facilities.
  - All Project ground-breaking and ground-clearance works, including trenching, grading, excavations, soil movements and stockpiling, shall be carried out within the established construction footprint of the Project site and Associated Facilities.
  - The EPC Contractor shall establish an archaeological watching brief for all ground disturbance/ground-breaking works, which shall not commence or continue without the presence of a qualified archaeologist. The watching brief shall continue until the completion of construction-related earthworks, including reinstatement.
  - When a chance find is encountered, a report of the following minimum contents shall be prepared and submitted to the DoA:
    - Photographic record of the chance finds, including photographs of the barriers and warning signage erected.
    - Change find location (Global Positioning Systems (GPS) coordinates) and topographic description.
    - Description of the nature and conditions of the chance find.

- On completion of the DoA assessment of the chance find, the above report shall be updated with the findings of the Inspection Office and supplemented with the following formal correspondence from the Inspection Office: (i) the letter outlining any mitigation measures to be implemented, (ii) the letter granting permission to resume construction work within the chance find location.

- During reinstatement, the Engineering, Procurement and Construction (EPC) Contractor shall continue to work within the established construction footprint of the Project site and Associated Facilities and adhere to a sensitive backfilling and site clean-up methodology.

With the mitigation incorporated into the Project ESMS, applied, verified and reported, the residual impact significance is considered **Negligible**. The justification for the reduction in impact significance is due to:

- Reduction in magnitude of effect due to personnel training and implementation of the archaeological watching brief and Chance Find Procedure.

8.8 Land Use, Resettlement and Livelihoods

8.8.1 Scoping

The construction and operation of the CCPP and the Associated Facilities, comprising a new 400 kV substation and OHTL, a gas pipeline tie-in, and a water supply pipeline tie-in will require the permanent allocation and temporary use of land, as well as the establishment of permanent easements and temporary rights-of-way. Consequently, Project activities may affect the owners and users of both state-owned and privately owned land within and adjacent to the Project footprint. This section assesses the potential impacts of the Project on private and state landowners and land users during construction and operation, and defines the measures required to avoid, minimize and manage adverse effects in line with Jordanian law and Good International Industry Practice.

The main Plant Area and Substation Area are located on state land. They form part of Plot No. 1, Parcel No. 1 of the Khanasri lands, which is owned by the Treasury of the Government of Jordan and classified as Haraj (forest) land, of which 300 dunums have been allocated to the Ministry of Energy and Mineral Resources (MEMR) for the CCGT Project by Prime Ministry Decision No. 9/6/1/8651 of 16 April 2025, on condition that the land remains under governmental ownership. The allocated area lies partly within the Khanasri Grazing Reserve, which is owned by the Ministry of Agriculture (MoA) and managed by the Al Khanasri Animal Research Station under the National Agricultural Research Center (NARC), and represents approximately 10% of the reserve. The site is fenced, and access is controlled, and site surveys and consultation with the MoA confirmed that the allocated area is unoccupied, holds no structures or assets, and is not used by external grazers.

In contrast, the Associated Facilities, being the OHTL, the gas pipeline tie-in are routed predominantly across privately owned land, and their construction will require temporary access and permanent easements affecting private landowners and land users. However, the water supply pipeline tie-in runs within the existing RoW of a formal road within which an existing water pipeline runs.

Construction activities with the potential to affect private and state landowners and users will include:

- The permanent occupation of the state-owned Plant and Substation Area, including clearance of vegetation and topsoil, re-routing of the wadi that currently crosses the Plant Area, grading, structural excavation, and construction of the permanent plant, buildings and evaporation pond
- The temporary use of a laydown area and temporary construction facilities, such as site offices, workshops, material storage and welfare facilities, and the construction of a new permanent access road from the existing road to the west of the site
- The establishment of a construction RoW and temporary working strip along the OHTL route across privately owned parcels, including access to tower locations, foundation excavation, tower assembly, and conductor stringing
- The establishment of a working strip and trenching for the gas pipeline tie-in, comprising an approximately 300 m connection and a fenced gas metering station of around 40 m × 60 m, and for the water supply pipeline tie-in that is within a corridor of existing water utilities and a public road
- Temporary restrictions on access to, and use of, land within and adjacent to construction areas and rights-of-way, including agricultural land, grazing land, and land used by nomadic and semi-nomadic Bedouin herders observed camped in the vicinity of the OHTL corridor during the baseline survey
- The potential disturbance, damage or loss of crops (including barley observed along parts of the OHTL

route), fences, irrigation infrastructure and other fixed assets on privately held land

- The movement of construction traffic and plant on and around the site and along access routes, with the potential to disturb adjacent land users, livestock and seasonal grazing movements
- Interfaces with other state landholdings and planned land uses, including the Ministry of Transport's planned railway, which requires a 100 m buffer partly overlapping the substation and OHTL route, and the military shooting range currently within part of the Project Site, which is to be relocated and the land cleared and remediated

Operational activities with the potential to affect private and state landowners and users will include:

- The permanent presence of the Plant, the Substation and the evaporation pond on the state-owned allocated land over the 25-year operational life, with the land remaining under governmental ownership
- The permanent presence of the OHTL, gas pipeline and water pipeline, together with their easements and safety corridors across privately owned land, and the associated restrictions on land use within the rights-of-way, such as limitations on cultivation, structures and deep-rooted planting beneath and around the OHTL
- Periodic access to the OHTL, pipelines and substation for inspection and maintenance, requiring occasional entry onto privately owned land
- The continued controlled occupation of the allocated reserve land, permanently removing approximately 10% of the Khanasri Grazing Reserve from the reserve's managed grazing rotation

Based on the above, the potential land, resettlement, and livelihood impacts during the construction phase comprise:

- Permanent loss of state land and grazing reserve area (adverse): the permanent allocation and enclosure of 300 dunums of state-owned Haraj land, including approximately 10% of the Khanasri Grazing Reserve, removing it from the MoA's managed grazing rotation, notwithstanding that the area is currently unoccupied and unused by external grazers
- Temporary and permanent loss of, or restricted access to, private land (adverse): the temporary occupation of private land for construction rights-of-way and working strips along the OHTL and pipeline routes, and the permanent easements required for these facilities, restricting owners' and users' use of the affected land
- Loss of or damage to crops and land-based assets (adverse): the disturbance, damage or loss of crops (including barley along the OHTL route), fences, irrigation infrastructure and other fixed assets on privately owned land during clearance, trenching and construction
- Disruption to agricultural and grazing livelihoods (adverse): temporary loss of agricultural income, and disruption to grazing access and to the seasonal movements of nomadic and semi-nomadic Bedouin herders and their livestock in the vicinity of the OHTL corridor
- Impacts on informal land users lacking formal tenure (adverse): the risk that informal users of state or private land, including Bedouin herders camped near the OHTL corridor and any agricultural users without registered title or documented rights, are affected without being eligible for compensation under national law unless additional measures aligned with lender standards are applied

- Disturbance to other land users and businesses (adverse): temporary disturbance to nearby land uses identified along the OHTL corridor, including poultry farms and a telecommunications facility, and to any roadside or other activity affected by construction access and traffic
- Risks to livestock (adverse): the risk of livestock straying into open trenches or excavations, or being struck by construction traffic, along the pipeline and OHTL routes
- Fair land access and livelihood support (positive): the opportunity, through fair and timely compensation and livelihood restoration, to ensure that affected owners and users are left no worse off, and to deliver community-level benefits where grazing land is affected

During the operational phase, the potential impacts comprise:

- Permanent land-use restriction within easements and rights-of-way (adverse): ongoing restrictions on the use of privately owned land within the OHTL and pipeline easements and safety corridors, limiting cultivation, structures and certain activities over the operational life
- Permanent removal of land from grazing use (adverse): the permanent loss to the Khanasri Grazing Reserve of the allocated area, which remains unavailable for grazing over the operational life
- Occasional access for operation and maintenance (adverse): periodic entry onto privately owned land for the inspection and maintenance of the OHTL, pipelines and substation, with the potential for localized, short-term disturbance
- Secure land tenure and reinstatement (positive): the reinstatement of temporarily used land to its former condition or better on completion of construction, and the clarification and formalization of land rights and easements, providing greater certainty for affected owners and users

The land requirements of the Project, the treatment of affected private and state landowners and users, and the fairness, transparency, and timeliness of any compensation are matters of direct relevance to the Project's lenders and are expected to be raised by affected landowners, farmers, herders, and local authorities during Project delivery.

The AoI for land use, resettlement and livelihood impacts is impact-based and defined by tenure and use rather than by a fixed radius, and it is therefore non-contiguous and partly linear. It comprises the allocated state land at the Plant, Substation and Laydown Areas, including the affected portion of the Khanasri Grazing Reserve; the 6.8 km OHTL corridor, its temporary construction working width and permanent right-of-way; and the gas and water pipeline tie-in corridors and easements. The affected parties are identified separately and comprise registered private landowners; tenant, migrant and informal land users without documented title; households within and adjacent to the corridors; the Ministry of Agriculture and Khanasri station employees who cultivate and graze the reserve on rotation; and mobile or seasonal Bedouin herders, whose exposure is defined by their spring grazing range intersecting the Project Site and linear Associated Facilities.

8.8.2 Land Use, Resettlement and Livelihood Impacts

The assessment of land, resettlement, and livelihood impacts considers the sensitivity of potentially affected landowners and users, the magnitude of potential effects during construction and operation, and the significance of the resulting impacts both before and after the application of mitigation measures.

8.8.2.1 Receptor Sensitivity

The receptors sensitive to land, resettlement and livelihood impacts comprise the owners and users of the state-owned and privately owned land affected by the Project and its Associated Facilities. State land interests include the Treasury of the Government of Jordan as landowner, MEMR as the allocated user of the Plant and Substation Area, and the MoA and the Al Khanasri Animal Research Station (managed by NARC) as owner and manager of the affected portion of the Khanasri Grazing Reserve. Private land interests comprise the owners and users of the parcels crossed by the OHTL, the gas pipeline, and the water pipeline, including farmers and farm workers, as well as the informal users of land along these corridors.

Among the affected owners and users, the following groups are considered to have a heightened sensitivity to land, resettlement and livelihood impacts:

- Nomadic and semi-nomadic Bedouin herders and their households, camped on or near the OHTL corridor on state or private land, whose livelihoods depend on grazing access and seasonal movement and who often lack formal tenure
- Informal and unregistered land users, including herders and any agricultural users occupying state or private land without registered title or documented rights, who may not be entitled to compensation under national law without additional measures
- Small-scale farmers and farm workers on the private parcels crossed by the Associated Facilities, including migrant agricultural laborers, who have limited adaptive capacity and may depend on the affected land for income
- Owners and operators of land-based assets and businesses identified along the OHTL corridor, such as poultry farms, whose operations could be disturbed by construction

Taking into account the predominance of state ownership on the main site, which is unoccupied and unused by external parties, the routing of Associated Facilities across privately owned land, and the presence of informal and vulnerable land users along the OHTL corridor, the sensitivity of receptors to land, resettlement and livelihood impacts is assessed as **Medium**, with the following justification:

- Vulnerability and presence:
    - The main Plant Area is unoccupied state land with no current users or assets, but the associated-facility corridors cross privately owned land and are used by farmers and by informal Bedouin herders whose tenure is often insecure
- Value:
    - Access to land, grazing and water resources is central to the livelihoods and social identity of affected herders and farmers, and privately held land, crops and assets are of high value to their owners and to their dependent households
- Resilience:
    - Small-scale farmers, herders and informal land users have limited ability to absorb the loss of, or restricted access to, land, crops or grazing, and limited leverage to secure redress, particularly where they lack formal tenure

8.8.2.2 Magnitude of Effect

With regard to construction impacts, the impact magnitude is assessed as **Medium** and predominantly adverse in the absence of mitigation, with the following justification:

- The main Plant Area is located on unoccupied state land, limiting physical displacement, but the associated facilities extend across multiple privately owned parcels, so a number of owners and users may be temporarily or permanently affected
- Economic displacement, comprising temporary loss of access to or use of land and loss of or damage to crops, fences and irrigation, is the predominant impact type and arises principally during construction along the OHTL and pipeline routes
- The permanent allocation of state land removes approximately 10% of the Khanasri Grazing Reserve from managed grazing use, although the area is currently unoccupied, and the MoA has confirmed that no individuals are affected
- Informal and vulnerable users, including Bedouin herders and any undocumented agricultural users, could experience disproportionate effects if their use of land is disrupted without mitigation
- Conversely, careful route optimization, reinstatement and fair compensation would substantially reduce these effects

Considering operational impacts, the impact magnitude is assessed as **Low**, with the following justification:

- Land temporarily used during construction will be reinstated to its former condition, so residual impacts are limited principally to the permanent easements and safety corridors of the OHTL and pipelines
- Restrictions on the use of private land within the rights-of-way persist over the operational life but affect a limited area, and access for maintenance is occasional and short-term
- The permanent removal of the allocated area from the Grazing Reserve continues through operation, but affects an unoccupied area representing a small proportion of the Reserve

Embedded commitments already made by the Project that contribute to managing land and livelihood effects include:

- The siting of the main Plant Area on state land already allocated to MEMR and confirmed by the MoA to be unoccupied and unused by external grazers, minimizing physical and economic displacement on the main site
- The involvement of the MoA in the selection of the allocated area within the grazing reserve, and the condition that the land remains under governmental ownership
- The commitment to reinstate all areas in temporary use to their pre-construction condition or better, including reinstatement of land drainage, access, other networks and vegetation disturbed during construction
- Ongoing route refinement of the associated facilities to avoid and minimize impacts on private land, together with respect for the 100 m railway buffer through continued engagement with the Ministry of Transport

8.8.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation, and taking into account the Medium sensitivity of receptors, the Medium magnitude of construction effects, and the Low magnitude of operational effects, the impact significance for land, resettlement and livelihoods is assessed as **Moderate Negative** during construction and **Minor Negative** during operation, reflecting the predominance of temporary economic displacement along the associated-facility corridors and the high sensitivity of informal and vulnerable land users.

Mitigation to prevent and reduce these adverse effects is defined below. The overarching mitigation is the development and implementation, prior to construction, of a Land Acquisition Framework (LAF). The LAF will be prepared in accordance with Jordanian law and Good International Industry Practice, including IFC Performance Standard 5 and the applicable lender land acquisition and resettlement requirements, to ensure that all affected people, whether they hold legal, customary or informal land rights, are treated fairly and left no worse off.

- Construction planning, to be completed prior to construction:
    - The Project to prepare a Resettlement Policy Framework, which will make the following commitments:
    - Confirmation, through continued engagement with the Ministry of Transport, of the acceptability of the substation and OHTL locations within the 100 m railway buffer, and confirmation with the MoA of the reserve land allocation, prior to construction
    - Confirmation that the military shooting range is relocated outside the Project boundary, with related structures removed and the land cleared and remediated, prior to construction in the affected area. This should include a contaminated land / UXO clearance.

With the application of the above mitigation, embedded within the Project Environmental and Social Management System (ESMS) and supported by the LAF, the residual land, resettlement and livelihood impact is assessed as **Minor Negative** during construction and **Negligible to Minor Negative** during operations.

8.9 Community Health, Safety, Security and 3rd Party Infrastructure and Services

8.9.1 Scoping

Community Health, Safety and Security (HSS) impacts, as well as impacts on infrastructure services and utilities, have the potential to arise during both the construction and operational phases of the Project, affecting communities, residents, road users, farmers, herders and other land users located in the vicinity of the Project Site and Associated Facilities. This section assesses the potential for the Project to affect community HSS, as well as services and utilities, and defines the measures required to prevent and manage these impacts in line with Jordanian law and Good International Industry Practice, including the requirements of the Project's lenders. Dust, noise and visual impacts, which also have the potential to affect community health and amenity, are assessed within 'Chapter E', 'Chapter 8.3' and 'Chapter 8.6' respectively and are cross-referenced where relevant below.

Construction activities with the potential to affect community health, safety and security will include:

- Site preparation, excavation and civil works across the Project Site in advance of fencing being installed
- Associated Facilities trenching and installation of the gas and water pipeline tie-ins and preparation of OHTL tower foundations that may intersect grazing land, community movements and public access routes
- Movement of construction plant, heavy goods vehicles and personnel to and from the site via the existing public road, including deliveries routed from ports such as Aqaba Port and other logistic hubs
- Storage and handling of fuels, oils and chemicals on site, including above-ground diesel tanks, and the laydown and storage of materials, plant and equipment within the Temporary Laydown Area
- Presence of a construction workforce of up to approximately 1,500 personnel at peak over a construction period of around 20 months, and the potential establishment of one or more construction camps close to the Project Site or the use of existing non-camp accommodation
- Establishment of construction security arrangements, including gates, fencing, signage and the deployment of security personnel

Operational activities with the potential to affect community health, safety and security will include:

- Operation of the CCGT plant over its 25-year operational life, routinely using natural gas and using distillate oil as a backup fuel, including the operation of high-temperature and high-pressure gas, steam and water systems
- Receipt, storage and handling of distillate oil (with a minimum 14-day full-load inventory), dosing chemicals (including ammonia, alkaline agents and trisodium phosphate) and operation of the natural gas system and tie-in
- Operation of the adjacent 400 kV substation and OHTL, constructed and operated by NEPCO
- Movement of the operational workforce of around 60 personnel and ongoing deliveries of fuel, chemicals and consumables and the removal of wastes
- Operation of the evaporation pond and ongoing operational security arrangements

Based on the above, the potential community health, safety, and security impacts scoped for this assessment are as follows.

During the construction phase, the potential impacts comprise:

- Construction hazards and disturbances: open trenches and unprotected excavations (including along the water, gas pipeline and OHTL routes) present a hazard to community members and livestock, particularly where they intersect grazing movements, pedestrian routes; safety hazards associated areas of the site that are not fenced; the potential for spills or fire associated with the on-site storage of fuels, oils and chemicals; and increased exposure to flooding where temporary works alter natural wadi drainage patterns
- Traffic, access and road safety: increased vehicle movements on the existing public road and highway network, creating collision and safety risks for pedestrians, herders, livestock and other road users, together with temporary access restrictions and accelerated deterioration of local roads
- Worker influx: the temporary influx of non-local workers, which, if not carefully managed, could increase the transmission of communicable diseases, anti-social behavior, Gender-Based Violence, Harassment, Sexual Exploitation and Abuse (GBVH/SEAH), or tensions between the workforce and local communities
- Community infrastructure and services: localized pressure on health services, water, supply, sanitation, waste management and emergency response capacity, particularly for the smaller municipalities of Al-Basiliyah and Hosha
- Security arrangements: potential risks to communities arising from the conduct of public or private security personnel, including the use of excessive force, intimidation or inappropriate interactions, if security is not managed in line with international good practice

During the operational phase, the potential impacts comprise:

- Major accident hazards and process safety: the potential for fire, explosion or hazardous release associated with the natural gas system and tie-in, distillate oil storage, chemical storage and the high-temperature and high-pressure steam and water systems, with the potential to affect the nearest receptors located within approximately 500 m of the Project Site
- Electrical safety and the OHTL and substation: electrocution and the need to maintain safe clearances along the OHTL right of way (RoW), together with community concern regarding potential exposure to electric and magnetic fields (EMF)
- Traffic and transport: ongoing, lower-level movements associated with the operational workforce and the delivery of distillate oil, chemicals, consumables and the removal of wastes
- Nuisance and routine emissions: noise and air emissions during routine and non-routine operation, which are assessed within the other impact sections
- Security arrangements: the ongoing presence and conduct of operational security personnel
- Aviation safety and obstacle risk: the potential for tall Project structures, including the emission stacks, gas turbine buildings and the associated 7 km OHTL towers, together with tall construction cranes during the construction phase that could constitute obstacles to civil and military aviation, given the proximity of regional flight paths and a military airbase operating in the area

Community health and safety, including concerns relating to dust, traffic safety and the potential effects of the Project on livestock, were raised by communities during the ESIA scoping meetings.

The services and utilities that the Project may use during construction and operation, and which are relevant to potential pressures on community infrastructure and services, are set out in the Infrastructure and Utilities assessment and summarized below:

- Water supply: A Water Supply Agreement (WSA) has been signed between the Developer, the Water Authority of Jordan (WAJ) and the Yarmouk Water Company (YWC) for the supply of approximately 600 m^3/day of water to the Project over a period of 25 years. The main supply in the area is drawn from the Zaatari groundwater resources, and the arrangements were assessed and agreed on the basis that the Project's water requirements can be met without affecting water availability for local communities or existing users in the area.
- Wastewater: during operations, the Project will adopt a Zero Liquid Discharge (ZLD) design, so that no process wastewater is discharged beyond the plant boundary. Wastewater generated during construction may be directed to the nearest wastewater treatment plants (WWTPs) Wadi Hassan (approximately 9 km west), Al-Ekader (approximately 11 km north) and Mafraq (approximately 14 km east), subject to obtaining the necessary approvals and confirmation of available treatment capacity.
- Solid waste: non-hazardous solid waste may be disposed of at El Ekaider Landfill, the closest authorized landfill to the Project Site, which is operated and managed by the Joint Services Council (JSC) of Irbid.
- Hazardous waste: hazardous waste would be transported to the Swaqa Hazardous Waste Treatment Facility, the only designated hazardous waste facility in Jordan, operated by the Ministry of Environment (MoEnv) and located approximately 266 km south of the Project Site.
- Electricity: grid connection and power export are provided via the adjacent 400 kV substation and overhead transmission line (OHTL), constructed and operated by NEPCO.
- The Project's reliance on these dedicated supply arrangements and designated regional waste and wastewater facilities, rather than on local municipal services, limits the potential for additional pressure on the community infrastructure and services of the smaller surrounding municipalities.

The AoI for community health, safety, security and third-party infrastructure and services is impact-based, set by the reach of each pathway rather than a single radius, and in parts extends beyond the 5 km screening envelope used for emissions and noise. It comprises:

- Scattered households and structures within approximately 1 km of the Project Site, which are individually exposed to dust, noise, night lighting and site traffic
- Land users, farmers and herders adjacent to the open trenches and excavations of the OHTL and pipeline corridors
- Road users, including pedestrians, children, herders and livestock, along the public roads and haul routes used by construction traffic to quarries, suppliers, the El Ekaider Landfill and workforce origin settlements
- Localities affected by worker accommodation and associated facilities, whether in camps close to the Project Site or in rented housing in nearby villages
- Service providers whose capacity may be drawn upon, comprising municipalities and Local Development Units, health and emergency services, and waste and wastewater operator

8.9.2 Community HSS and Infrastructure and Services Impacts

The assessment of community HSS and infrastructure and services impacts considers the sensitivity of the potentially affected receptors, the magnitude of potential effects during construction and operation, and the resulting impact significance both prior to and following the application of mitigation measures.

8.9.2.1 Receptor Sensitivity

The receptors sensitive to community health, safety and security impacts comprise the communities, residents, land users, road users and local authorities located within the Project Area of Influence (AoI). The towns and villages closest to the Project Site comprise:

- Faa', located approximately 0.76 km northeast of the Project Site
- AlHarsh, located approximately 1 km northwest
- AlKhanasri, located approximately 1.2 km southwest
- Buraiqa, located approximately 3.5 km northwest
- Hosha, located approximately 3.83 km northeast

The above communities' populations range from 2,598 in Faa' to 872 in AlKhanasri, according to the 2015 census.

Communities within the neighboring Qasabet AlMafraq District comprise Umm Al Lulu (approximately 2.76 km southeast), Deir Al Waraq (approximately 3.1 km south-southwest) and Manshyet Bani Hassan (approximately 3.2 km south-southeast). The closest individual receptors to the Project Site comprise residences located approximately 500 m to the southwest and 715 m to the northwest.

In addition to residential communities, sensitive receptors include:

- Land users, including grazers using areas outside the Khanasri Grazing Reserve (the Project Site itself being located on an allocated development plot within the reserve, which is managed by the Ministry of Agriculture and restricted from external grazers), smallholdings and farms across the wider area, and the area of poultry farming adjacent to the OHTL route
- Road users on the existing public road and highway network used to access the Project Site
- Aviation receptors, comprising civil and military aircraft operating within the regional airspace and along known flight paths and routes in the vicinity of the Project, together with the military airbase operating in the area (in proximity to Al-Albayt University) and the restricted military airspace and prohibited zones managed by the Royal Jordanian Air Force. The Project's tall structures have the potential to create aviation obstacles, and aviation receptors are therefore sensitive to the introduction of tall permanent structures and temporary construction equipment. Consultation with the Jordanian Civil Aviation Regulatory Commission (CARC) confirmed that any structure exceeding 40 meters in height is classified as an aviation obstacle requiring aviation warning lighting and specialized markings. CARC further advised that a military airbase operates in the area, such that mandatory approval from the Royal Jordanian Air Force is also required. The maximum allowable structure heights are to be confirmed by CARC following formal submission and review of the exact Project coordinates and elevations.

Among the potentially affected people, the following vulnerable groups are considered to have a heightened sensitivity to community health, safety and security impacts:

- Women, who may face structural barriers to mobility and to raising concerns through conventional channels, and heightened exposure to GBVH/SEAH risks
- Children, who may be less aware of construction hazards and who may use local roads and paths
- Youth, particularly given the high levels of unemployment across the Badia
- Small-scale herders and livestock keepers, whose livelihoods and animals are sensitive to disturbance, access restrictions and road safety risks
- Economically vulnerable households, including those with limited capacity to absorb short-term disruption, and households living informally or in tented accommodation without secure services
- Persons with disabilities, who may face additional barriers to accessing services, transport and consultation processes

Taking into account the proximity of receptors to the Project Site and Associated Facilities, the presence of vulnerable groups within the surrounding rural communities, and the reliance of many land users on livestock and grazing, the sensitivity of receptors to community health, safety and security impacts is assessed as **Medium**, with the following justification:

- Vulnerability and presence:
  - Residential receptors are located within approximately 500–715 m of the Project Site, and vulnerable groups (including children, women, small-scale herders and economically vulnerable households) are present within the potentially affected communities
- Value:
  - Community health, safety and security are fundamental concerns, and the potential consequences of certain impacts (such as traffic accidents, excavation-related incidents or major accident hazards) can be serious and, in some cases, irreversible
- Resilience:
  - Small rural municipalities have limited health, emergency-response and service capacity, and some land users and households have limited capacity to absorb disruption, reducing their resilience to potential impacts

8.9.2.2 Magnitude of Effect

With regard to construction impacts, the impact magnitude is assessed as **Medium**, with the following justification:

- Construction will involve multiple simultaneous activities across the Project Site and along the linear pipeline tie-in and OHTL routes, over a construction period of approximately 20 months, with the potential to affect a number of communities, land users and road users
- The majority of disturbances (such as access restrictions, nuisance and increased traffic) are expected

to be temporary, short to medium term, localized and reversible, ceasing on completion of construction

- Certain risks, however, including traffic accidents involving community members or livestock and safety incidents associated with unprotected excavations or machinery, carry the potential for serious consequences if not adequately managed
- The contained footprint of the Project Site and the relatively short length of the Associated Facilities (including the approximately 300m gas pipeline tie-in and the local water supply tie-in) limit the geographic extent of construction impacts compared with more extensive linear developments

Considering operational impacts, the impact magnitude is assessed as **Low**, with the following justification:

- Routine operation of the CCPP is a contained activity within an estimated site boundary (excluding noise and emissions)
- Traffic levels on the public roads will be limited to deliveries of office and maintenance products and an operational workforce of around 60 personnel, creating limited routine community disturbance
- Major accident hazards associated with the gas system, distillate oil and chemical storage and the high-temperature and high-pressure systems are low-probability events, reduced by the embedded mitigation provided below
- Electrical safety and EMF considerations associated with the 400 kV substation and OHTL are managed through design, safe clearances and the maintenance of the RoW by NEPCO
- Routine air emissions and noise during operation are not predicted to result in significant impacts at the nearest receptors (refer to Chapters 6.1 and 8.3 above)

Embedded routine construction and operational controls that contribute to the reduction and management of community health, safety and security impacts include:

- Temporary and permanent engineered flood protection measures based on the flood model that was assessed for an extreme-event scenario equivalent to a 100-year flood
- Secondary containment during construction of hazardous liquids such as fuel and chemicals, and the operations phase, distillate oil and chemical storage
- An operational phase zero liquid discharge design with a fully lined evaporation pond and incorporating operational monitoring including integrity monitoring
- Process controls, described in the air and noise impact sections and emergency shutdown provisions and the absence of on-site natural gas storage
- Emergency shutdown capability provided by the black start and emergency diesel generators

8.9.2.3 Impact Significance, Mitigation and Residual Impacts

Prior to mitigation, and taking into account the Medium sensitivity of receptors, the Medium magnitude of construction effects, and the Low magnitude of operational effects, the impact significance on community HSS, infrastructure, and services is assessed as **Moderate Negative** during construction and **Minor to Moderate Negative** during operations.

Mitigation to further reduce the potential impact significance is defined below.

- Construction planning, to be completed prior to construction:

  - Inclusion of Project Community Health, Safety and Security measures within the relevant ESMS Plans (as discussed in "Chapter 10.2"), to be prepared by the EPC Contractor in consultation with the affected municipalities and relevant local authorities prior to mobilization. The plans will include measures to:

    - Address construction hazards and disturbance, including clear fencing of working areas with signage and lighting around offsite open excavations and trenches, machinery yards and laydown areas; timely reinstatement; safe and controlled storage of materials;

    - Erosion and surface water controls aligned with the Pollution Prevention Management Plan to maintain natural drainage as far as possible and avoid increasing flood risk to surrounding areas using temporary measures prior to the installation of permanent controls

    - Manage worker influx, including workforce accommodation planning to avoid strain on local services, provision of medical facilities within any accommodation camps, and the implementation of a worker code of conduct and a GBVH/SEAH code of conduct for all Project workers, contractors and sub-contractors

    - Address pressures on community infrastructure and services, including solid waste and wastewater management, aligned with municipal capacity and coordination with public health and emergency response services.

    - Address water supply contingency measures and drought response protocols aligned with the Water Management Plan, and in coordination with local municipal capacity and relevant national and regional authorities and services

  - Prior to construction, the baseline data gaps that currently limit the assessment of whether the construction workforce, worker accommodation, construction traffic and emergency risks would place additional pressure on community health, emergency response, water, sanitation, waste and security services. The studies and confirmations set out below will be completed by the EPC Contractor in consultation with the affected municipalities and the relevant local authorities and service providers, and their outcomes will be reflected in the ESMS Plans, the ESMMP and the Project design prior to mobilization.

  - Confirm the peak and average construction workforce numbers, the anticipated split between workers recruited locally, nationally and internationally, shift and rotation patterns, and the accommodation strategy, specifically whether non-local workers will be housed in a dedicated construction accommodation camp, in rented accommodation within the surrounding communities, or transported daily from outside the area. Where a worker accommodation camp or the use of local rented accommodation is proposed, its location, capacity, servicing and management arrangements will be confirmed and the need for a supplementary influx and accommodation assessment confirmed and if considered necessary completed prior to construction, addressing demand for local housing, health services, water, wastewater and waste services, and the associated community safety and GBVH/SEAH risks.

  - Complete a survey of the capacity of local health and emergency response services prior to construction, covering the health facilities serving Faa', AlHarsh, AlKhanasri, Buraiqa and Hosha

and the hospitals within Al Mafraq, together with civil defense ambulance, fire and rescue resources, equipment and response times to the Project Site and the Associated Facilities. The survey will compare the demand generated by the construction workforce with the capacity available, and where the demand cannot be accommodated without reducing service availability to local communities, the Project will provide self-sufficient on-site medical, fire and rescue capability, arrange private medical referral and medical evacuation, and formalize referral, mutual aid and joint drill arrangements with the civil defense and health authorities before construction commences.

- Quantify construction phase water demand and the volumes of wastewater and sanitary effluent to be generated, together with the proposed supply sources and disposal routes, and confirm with the relevant water authority, service providers and municipalities, prior to construction, that these can be met without reducing the availability, pressure or quality of supply to local communities or exceeding the capacity of the receiving wastewater facilities. The projects arrangements for water supply and wastewater disposal will be recorded in the relevant ESMS Plans.

- Confirm, as part of the detailed waste forecast referred to below, the licensed capacity of the receiving, treatment and disposal facilities intended to be used for construction and worker accommodation wastes, including hazardous wastes, and verify with the municipalities and the relevant regulator that Project volumes can be accepted without displacing or reducing municipal waste collection and disposal services for local communities. Where sufficient licensed capacity is not available, alternative or additional arrangements will be secured prior to construction.

- In conjunction with the EPC confirm the project forecast traffic counts and a road condition and safety survey of the public roads to be used to access the Project Site and the Associated Facilities prior to construction. The results will quantify the increase in traffic relative to existing conditions, identify sensitive locations such as community access points, school routes, pedestrian routes and livestock crossing points, and inform the Traffic and Transportation Management Plan, together with agreements with the relevant authorities on route selection, speed control, road maintenance and the repair of any Project-related damage.

- Complete a Project security risk assessment prior to construction that confirms the security arrangements to be applied at the Project Site, the Associated Facilities and any worker accommodation, the extent to which public security forces will be relied upon, and the resulting risks to local communities, so that the Security Management Plan and the associated screening, training, monitoring and engagement measures are informed by confirmed data rather than assumption.

- Prior to construction, the EPC Contractor will complete an accommodation options assessment comparing a dedicated construction camp against existing guest houses, hotels and rented housing, weighing community health, safety and security risk, effects on local housing supply and rents, the capacity of local water, wastewater, waste, health and emergency services, worker travel distance and journey risk, and the practicality of managing accommodation to Project standards. The selected option and its justification will be recorded in a Worker Accommodation Plan aligned with the principles below.

    - Any camp will be sited using defined criteria: minimum separation from Faa', AlHarsh, AlKhanasri, Buraiqa and Hosha and from schools, health facilities and places of worship;

avoidance of grazing land, Bedouin camping grounds, water points, watercourses, flood-prone land and ecological, archaeological or cultural heritage sensitivities; and safe road access. Existing premises must be licensed, meet Project accommodation and fire safety standards, and not displace residents.

- Municipalities, local authorities, community representatives and accommodation owners will be consulted before location and capacity are fixed, with outcomes disclosed through the Stakeholder Engagement Plan and concerns handled via the Grievance Mechanism.
- A closure and reinstatement plan will be confirmed before occupation, including verification by post-construction inspection and confirmed through consultation with the affected communities

- Develop a Waste Management Plan before the start of construction that addresses pressures on waste infrastructure and services, aligned with municipal capacity and coordination. This will be supported by:
  - Completing a detailed waste forecast for the construction and operation phases prior to construction
  - Completing a due diligence of waste contractors (transporters and receiving and disposal facilities) to ensure all contractors used comply with applicable project standards
- Develop a Waste Management Plan that details: principles of waste minimization and management, processes for assessment and selection of waste management subcontractors, waste identification and classification system, temporary site storage, segregation and handling requirements, waste transportation and chain-of-custody documentation requirements, estimation of the frequencies, duration, days of the week, planned working hours for noisy activities and predicted noise levels, waste tracking, monitoring and reporting requirements, including assurance activities such as inspection, reporting and auditing
- Develop a Security Management Plan to manage community risks associated with Project security in line with international good practice (for example the Voluntary Principles on Security and Human Rights), including the screening, training and monitoring of security providers on behavioral standards, human rights and the proportionate use of force, clear protocols for respectful engagement with local communities and engagement with public security forces to ensure alignment and coordination over Project security measures
- Develop a Traffic and Transportation Management Plan, based on a forecast of construction traffic flows and routes, to be prepared by the EPC Contractor in coordination with the relevant authorities and approved prior to mobilization, taking into account community access, key sensitive receptors, speed control, alternative routes and the safety of other road users, pedestrians and livestock
- Develop an Emergency Preparedness and Response Plans (EPRP) in conformance with all statutory requirements and government authorizations for the construction and operations phases. The EPRP for the Construction Period shall be prepared before the start of construction activities. The EPRP for the Operational Period shall be submitted prior to the start of operations.
  - The EPRP will define clear notification, response, investigation and reporting arrangements for emergency events. In the event of an emergency, the Project will notify the relevant

government authorities within the statutory timeframe and, in all cases, as soon as practicable, implement appropriate corrective and mitigation measures, maintain competent emergency response resources across the Project and contractor workforce, communicate emergency procedures to EPC Contractors and subcontractors, and conduct regular joint drills to test preparedness and share lessons learned.

- The EPRP will also define emergency scenarios relating to natural hazards including, but not limited to extreme heat, seasonal dust storms and wildfires with specific triggers (e.g. Jordan Meteorological Department heat/dust alerts, visibility thresholds for suspending work at height and crane operations), responses, implementation, communication and reporting requirements developed accordingly.

- Confirmation that the Project Grievance Mechanism includes clear, accessible and culturally appropriate channels for communities to raise community health, safety and security concerns

- NEPCO to undertake engagement with existing utility owners and operators and the community as required to manage crossings of existing services and utilities, outlining the processes for notification on potential service disruptions

- Undertake a Quantitative Risk Assessment covering gas release, fire/explosion, thermal radiation modeling and consequence assessment in conformance with international best practice and statutory and lender requirements to inform the Project design. Relevant outcomes to be integrated into the Emergency Preparedness and Response Plans (EPRP) as required.

- Obtain aviation safety clearance from the Jordanian Civil Aviation Regulatory Commission (CARC) and Jordanian Air Force (JAF) manage the Project's tall structures and construction equipment as aviation obstacles, to be secured prior to the commencement of construction. This will include:

  - Confirming the maximum allowable structure heights with CARC following formal submission and review of the exact Project coordinates and elevations, and reflecting any resulting height limits in the final Project design

  - Securing a No Objection Certificate (NOC) from CARC before construction commences, applicable to both permanent structures and temporary construction equipment, supported by submission of a Navigational Obstacles Study Request together with official coordinates and site elevations certified by the Royal Jordanian Geographic Center (RJGC), land registration documents and site plan, and detailed structural and engineering plans

  - Obtaining mandatory approval from the JAF and obtaining data on restricted military airspace and prohibited zones, given the military airbase operating in the area

  - Fitting all structures exceeding 40 meters in height with aviation warning lighting and specialized markings, with the emission stacks featuring alternating red and white banding and taller structures fitted with higher-intensity, multi-layered lighting systems in the configurations specified by CARC

  - NEPCO is to install high-visibility aerial warning spheres on the transmission towers of the associated 7 km OHTL and, depending on the final tower heights, full line-marking systems

  - Obtaining independent CARC approval for all construction cranes deployed during the construction phase, each fitted with certified aviation warning lighting

- Record the outcomes of the above studies in the ESMMP and disclose them to the affected municipalities and communities through the Stakeholder Engagement Plan. Where the outcomes indicate that pressure on community health, emergency response, water, sanitation, waste or security services would be greater than assessed in this Section, the impact significance will be re-evaluated and additional mitigation defined and implemented prior to the activity giving rise to the pressure, with the residual position reported through the Project's monitoring and reporting arrangements.

- Construction phase:
  - Implementation of all community health and safety measures set out in the various plans to include the Traffic and Transportation Management Plan, the Waste Management Plan, and the Project Emergency Preparedness and Response Plan and, supported by continuous monitoring, transparent communication and proactive engagement with local authorities and community representatives
  - Advance notification of construction schedules and public awareness campaigns to alert communities to work schedules, restricted zones, temporary closures, detours and safety precautions, with particular attention to schools, grazing areas and routes used by livestock
  - Monitoring, recording and reporting of community safety incidents, near-misses and grievances, with emerging risks triggering corrective action, supported by periodic joint inspections with local municipalities and districts
  - A post-construction verification and close-out program, including final safety inspections, reinstatement verification, the closure of temporary access routes and laydown areas with appropriate signage and rehabilitation, and post-construction consultation with communities and land users to confirm that residual risks have been addressed prior to operation
- Operations phase:
  - Development and implementation of an Operations community health, safety and security measures, including emergency preparedness and response arrangements coordinated with civil defense and local authorities
  - Implementation of a process safety and major accident hazard management approach, including hazard identification and assessment (for example, HAZID and HAZOP studies), fire safety measures, the maintenance of secondary containment and emergency shutdown systems, and operational integrity management for the gas, fuel, chemical and steam systems
  - Maintenance of electrical safety and safe clearances along the OHTL RoW and at the substation, and the provision of public awareness of the associated hazards, to be undertaken by NEPCO
  - Continuation of operational security arrangements in line with international good practice, and maintenance of the Project Grievance Mechanism throughout operation
  - Maintaining the aviation warning lighting, obstacle markings and aerial warning spheres on all permanent tall structures and the OHTL in operable condition throughout the operational phase, and preserving the validity of the CARC No Objection Certificate, including notification

to CARC and the Royal Jordanian Air Force of any subsequent changes to structure heights or configurations

With the application of the above mitigation embedded within the Project Environmental and Social Management System (ESMS), supported by verification, monitoring and reporting, the residual community health, safety and security impact is assessed as **Minor Negative** during construction and **Negligible to Minor Negative** during operation.

8.10 Local Employment and Local Content

8.10.1 Scoping

Employment and procurement opportunities linked to the construction and operation of the Project have the potential to generate positive socio-economic benefits for local communities, particularly through short-term construction-related job creation, contracting and supply opportunities for local businesses and subcontractors, and associated skills development. This section assesses how the Project can maximize local employment and local content benefits while ensuring that recruitment, training, procurement and supplier engagement are implemented transparently, fairly and without discrimination, in compliance with Jordanian labor and procurement requirements and consistent with Good International Industry Practice, including the requirements of the Project's lenders.

These same issues are, however, highly sensitive: when recruitment and procurement are not transparent and are not perceived as fair and inclusive, they can also generate adverse social consequences. This section assesses the potential for the Project to affect local employment and local content, including supplier and subcontractor opportunities, during construction and operation, and defines the measures required to both enhance the potential benefits and prevent and manage potential adverse impacts.

Worker influx, community health and GBVH/SEAH considerations associated with the construction workforce are assessed within 'Chapter 8.9' and are cross-referenced where relevant below.

Construction activities with the potential to affect local employment and local content will include:

- Recruitment and mobilization of a construction workforce of up to approximately 1,500 personnel at peak over a construction period of around 20 months, comprising skilled roles (such as engineers, technicians, consultants and surveyors) and semi-skilled and unskilled roles (such as laborers, security personnel and housekeeping staff)
- Engagement of the EPC Contractor and its subcontractors, and the procurement of materials, plant, equipment and services from a combination of national and international suppliers
- Opportunities for local businesses, SMEs and cooperatives to supply goods and services to the construction effort, including construction materials and aggregates, transport and haulage, plant hire, catering, fuel supply, waste collection, security and welfare or accommodation services
- The potential establishment of one or more construction camps close to the Project Site, generating additional local supply and service opportunities
- The recruitment, selection and contracting processes themselves, and the manner in which jobs and contracts are allocated across the surrounding communities and municipalities

Operational activities with the potential to affect local employment and local content will include:

- Recruitment of an operational workforce of around 60 personnel over the 25-year operational life of the Project, comprising skilled roles (such as engineers, technicians and administrative staff) and unskilled roles (such as security personnel and drivers)
- Delivery of Operation and Maintenance (O&M) activities through a long-term O&M contract, together with a maintenance arrangement with the gas turbine provider, with associated procurement of spares, consumables and specialist services
- Ongoing procurement of goods and services during operation, including fuel and chemical deliveries,

waste removal, maintenance, catering and security, offering continued local supply opportunities

- The transition from a temporary construction workforce to a small permanent operational workforce on completion of construction

Based on the above, the potential local employment and local content impacts during the construction phase comprise:

- Local employment and income (positive): the creation of a substantial number of temporary direct and indirect jobs for local community members, providing wages, household income and short-term livelihood improvements in an area of high unemployment
- Local supplier and subcontractor opportunities (positive): contracting, procurement and supply opportunities for local businesses, SMEs and cooperatives, together with the wider economic multiplier effect of construction expenditure circulating in the local economy
- Skills development and capacity building (positive): on-the-job training and the acquisition of transferable skills by the local workforce, including youth (and disabled youth) and women, improving longer-term employability beyond the Project
- Unmet expectations and perceived unfairness (adverse): competition for a limited number of jobs and contracts, where expectations are high, and opportunities are distributed through perceived bias, favoritism or the influence of wasta, can create resentment, grievances and tensions between localities
- Exclusion of vulnerable and under-represented groups (adverse): the risk that women, youth and persons with disabilities are sidelined from employment and procurement opportunities in the absence of deliberate inclusion measures
- Limited local capture and in-migration (adverse): the risk that local workers and suppliers are unable to meet skills, qualification or pre-qualification requirements, so that benefits are captured predominantly by non-local workers and by national or international firms, together with the potential for an influx of job seekers into the area in anticipation of employment

Potential for competition for employment and services between local communities and Syrians within the local communities which could create tension (adverse). During the operational phase, the potential impacts comprise:

- Long-term employment (positive): a small number of stable, skilled and unskilled jobs sustained over the 25-year operational life, providing longer-term income for those employed
- Ongoing local procurement (positive): continued opportunities for local suppliers and service providers to support routine operation and maintenance
- Loss of employment on demobilization (adverse): the sharp reduction in workforce from approximately 1,500 at the construction peak to around 60 during operation, which can create a localized loss of income and a sense of disappointment as construction employment ends
- Unmet expectations of permanent employment (adverse): the risk that community expectations for long-term employment are not met, given the small number of permanent operational roles, generating dissatisfaction if not managed through clear and early communication
- Potential for competition for employment and services between local communities and Syrians within

the local communities which could create tension (adverse).

Local employment and the use of local contractors and suppliers, together with the fairness, transparency, and inclusiveness of the processes through which these opportunities are allocated, were consistently raised by communities and local authorities as primary expectations and concerns during the ESIA stakeholder engagement.

The AoI for local employment and local content is impact-based and administratively rather than geometrically defined, because employment, procurement and training effects propagate through labor markets and institutions and do not attenuate with distance. It comprises:

- Hosha Sub-District, the Northwestern Badia and Qasabet Al Mafraq Districts and, for specialized roles and supply, Mafraq Governorate more widely.
- Communities and households within the settlements nearest the Project Site and its Associated Facilities, whose expectations of employment are highest.
- Job seekers drawn from beyond those settlements by construction of the plant, OHTL, pipelines and access roads.
- Local businesses, suppliers, contractors, cooperatives and service providers, including those supplying worker accommodation and associated facilities.
- Mobile or seasonal users and informally employed workers who may be least able to access recruitment processes without targeted outreach.

8.10.2 Local Employment and Local Content Impacts

The assessment of local employment and local content impacts considers the sensitivity of potentially affected receptors, the magnitude of potential effects during construction and operation, and the resulting significance of impacts both prior to and following the application of mitigation and enhancement measures.

8.10.2.1 Receptor Sensitivity

The receptors sensitive to local employment and local content impacts comprise local community members seeking employment, local businesses, suppliers and subcontractors seeking Project-related contracts and local authorities (the municipalities and the Hosha Sub-District). The communities with the likely highest expectations are those closest to the Project Site within Al-Basiliyah Municipality, including Al Khanasri, where the Project Site is located, Faa', AlHarsh and Buraiqa, together with the neighboring community of Hosha.

Among the potentially affected people, the following groups are considered to have a heightened sensitivity to local employment and local content impacts:

- Women, who face structural barriers to mobility, economic participation and representation in public decision-making, may have limited access to information about opportunities through conventional channels, and face heightened exposure to GBVH/SEAH risks
- Youth, where unemployment is extremely high and economic opportunities are scarce, making them

especially exposed to Project-related expectations and frustrations

- Persons with disabilities, and disabled youth in particular, who may face additional barriers to accessing employment, transport, information and consultation processes
- Small local businesses, SMEs and cooperatives, which may be unable to meet pre-qualification, scale or health, safety and environmental requirements, and so risk being excluded from Project procurement

Taking into account the high levels of local unemployment, the strong expectations around local employment and procurement, the reliance of many households on scarce economic opportunities, and the potential for perceived unfairness, the sensitivity of receptors to local employment and local content impacts is assessed as **High**, with the following justification:

- Vulnerability and presence:
  - Local unemployment levels are among the highest nationally, and vulnerable groups, including women, youth, disabled youth and economically dependent households, are present within the potentially affected communities and are at risk of exclusion from Project benefits
- Value:
  - Local employment and procurement are a primary community expectation and one of the principal channels through which the Project can deliver local benefit; for many households, it represents a rare opportunity for income, making the fair distribution of opportunities highly valued
- Resilience:
  - There are limited alternative economic opportunities in the area, and existing social dynamics, including tribal and clan interfaces and the reported influence of wasta on access to opportunities, mean that perceived unfairness or exclusion can quickly translate into wider grievances, reducing the resilience of communities to poorly managed processes

8.10.2.2 Magnitude of Effect

With regard to construction impacts, the impact magnitude is assessed as **Major**, with the type of impact (beneficial or adverse) depending on how effectively local employment and procurement are implemented, and with the following justification:

- The Project will generate a substantial volume of temporary employment, of up to approximately 1,500 personnel at peak, and a significant value of procurement and subcontracting opportunities over the approximately 20-month construction period, given the scale of the works and the number of contractors involved
- If managed effectively, these opportunities could make a major positive contribution to local livelihoods, household income stability and local business activity
- Conversely, the magnitude of potential adverse effects is also major if expectations are not met or if recruitment and procurement are not transparent and inclusive, since the real or perceived exclusion of local workers or suppliers could lead to significant dissatisfaction

- The number of directly and indirectly affected people, and the strength of local expectations, mean that both the beneficial and adverse dimensions of this impact are potentially large in scale

Considering operational impacts, the impact magnitude is assessed as **Low**, with the following justification:

- Operation will generate only a small number of permanent jobs, of around 60 personnel over 25 years, and a correspondingly limited volume of ongoing procurement, so the scale of both beneficial and adverse effects during operation is low
- The main operational sensitivity arises not from operation itself but from the sharp reduction in employment on completion of construction, and from the risk that expectations of long-term employment are not met
- Routine operational procurement, including fuel and chemical deliveries, maintenance, waste services and security, nonetheless offers a modest but sustained opportunity for continued local supply

Embedded commitments already made by the Project that contribute to enhancing the potential benefits and reducing the potential adverse effects on local employment and local content include:

- A commitment by the Project Developer to transparent recruitment procedures that include local community members
- A commitment to hire local community members to the greatest extent possible, for both skilled and unskilled roles, where they hold the prerequisite skills and qualities for the job
- Recruitment undertaken in accordance with "Regulation for Obligatory Employment of Jordanian Workforce from Surrounding Communities in Construction Projects No. (131) of 2016" and based on a fair assessment of skills, with no discrimination on ethnic, gender, race or other demographic grounds, and with directly affected people the only preferential factor, subject to meeting the job prerequisites
- The anticipated use of both national and international suppliers, providing scope to maximize local content where local capacity and standards allow

8.10.2.3 Impact Significance, Mitigation, and Residual Impacts

Prior to mitigation, and taking into account the High sensitivity of receptors, the Major magnitude of construction effects and the Low magnitude of operational effects, the impact significance for local employment and local content is assessed as **Major (Negative or Positive)** during construction and **Minor to Moderate (Negative or Positive)** during operation. The impact has the potential to bring widespread benefits to the local economy but, if not managed equitably and transparently, carries a serious risk of adverse social tension and reputational harm; it is therefore conservatively assessed as **Major Negative** during construction prior to mitigation.

Mitigation measures to reduce potential adverse significance and enhancement measures to maximize potential benefits are defined below. Based on consistent stakeholder feedback, the first and main step toward transparent and fair processes will be to work in close coordination with the local municipalities and the district and sub-district authorities.

- Construction planning, to be completed prior to construction:

- Registration of the EPC Contractor and the Developer on the Ministry of Labour's National Employment Program (NEP), a government, performance-based wage-subsidy and placement program designed to stimulate private-sector hiring of Jordanians, especially youth and women, which blends temporary wage support, social security and transport top-ups, and on-the-job and short classroom training tied to signed work contracts

- Development of a Project Local Employment and Local Procurement Procedure as part of the Labor and Working Conditions Management plan before the start of construction, prepared by the EPC Contractor in consultation with the local municipalities and district and sub-district authorities prior to mobilization, to design the most effective, transparent and fair processes for each Project locality, integrating the NEP process. The Procedure will:

    - Follow the employment targets set within the "Regulation for Obligatory Employment of Jordanian Workforce from Surrounding Communities in Construction Projects No. (131) of 2016". The procedure should consider potential for tension between local communities and Syrian population within the local communities. Local community will be prioritized as follows: (i) local communities as identified within ESIA, followed by (ii) Northwestern Badia District; followed by; (iii) Mafraq Governorate; (iv) Syrians within the local community population.

    - Consider inclusive Local Advisory Committees (LACs), established through the sub-district and municipalities with oversight from the local governors, to support transparency and defuse grievances, and draw on positive local employment examples from past infrastructure projects (as required by the local communities)

    - Set realistic targets for local employment and local procurement, prioritizing residents of the directly affected communities

    - Specify the number and types of roles targeted for local employment (unskilled, semi-skilled and skilled) and the procedures for verification and record-keeping

    - Define the monitoring and assurance framework that will include compliance tasks to be completed prior to and during construction, monitoring and KPIs for evaluation of EPC Contractor(s) compliance with applicable standards, and EPC Contractor(s) performance trends

- Capacity building and skills development, working with the Ministry of Labour, the NEP and relevant vocational training centers to provide skills training and pre-employment preparation, particularly targeting youth (including disabled youth) and women, so that they can qualify for construction-related jobs and contracts

- Advance communication with local authorities of the expected local procurement selection criteria, through the municipalities and district and sub-district offices, so that local businesses can prepare and obtain additional training where required

- Consider a Corporate Social Responsibility (CSR) program for the local communities during construction and operation. This is to be undertaken through a structured and transparent approach that is built on a proper needs assessment. Such needs assessment is available through the LDUs from the local authorities.

- Construction phase:

- Implementation of all measures set out in the Local Employment and Local Procurement procedure, supported by continuous monitoring, transparent communication and proactive engagement with local authorities and community representatives, including through the following:

- Apply gender-responsive consultation arrangements — women-only sessions with female facilitators, at times and venues accessible to women, arranged through local community and women's organizations — and ensure that Project grievance channels include confidential, non-digital and women-only routes with a trained female focal point. Consultation participation, employment and grievance data should be monitored on a sex-disaggregated basis, consistent with the gender baseline and commitments set out in the Gender and Human Rights Risk Assessment (Annex II)

- As requested by the local communities during scoping consultations, all communication and updates to local communities should be provided through the following channels in particular: (i) notifications via key local platforms in Mafraq and Housha Sub-District, to include but not limited to Local Unit Offices, mosques, commercial areas, charitable societies, and other local governmental entities; (ii) key social media pages related to Mafraq Governorate and Housha Sub-District; (iii) public announcements through the Mayor of Al-Basiliyah Municipality and Housha Municipality.

- All construction employment opportunities announced publicly and in advance through accessible local channels, clear, merit-based recruitment criteria and selection through a diverse committee in coordination with local authorities

- Identification and pre-qualification of local suppliers, subcontractors and service providers wherever feasible, subject to health, safety, environmental and ethical standards, with procurement prioritizing local companies, particularly SMEs and cooperatives, from within the Project area, and contracts unbundled where feasible to enable local participation

- Recruitment and local contracting coordinated through the municipal, district and sub-district authorities to ensure alignment with labor regulations and fairness, with Local Advisory Committees if adopted, where relevant, to facilitate communication and defuse grievances

- Inclusive participation: targeted outreach through local community associations, cooperatives and social media to under-represented groups, including women, youth, disabled youth and small businesses, so that opportunities are accessible to all segments of the population and not only to well-connected individuals or families

- Grievance redress: employment- and procurement-related grievances received, documented and resolved promptly through the Project Grievance Mechanism

- Managing expectations: clear, early and consistent communication with communities about the number, type, timing and temporary nature of construction opportunities, to avoid raising unrealistic expectations

- Monitoring and reporting: tracking and periodic public reporting of indicators including the number and percentage of local hires (disaggregated by locality, gender, age and skill level), the number and value of contracts awarded to local suppliers and to local women's associations and cooperatives, the number and resolution rate of employment and procurement grievances,

participation in training programs, and community satisfaction, with quarterly monitoring summaries shared with lenders, local authorities and communities

- Operations phase:
  - Continuation of transparent, non-discriminatory local recruitment for the approximately 60 operational roles, prioritizing local community members with the prerequisite skills in accordance with Jordanian law.
  - Incorporation of local employment and local procurement commitments with continued local procurement of operational goods and services where feasible
  - Management of the construction-to-operations transition, including advance notice of demobilization timelines, support for released workers where feasible, and continuation of the Project Grievance Mechanism throughout operation

With the application of the above mitigation and enhancement measures, embedded within the Project Environmental and Social Management System (ESMS) and supported by verification, monitoring and reporting, the impact is more likely to be realized as a beneficial one. The residual local employment and local content impact is assessed as **Moderate Positive** during construction and **Minor Positive** during operation, with any residual adverse effects, such as grievances arising from unmet expectations or perceived unfairness, reduced to **Minor Negative** during construction and **Negligible to Minor Negative** during operation.

8.11 Labor Management, Working Conditions and Occupational Health and Safety

8.11.1 Scoping

The construction and operation of the Project will require the mobilization and management of a substantial and diverse workforce, engaged directly by the Project Developer, by the EPC Contractor and its subcontractors, and by third-party service providers. While this workforce underpins delivery of the Project and the local employment benefits assessed in a dedicated section on local employment, the scale, diversity and multi-contractor nature of the construction effort also introduce risks relating to working conditions, occupational health and safety (OHS), workers' accommodation, equal treatment and the fair management of the employment relationship. This section assesses the potential impacts of the Project on the management, working conditions, health, safety and welfare of its own workforce during construction and operation, and defines the measures required to prevent and manage adverse effects in line with Jordanian law and Good International Industry Practice, including the requirements of the Project's lenders.

Jordanian labor legislation provides a comprehensive legal framework governing the employment relationship, including working hours, wages, occupational safety and health, and social security, enforced by the Ministry of Labour through its labor inspectorate and OHS functions. Implementation gaps can nonetheless arise on large-scale, multi-contractor construction projects, particularly where migrant labor is engaged and where oversight of numerous subcontractors is complex. The Project's hot, arid setting at the Al Khanasri site, combined with the physical hazards inherent to power plant construction and commissioning, further heightens the importance of a consistent, Project-wide approach to labor and OHS management.

Construction activities with the potential to affect labor management and worker occupational health and safety will include:

- Mobilization and management of a construction workforce of up to approximately 1,500 personnel at peak over a construction period of around 20 months, comprising a mix of skilled, semi-skilled and unskilled roles engaged by the EPC Contractor, its subcontractors and third-party service providers, and potentially including both non-local Jordanian and foreign migrant workers
- Recruitment, contracting, wage payment, working-time and record-keeping arrangements applied across multiple contractors and subcontractors, each with potentially different human resources practices and standards
- The performance of physically demanding and higher-risk construction and commissioning activities, including earthworks and civil works, working at height, lifting and craneage of heavy plant, excavation and confined-space entry, hot works and welding, work on and around energized electrical systems and the new 400 kV connection, and the introduction of high-temperature and high-pressure steam and rotating equipment during commissioning
- Exposure of the workforce to the site's environmental and natural-hazard conditions, including extreme heat, high solar radiation, seasonal high winds and sand or dust storms, and other hard weather conditions
- The handling, storage and use of hazardous substances during construction and commissioning, including fuels, distillate oil, chemicals, lubricants and cleaning fluids
- The potential establishment of one or more temporary construction camps close to the Project Site to

accommodate the workforce, together with the associated welfare, catering, sanitation, potable water supply and waste management facilities and services

- The transport of workers to, from and around the Project Site, and the interface of construction traffic with the workforce and other road users

Operational activities with the potential to affect labor management and worker occupational health and safety will include:

- Employment of an operational workforce of around 60 personnel over the 25-year operational life, engaged directly and through the long-term Operation and Maintenance (O&M) contract and the gas turbine maintenance arrangement with the turbine provider
- The performance of routine and major maintenance activities, including work on rotating equipment, electrical systems, pressurized systems and the air-cooled condenser, together with confined-space entry, working at height and hot works during outages
- Ongoing exposure of operational and maintenance personnel to plant hazards, including noise, heat, rotating machinery, electrical and high-pressure steam hazards, and the handling of fuels, chemicals and wastes
- Shift-working arrangements associated with continuous 24-hour operation, and periodic maintenance campaigns that may temporarily increase the on-site workforce and engage additional contractors

Based on the above, the potential labor management and occupational health and safety impacts scoped into this assessment comprise the following.

During the construction phase, the potential impacts comprise:

- Occupational health and safety risks (adverse): the risk of accidents, injuries, ill-health or fatalities among the workforce arising from high-risk construction and commissioning activities, compounded by extreme heat and natural hazards and by the inconsistent application of OHS standards across a large number of contractors and subcontractors
- Poor or inconsistent working conditions (adverse): the risk of excessive working hours, inadequate rest, late or incomplete payment of wages, unclear or absent written contracts, unlawful deductions and other substandard terms of employment, particularly among subcontracted, day and low-skilled workers
- Inadequate worker accommodation and welfare (adverse): the risk that, where workers are housed in temporary camps or provided with on-site welfare facilities, the standard of accommodation, sanitation, potable water, catering and medical provision falls below national and international standards
- Vulnerability of migrant and foreign workers (adverse): the risk that foreign workers, including any engaged under sponsorship (kafala) arrangements, face recruitment fees, retention of identity documents, restrictions on movement or terms less favorable than comparable local workers, creating exposure to forced-labor indicators
- Discrimination, harassment and unequal treatment (adverse): the risk of discrimination, of gender-based violence and harassment (GBVH) and sexual exploitation, abuse and harassment (SEAH), and of insufficient provision for women workers, including maternity protection and gender-appropriate

facilities

- Barriers to freedom of association and grievance redress (adverse): the risk that workers are unable to raise workplace concerns, to organize, or to access an effective, confidential and retaliation-free grievance mechanism
- Child labor (adverse): the risk, principally among subcontractors and in the supply chain, of persons under 18 being engaged, or engaged in hazardous work
- Safe, fair and decent employment (positive): the opportunity, through a well-managed workforce, to provide safe, fairly remunerated employment, structured OHS and skills training, and improved labor standards across the contractor supply chain

During the operational phase, the potential impacts comprise:

- Occupational health and safety risks (adverse): the ongoing risk of accidents, injuries and occupational ill-health among operational and maintenance personnel from plant hazards, principally during maintenance and outage activities
- Working conditions for a small permanent workforce (positive and adverse): the opportunity to provide stable, skilled employment under sound working conditions, with a residual risk relating to shift working, fatigue and the management of contractors engaged during maintenance campaigns
- Contractor and third-party management (adverse): the risk that O&M and specialist maintenance contractors apply labor and OHS standards inconsistent with those of the Project unless actively managed through the operational management system
- Demobilization of the construction workforce (adverse): the risk that the reduction of the workforce from approximately 1,500 at the construction peak to around 60 during operation is not managed with adequate notice, fair final payments and support, requiring management as a retrenchment consideration

The health, safety, welfare and fair treatment of the workforce, and the standard of any worker accommodation, are matters of direct relevance to the Project's lenders and are expected to be raised by workers, contractors and local authorities during Project delivery.

The AoI for labor management, working conditions and occupational health and safety is impact-based and defined by where the workforce is engaged, works and is housed, rather than by a radius around the Plant. It comprises:

- All Project workplaces, including the Plant Area, Substation Area and Temporary Laydown Area
- The OHTL and pipeline tie-in corridors
- Access roads and construction traffic routes
- Worker accommodation and associated facilities, whether provided as one or more construction camps close to the Project Site or as rented housing in nearby villages
- Directly engaged workers
- EPC contractor, subcontractor and third-party service-provider personnel, including drivers, catering, security and camp staff

- Migrant and non-Jordanian workers
- Host communities and households whose living conditions and local services are affected by the presence of the workforce, where accommodation is located within or adjacent to settlements

8.11.2 Labor Management and Occupational Health and Safety Impacts

The assessment of labor management and occupational health and safety impacts considers the sensitivity of the potentially affected workforce, the magnitude of potential effects during construction and operation, and the significance of the resulting impacts both prior to and following the application of mitigation measures.

8.11.2.1 Receptor Sensitivity

The receptors sensitive to labor management and OHS impacts comprise all workers associated with the Project, including the direct employees of the Project Developer, the workers of the EPC Contractor and its subcontractors, third-party service providers and, during operation, the personnel of the O&M and maintenance contractors.

Among the workforce, the following groups are considered to have a heightened sensitivity to labor management and OHS impacts:

- Foreign and migrant workers, who may face language barriers, limited knowledge of their rights, restricted mobility, dependence on sponsors or recruitment agents, and reduced access to grievance mechanisms
- Women workers, whose participation in the construction sector is low nationally and who face heightened exposure to discrimination, harassment and GBVH/SEAH, and who require gender-appropriate facilities and maternity protection
- Low-skilled, semi-skilled, day and subcontracted workers, who are more exposed to informal terms of employment, weaker OHS protection and irregular payment of wages
- Young workers of legal working age, who may have limited experience of workplace hazards, and in respect of whom controls are required to prevent the engagement of persons under 18 in hazardous work

Taking into account the physical hazards inherent to power plant construction and operation, the extreme environmental conditions at the site, the multi-contractor delivery model and the presence of vulnerable worker groups, the sensitivity of receptors to labor management and OHS impacts is assessed as **Medium**, with the following justification:

- Vulnerability and presence:
    - Construction workers are inherently exposed to physical hazards and to power imbalances in the employment relationship, and vulnerable groups, including foreign and migrant workers, women, and low-skilled and subcontracted workers, are expected to be present in the workforce

- Value:
  - Safe working conditions, fair terms of employment and adequate welfare are fundamental worker rights and are of high value to the individuals concerned and their dependent households, for whom Project employment may represent a principal source of income
- Resilience:
  - Workers, and migrant and low-skilled workers in particular, have a limited ability to absorb the consequences of an injury, ill-health, unfair dismissal or non-payment of wages, and limited leverage to secure redress, reducing their resilience to poorly managed labor practices

8.11.2.2 Magnitude of Effect

With regard to construction impacts, the impact magnitude is assessed as **Medium** and predominantly adverse in the absence of mitigation, with the following justification:

- The construction workforce is large, of up to approximately 1,500 personnel at peak, and will be engaged through numerous contractors and subcontractors over an intensive construction period of around 20 months, increasing the complexity of oversight and the likelihood of inconsistent labor and OHS practices
- The construction and commissioning activities are inherently high-risk, and the consequences of an OHS failure can be severe, including serious injury or fatality
- Extreme heat, sand and dust storms, high winds and potential flash flooding elevate the risk of heat stress and other harm unless actively managed
- The potential engagement of foreign and migrant workers, and the possible use of temporary accommodation, introduce risks relating to recruitment practices, equal treatment and living conditions that, if unmanaged, could be significant
- Conversely, the effective and unified management of labor and OHS across all contractors would substantially reduce these risks and generate sustained positive outcomes through safe, fair and decent employment

Considering operational impacts, the impact magnitude is assessed as **Low**, with the following justification:

- Operation involves a small permanent workforce of around 60 personnel working under controlled, procedure-based conditions, so the routine scale of effect is limited
- The principal operational risks arise during maintenance and outage activities, when higher-hazard tasks are undertaken, and additional contractors may be engaged
- The one-off reduction of the workforce on completion of construction represents a collective demobilization that requires fair management

Embedded commitments already made by the Project that contribute to managing labor and OHS effects include:

- A commitment to undertake recruitment in accordance with Jordanian law, on the basis of a fair, non-

discriminatory assessment of skills, with no discrimination on ethnic, gender, race or other demographic grounds

- The requirement for the EPC Contractor and the O&M Contractor to comply with Jordanian labor and OHS legislation and with the Project's environmental and social requirements, including applicable lender standards
- The provision of temporary welfare facilities for the construction workforce and the intent, should one or more construction camps be required, to provide temporary accommodation together with canteen and welfare facilities such as toilets, showers and rest areas, with the requirement, location and facilities to be confirmed during detailed design

8.11.2.3 Impact Significance, Mitigation, and Residual Impacts

Prior to mitigation and taking into account the High sensitivity of receptors and the Major magnitude of construction effects, the impact significance for labor management and occupational health and safety is assessed as **Moderate Adverse during construction** and **Minor Adverse during operation**, reflecting the combination of potential severity, the multi-contractor delivery model and the high sensitivity of the workforce.

Mitigation to prevent and reduce these adverse effects is defined below. The overarching measure is the development and implementation, prior to construction, of a comprehensive Labor and Working Conditions Management Plan, together with an associated Occupational Health and Safety Management Plan, applying to the Project Developer, the EPC Contractor and all subcontractors and third-party employers, and designed to comply with Jordanian labor law and with Good International Industry Practice, including the ILO Core Labour Standards, IFC Performance Standard 2 and the World Bank Group Environmental, Health and Safety Guidelines.

- Construction planning, to be completed prior to construction:
  - The EPC Contractor shall develop and implement a Labor and Working Conditions Management Plan, incorporating human resources policies and procedures covering all categories of workers (including direct, contracted, day and part-time workers), which makes the following commitments:
    - Written contracts issued to all workers in a language they understand (Arabic and the worker's language), setting out the terms and duration of employment, wages and wage calculation, working hours, overtime, rest days, deductions, benefits, grievance procedures and termination, with day workers registered in a day-labor log recording written day-rate terms
    - Fair wages at least equal to the national minimum wage, paid in full and on time, with transparent pay slips, overtime paid at legal rates and no unlawful deductions
    - No worker shall be required to pay recruitment or placement fees, and there shall be no retention of workers' identity or travel documents, which remain in the workers' possession at all times

- Working hours shall be managed in accordance with the law, with normal hours not exceeding 8 hours per day or 48 hours per week, at least one 24-hour rest period each week, and overtime only under legal exceptions and paid at premium rates
- Migrant and foreign workers shall be engaged on terms substantially equivalent to those of comparable non-migrant workers, through licensed and ethical recruitment, with no forced, bonded, trafficked or child labor
- Social protection arrangements, including Social Security Corporation (or equivalent accident insurance), shall cover all workers, with workers informed of their injury insurance and compensation rights
- Injury compensation and medical care arrangements shall be made, including immediate first aid and transport, notification and compensation in accordance with the law, and the logging of incidents to the Ministry of Labour within the prescribed period
- Protection of workers in adverse weather, including compliance with any ministerial working-hour prohibitions during extreme heat, in accordance with Regulation 31/2023 Article 9, with stop-work or rescheduling when heat bans are announced and compliance documented and incorporating heat-stress controls of the Occupational Health and Safety Management Plan as a defined stop-work trigger

- The EPC Contractor shall develop and implement an Occupational Health and Safety Management Plan meeting national and international standards, which will:
  - Identify and assess the hazards associated with each construction and commissioning activity and apply the hierarchy of control, eliminating hazards at source where practicable, applying engineering and administrative controls, and providing appropriate personal protective equipment at no cost to workers
  - Address the site's natural-hazard and climatic risks, including heat-stress management based on Wet Bulb Globe Temperature (WBGT) rather than air temperature alone, so that humidity, solar and radiant heat, air movement, task metabolic demand and the insulating effect of PPE are taken into account, with WBGT measured on site at representative work locations in accordance with ISO 7243 and managed through escalating action levels and stop-work triggers and other controls such as:
    - Work-rest regimes, hydration, shading and cooled rest areas, acclimatization of new and returning workers, and enhanced supervision as the screening thresholds for the applicable workload are approached, and suspension of heavy, unshaded and unacclimatized work where the measured WBGT exceeds the applicable screening limit
    - The ministerial midday working prohibition issued under Regulation 31/2023 Article 9 shall apply as an absolute stop-work trigger for all outdoor and unshaded works during the prohibited hours irrespective of the measured WBGT, with WBGT readings, stoppages and rescheduled hours recorded and reported monthly, alongside weather monitoring and early-warning protocols and location-specific safe-work procedures such as suspending works in flood-prone areas when rainfall thresholds are reached

- Provide OHS induction and task-specific training to all workers, supervisors and visitors, covering high-risk activities such as work at height, lifting operations, confined-space entry, hot works, electrical and energized-systems work and the commissioning of high-temperature and high-pressure systems
- Establish emergency prevention, preparedness and response arrangements, including first aid, medical provision and evacuation, and the documentation, investigation and reporting of occupational accidents, incidents, diseases and near-misses

- The Occupational Health and Safety Management Plan shall be supported by:
  - A Project-wide Worker Code of Conduct, provided and explained in the worker's language and signed by all workers, prohibiting discrimination, harassment, GBVH and SEAH, forced and child labor, and requiring respect for freedom of association
  - Worker Accommodation Standards, where workers are housed in temporary facilities, ensuring adequate space, potable water, sanitation, ventilation, protection against heat and cold, catering, waste management, lighting, fire safety and access to medical care, consistent with the requirements of this ESIA and with the IFC guidance on Workers' Accommodation, and managed so as not to restrict workers' freedom of movement or association
  - A dedicated, confidential worker Grievance Mechanism, separate from and additional to the community grievance mechanism, communicated to all workers at recruitment, allowing anonymous complaints and providing timely resolution without retaliation, and extended to the workers of third parties, where these cannot provide their own
  - Measures for the inclusion and protection of women workers, including gender-appropriate and separately provided sanitary, changing and welfare facilities with lockable doors, equal pay, maternity rights and a zero-tolerance approach to GBVH and SEAH
  - Arrangements to recognize workers' right to freedom of association and, where this is restricted, to allow alternative mechanisms such as elected worker representatives or committees through which workers can raise concerns regarding working conditions

- Construction phase:
  - Implementation of the Labor and Working Conditions Management Plan and the OHS Management Plan across the EPC Contractor and all subcontractors, with clear contractual flow-down of labor and OHS requirements to every subcontractor and third-party employer
  - Contractor management and oversight: commercially reasonable due diligence on the labor and OHS practices of contractors, subcontractors and recruitment agents, incorporation of Project requirements into contracts, and monitoring of performance with corrective action where required
  - OHS supervision: competent OHS supervision on site, permit-to-work systems for high-risk activities, regular inspections, toolbox talks, and enforcement of the right of workers to stop or refuse unsafe work without penalty
  - Heat-stress control: daily WBGT monitoring at representative work locations, with the prevailing action level communicated at pre-shift briefings, implementation of the corresponding work-

rest, hydration and shading regime, and enforcement of the ministerial midday working prohibition issued under Regulation 31/2023 Article 9 as a defined stop-work trigger, with readings, stoppages and hours worked documented and reported monthly.

- Accommodation and welfare monitoring: where camps or welfare facilities are provided, regular inspection and monitoring against the Worker Accommodation Standards
- Worker grievance redress: operation of the confidential worker grievance mechanism, with prompt documentation and resolution of concerns and no retaliation against those raising them
- Monitoring and reporting: monthly contractor reporting of workforce metrics, including workforce numbers, gender, nationality, hours worked, training delivered, OHS statistics (incidents, injuries, lost-time cases and near-misses), accommodation conditions and grievances, maintained under the oversight of the Project's environmental and social team through labor inspections, compliance audits, documentation review and worker interviews

- Operations phase:
  - Incorporation of labor, working conditions and OHS requirements and the O&M contract, with flow-down to maintenance and specialist contractors
  - Continuation of the OHS Management System during operation, including permit-to-work, hazardous-work controls, training, health surveillance where relevant, incident reporting and emergency preparedness, with particular attention to maintenance and outage activities.
  - WBGT-based heat-stress controls, applied to outdoor maintenance, inspection, testing and outage activities and to hot areas of the plant, including WBGT monitoring at representative work locations, work-rest scheduling for the applicable metabolic workload and acclimatization status, and observance of the ministerial midday working prohibition issued under Regulation 31/2023 Article 9 as a defined stop-work trigger, confirmed at permit-to-work sign-off before high-heat tasks proceed.
  - Continuation of the worker grievance mechanism, the Worker Code of Conduct and non-discriminatory, fair employment practices for the operational workforce
  - Fair management of the construction-to-operations transition and demobilization of the construction workforce, including advance notice, payment of all wages, benefits and end-of-service entitlements due under law and contract, and, where collective dismissals arise, management as a retrenchment consistent with lender requirements

With the application of the above mitigation, embedded within the Project Environmental and Social Management System (ESMS) and supported by contractor management, monitoring, auditing and reporting, the residual labor management and occupational health and safety impact is assessed as **Moderate Negative** during construction and **Minor Negative** during operation, recognizing that OHS risk, while substantially reduced, cannot be entirely eliminated on a project of this nature. Effectively implemented, the measures also deliver **beneficial outcomes** through safe, fair, and decent employment and improved labor standards across the contractor workforce.

8.12 Gender-Based Violence, Sexual Exploitation, Abuse and Harassment (GBVH/SEAH)

8.12.1 Scoping

Project activities will include:

- Recruitment of approximately 1,600 persons for construction works at the Plant Area, temporary Laydown area and Associated Facilities (Substation Area and along the routes of the OHTL and gas and water pipeline tie-ins), with potential for a local construction camp or temporary housing in the nearby villages.
- Recruitment of around 60 persons for the operation of the Plant and Associated Facilities.

Large-scale construction projects involving significant workforce mobilization can increase risks of GBVH and SEAH, particularly if workers are housed near communities, where migrant and local workers mix, or where women and girls already face constraints on mobility, economic participation or access to protection networks.

Therefore, the Area of Influence for the GBVH/SEAH impact is defined beyond the construction footprint of the Project and includes local communities of Northwestern Badia and Qasabet AlMafraq districts within 5 km radius of the future Plant.

This AoI is impact-based rather than a fixed radius; the 5 km figure is adopted only as a conservative outer bound for the settlements where worker and community interaction is most likely, and the AoI extends further where the pathway does. The persons at risk are identified separately and comprise:

- Women, girls and other community members in the settlements nearest the Plant, OHTL, pipelines and access roads.
- Households and structures scattered within approximately 1 km of the Project Site.
- Land users, farmers and herders working close to construction fronts and rights-of-way.
- Road users and pedestrians, particularly women and children, on routes used by construction traffic.
- Communities hosting worker accommodation and associated facilities, including rented housing in nearby villages.
- Mobile and seasonal Bedouin users who are present only in the spring grazing period.
- The workforce itself.

The AoI will be re-screened once the EPC Contractor's accommodation strategy and traffic routes are confirmed.

Potential impacts of discrimination against women during recruitment and employment are discussed in 'Chapter 8.11'.

8.12.2 GBVH/SEAH Impacts

This assessment focuses on any potential GBVH/SEAH impacts on women and girls within the Project AoI, who may come into contact with the Project workforce, as well as women employed by the Project, including those employed by contractors and their subcontractors.

8.12.2.1 Receptor Sensitivity

As discussed in 'Chapter 6', available data review, observations from stakeholder consultations and focus group discussions and a Project-specific Gender and Human Rights Risk Assessment (GHRRA) (as presented in Annex II) identified a number of gender-related challenges relevant both nationally and within the Project area. These include factors that may influence women's participation in the workforce and community life, such as transport and childcare constraints, disparities in employment opportunities and remuneration, the potential for workplace harassment, and prevailing socio-cultural norms. The GHRRA defined the risk of GBVH as real and present, with documented complaints, including cases of physical violence, sexual harassment and coercion, against the backdrop of weak enforcement.

Jordan's GBVH risk profile in work and private settings is shaped by structural gender inequality, weak female labor-market attachment, stigma around reporting, and uneven enforcement. In development settings, those risks are compounded by displacement, aid dependency, poverty, and power asymmetries between service providers and affected populations[50].

Jordan's legal framework improved materially in 2023. The Labour Law now prohibits gender-based discrimination in employment and defines workplace sexual harassment, but the available evidence still points to major scope and enforcement gaps, especially for co-worker harassment, third-party harassment, subcontracted labor, and practical access to remedies.

The best public evidence in Jordan is still broader GBV / sexual-harassment evidence rather than workplace- or SEAH-specific prevalence data. The Jordanian National Commission for Women (JNCW) study[51], the IFC/Better Work Jordan's garment-sector evidence[52], and the Gender-Based Violence Information Management System (GBV IMS)[53] all point to serious underreporting and a concentration of harm among women in more precarious or dependent situations.

Based on the literature review, the key drivers for GBVH/SEAH risks in Jordan include:

- Labour-market exclusion and dependency: Jordan's broader labor-market context is a major GBVH risk driver. Persistently low female employment and participation, limited private-sector job creation, transport barriers, childcare constraints, wage inequality, and gender-biased regulation are structural factors that contribute to women's weaker bargaining power in the labor market. Women's economic participation remains low, with work opportunities concentrated in a narrow set of "acceptable"

[50] IMF (2022): Female Employment and Labour Force Participation in Jordan. Available at: https://www.imf.org/-/media/files/countries/mcd/jor/employment-and-labor-force-participation-in-jordan-for-posting.pdf
[51] The Jordanian National Commission for Women (2027): Sexual Harassment in Jordan. Available at: https://www.women.jo/~women/sites/default/files/SystemAssets/fb0c321a-42d2-4987-9211-1883a36a4dee.pdf
[52] IFC, ILO and Better Work (2012) Addressing Sexual Harassment in Jordan's garment industry. Available at: https://betterwork.org/wp-content/uploads/ILO-1402-SHP-training-Case-Study-WEB.pdf
[53] Gender-Based Violence Information Management System Taskforce in Jordan (2023): Annual Report. Available at: https://reliefweb.int/report/jordan/jordan-gbv-ims-task-force-annual-report-2023

sectors, and follow-up on implementation of supportive laws and policies remains weak. That matters for GBVH because economic dependency increases exposure and reduces exit options.

- Patriarchal norms, victim-blaming, and silence: The country's strongest social-norm evidence points to stigma, reputational fears, and victim-blaming as central drivers of underreporting. Official procedures do not encourage women and girls to report harassment, and fear of reputational harm is a major reason for silence. The prevailing social norms still normalize discrimination, tolerate violence in practice, and make women reluctant to use justice and protection systems[54]. Those norms are highly relevant in the workplace. A policy brief by Euromed Feminist Initiative[55] points to a "culture of shame" around sexual harassment that discourages complaints, with existing stereotypes about women workers' "low status" and beliefs that women invite harassment contributing to tolerance of abusive behavior in the workplace. In practice, this means many incidents remain informal, hidden, or recorded as "disciplinary" or "personal" problems rather than harassment or abuse.

- Legal and institutional gaps: Even after the 2023 reform, Jordan's workplace-protection framework still has important gaps. The amended Labor Law prohibits gender-based discrimination and defines sexual harassment, but the World Bank's Women, Business and the Law study[56] concludes that Jordan still does not fully meet the benchmark for "sexual harassment legislation in employment" because the amended article mainly addresses harassment by the employer or the employer's representative, and the penalties are treated as administrative fines rather than clear criminal penalties or civil remedies for all workplace actors. Institutionally, that means workers can still face a gap between the law on paper and the remedy in practice. The Euromed Feminist Initiative's 2024 brief says the legal system remains ill-equipped to address workplace sexual harassment comprehensively, citing a lack of clear procedures, weak awareness among judges and responders, and poor reporting pathways. The country still lacks a comprehensive anti-discrimination law, and implementation capacity and accountability remain weaker than the formal policy architecture suggests.

- Migration status, recruitment abuse, and isolation: For migrant women workers, Jordan's migration and recruitment systems create a distinct risk pattern. Research by Tamkeen[57] on irregular migrant domestic workers documents passport confiscation, non-payment of wages, denial of leave, restricted movement, fear of the police, weak access to justice, and physical, verbal, and sexual abuse, all of which are classic indicators of coercive control and heightened GBVH risk. The study also shows that irregular status and employer control over documents sharply reduce women's ability to seek help or leave abusive situations safely. This is not limited to domestic workers. Better Work Jordan's garment-sector case study notes that migrant women are at increased risk in factories because large numbers of women, often young and inexperienced, are supervised by a smaller number of men, under intense production pressure and within a culture where speaking up may carry costs. These dynamics are

[54] Economic & Social Council of Jordan and the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) (2022): General Framework for Gender Equality in Jordan. Available at: https://jordan.un.org/sites/default/files/2022-06/WC_General%20Framework%20for%20Gender%20Equality%20in%20Jordan_EN_f.pdf

[55] Euromed Feminist Initiative (2024): Policy Brief – Harassment in the Workplace in Jordan. Available at: https://www.efi-rcso.org/sites/default/files/2025-07/policy-brief-harassment-in-the-workplace-in-jordan.pdf

[56] World Bank (2024): Data Update – Women, Business and the Law - Jordan Ministry of Planning and International Coordination. Available at: https://wbl.worldbank.org/content/dam/sites/wbl/documents/2024/WBL2024-Response-Data-Update-Jordan-MoPIC.pdf

[57] Tamkeen (2024): Invisible Women – The Working and Living Conditions of Irregular Migrant Domestic Workers in Jordan. Available at: https://tamkeen-jo.org/sites/default/files/2024-12/Invisible_Women_English_Colored_amended.pdf

directly relevant to private-sector supply chains and to development projects that depend on outsourced or brokered labor.

- Aid dependency, displacement, and concentration of power: Jordan's development-sector SEAH risks are especially shaped by dependency on services and unequal power. The Jordan Protection From Sexual Exploitation and Abuse (PSEA) Network Strategy[58] states that SEAH risk rises where many people depend on others for survival, food, health services, or access to information, and where public-service disruptions or resource scarcity increase the power of frontline actors over vulnerable communities. The strategy explicitly links Jordan's refugee response, continuing hardship, structural gender inequality, and limited access to services to higher SEAH risk. This matters beyond "classic" refugee programming. Any development or humanitarian activity that controls access to jobs, cash, aid, documentation, grievance resolution, transport, permits, or referrals can reproduce the same risk logic with weak oversight. Jordan's formal PSEA architecture shows the risk is recognized nationally; the fact that the public documents are framed around risk prevention rather than public prevalence data is itself a sign that this remains a sensitive and underreported area.

The publicly available evidence suggests the following groups are especially exposed to risks of GBVH/SEAH:

- Young women and new entrants to the labor market, especially in sectors where women are supervised by male line managers or where women have weak bargaining power. This is explicitly relevant to women who are young, inexperienced, and sometimes illiterate, with female unemployment remaining especially high, increasing dependency and insecurity for those trying to enter or remain in work.
- Migrant women workers (especially domestic workers and migrant factory workers). Evidence shows migrant domestic workers face overlapping labor abuse, mobility restrictions, document confiscation, and exposure to physical, verbal, and sexual abuse.
- Refugee women and girls, and affected host-community women in aid settings, whose economic hardship, food insecurity, and dependence on aid and services heighten SEAH risk, especially where reporting channels are weak, or services are scarce.
- Women and girls with disabilities, women in remote/rural areas, and adolescent girls facing intersecting discrimination linked to remote-area marginalization, education barriers, and weak support systems.
- Women in informal or low-protection work. Jordan's gender-equality profile points to women's concentration in informal work and weakly protected sectors.

Receptor sensitivity is determined as **High** based on the following justification:

- Existing GBVH / SEAH risks both in the workplace and community due to local gender dynamics, structural norms, cultural barriers and a likely low reporting culture.

[58] PSEA Network, Jordan (2024) The Jordan PSEA Network Strategy 2023-2026. Available at: https://reliefweb.int/report/jordan/jordan-psea-network-strategy-2023-2026

8.12.2.2 Magnitude of Effect

Based on the baseline assessments undertaken, the magnitude of potential GBVH/SEAH impacts is assessed as **High Negative** for the construction phase and **Medium Negative** for the operations phase, with the following justification:

- The workforce is anticipated to be predominantly male, comprising 1,600 persons during construction for 20 months, and 60 persons during operations for 25 years.
- The Project site is located in close proximity to local communities of Northwestern Badia and Qasabet AlMafraq, which may be used for temporary accommodating the construction personnel.
- Even a small number of GBVH incidents may have serious and long-lasting effects on survivors and can undermine trust in the Project.

8.12.2.3 Impact Significance, Mitigation, and Residual Impacts

Prior to mitigation (taking into account receptor sensitivity and the magnitude of the effect ranking), the significance of the GBVH/SEAH impacts is considered to be **Major Negative** for the construction phase, and **Moderate Negative** for the operations phase of the Project.

Mitigations to reduce the potential GBVH/SEAH impact significance are defined below:

- The Project will adopt a survivor-centred, confidential, and zero-tolerance approach to GBVH/SEAH risk management to comply with Jordanian labor law and international best practices.
- The Project will establish and enforce a Project-wide GBVH/SEAH Code of Conduct for all workers, managers, and subcontractors, translated into Arabic (or other languages if necessary). All workers will be required to read and sign this Worker Code of Conduct (provided in the worker's language), which will also be explained verbally
- The EPC Contractors and their subcontractors will be required to implement robust GBVH/SEAH Prevention and Response Action Plans
- All workers will undergo mandatory induction and periodic refresher training on behavioral expectations, boundaries, and consequences of misconduct
- Supervision protocols will be developed to prevent worker-community misconduct, including restrictions on worker movement where necessary
- A Drug and Alcohol Policy shall be developed and implemented, together with a Zero Tolerance Policy for drug- and alcohol-related incidents. The policies shall apply to all Project personnel and shall be enforced within worker accommodation facilities and during interactions in nearby communities
- Worker accommodation shall be maintained in compliance with IFC/EBRD Worker Accommodation Guidelines
- Separate, lockable, well-lit sanitary, changing, prayer and (where applicable) accommodation facilities shall be provided for women workers
- Project Grievance Mechanism (GRM) shall integrate GBVH-sensitive channels, ensuring confidentiality,

anonymity, and non-retaliation and multiple reporting pathways (Community Liaison Officers (CLOs) women focal points, hotline, WhatsApp, trusted community intermediaries)

- Staff responsible for GRM and CLOs shall receive specialized GBVH/SEAH training
- The Project shall pre-identify and partner with specialized local GBVH service providers, including shelters, psychosocial services, and legal assistance, to ensure referral pathways for survivors. Available resources can be mapped with support from the Ministry of Social Development and CBOs
- Community Engagement shall include women-only consultations, where necessary, ensuring women can raise safety concerns freely
- The Project shall provide construction updates and worker presence notifications in all urban locations.
- Contractors shall undertake accountability for:
    - Immediate dismissal and legal referral for confirmed GBVH/SEAH violations
    - Contractual penalties and performance monitoring linked to GBVH/SEAH compliance
    - Require subcontractor compliance as a condition of contract award
- Gender-sensitive security searches will be adopted if required
- Safe female recruitment shall be promoted, including gender-inclusive advertising and mixed-sex selection panels
- Project monitoring and reporting system shall include GBVH/SEAH indicators, including training completion, incidents reported, response times, and status of corrective actions and third-party audits as required. Because GBVH/SEAH can never be reduced to zero, it will remain a high-priority, ongoing monitoring area

With the mitigation incorporated into the Project ESMS, applied, verified and reported, the residual impact significance is considered **Moderate Negative** for the construction phase and **Minor Negative** for the operations phase. The justification for the reduction in impact significance is due to:

- Reduction in magnitude of effect through implementation of Code of Conduct, worker management, workforce training and reporting and support mechanisms.
- Even a small number of GBVH incidents may have serious and long-lasting effects on survivors and can undermine trust in the Project.

8.13 Cumulative Impacts

8.13.1 Introduction

Cumulative impacts result from the successive, incremental and/or combined effects of a project when added to other past, existing, planned and/or reasonably anticipated future developments and activities. They have the potential to occur where projects and their effects arise in close spatial or temporal proximity. This section presents a rapid Cumulative Impact Assessment (CIA) for the Mafraq 700 MW Combined-Cycle Gas Turbine (CCGT) Thermal Power Plant (the Project).

The rapid CIA has been undertaken in accordance with international good practice, including the International Finance Corporation (IFC) Performance Standards (2012 and associated guidance. In particular, it follows the six-step CIA approach defined in the IFC Good Practice Handbook: Cumulative Impact Assessment and Management – Guidance for the Private Sector in Emerging Markets (2013).

The key objectives of the CIA are to:

- Assess the potential impacts and risks of the Project over time, in the context of the potential effects of other developments and natural environmental and social drivers on selected Valued Environmental and Social Components (VECs)
- Verify that the Project's cumulative impacts and risks will not exceed a threshold that could compromise the sustainability or viability of the selected VECs
- Confirm that cumulative environmental and social effects do not limit the Project's value and feasibility
- Ensure that the concerns of affected communities regarding cumulative impacts are identified, documented and addressed; and
- Manage potential reputational risks

A VEC is defined in the IFC Good Practice Handbook (2013) as an environmental or social attribute considered important for assessing risk, and may comprise physical features, habitats and wildlife populations, ecosystem services, natural processes, social conditions (such as health and economics), or cultural aspects. In alignment with the IFC CIA guidance, the steps followed to undertake the rapid CIA for the Project comprise the definition of spatial and temporal boundaries (Step 1); the identification of VECs, baseline conditions and cumulative impact sources (Steps 2 and 3); the assessment of cumulative impacts together with the associated mitigation and monitoring (Steps 4 and 5); and the final 6th step requires strategies, plans and procedures to manage impacts, monitoring and supervision. These steps are described in the sections below.

8.13.2 Cumulative Impact Assessment

8.13.2.1 Step 1: Define Spatial and Temporal Boundaries

The first step defines the geographic area over which potential impacts from the Project, its Associated Facilities and other cumulative sources may be experienced, taking into account the potential for additive and in-combination effects on the VECs identified under Steps 2 and 3. For the Project, the spatial boundary was developed from the ESIA Study Area and refined to consider:

- The Project's construction and operational activities and the temporary and permanent facilities within the Plant Area, Substation Area and Temporary Laydown Area, together with their associated area of impact
- The Associated Facilities, including the new 400 kV substation and overhead transmission line (OHTL) to be constructed and operated by the National Electric Power Company (NEPCO) directly adjacent to the Plant Area, the natural gas pipeline tie-in and the water supply tie-in; and
- The locations of other reasonably defined cumulative sources of impact that have the potential to affect the same VECs (see Steps 2 and 3)

The temporal boundary is defined by the anticipated duration of Project activities and the resulting duration of impact on each VEC. For the majority of impacts, the temporal scale spans the construction period (approximately 20 months) and the 25-year operational life of the Project. For impacts on the global climate arising from greenhouse gas (GHG) emissions, the temporal and spatial scales are, by nature, long-term and global, and are considered accordingly.

8.13.2.2 Steps 2 and 3: Identify VECs, Baseline Conditions and Cumulative Impact Sources

Identification of VECs and Baseline Conditions

In accordance with the IFC Good Practice Handbook, VECs were identified where they were considered important or sensitive within the ESIA, identified as important by national or international experts, or considered important or sensitive by stakeholders consulted during the ESIA. Taking into account the nature of the identified cumulative sources, the following VECs were carried forward into this rapid CIA:

- Air quality: the ambient air quality of the communities surrounding the Project, including Faa' (approximately 0.76 km northeast), AlHarsh (approximately 1 km northwest) and AlKhanasri (approximately 1.2 km southwest)
- Land use, community health, safety and access: land users, herders, residents and road users in the vicinity of the Project Site and its linear Associated Facilities
- Landscape, biodiversity and grid infrastructure: the shared landscape and terrestrial habitats of the Rihab–Mafraq area, including the Irbid–Mafraq Plains; and
- Global climate: the global atmosphere, to which the Project's GHG emissions contribute cumulatively alongside national and global emissions
- Water demand: cumulative water demand especially in drought conditions

The baseline condition, importance and key sensitivities of each VEC are described within the 'Chapter 6' and the relevant assessment sections of this ESIA and are not repeated in full here.

Identification of Cumulative Impact Sources

Sources of cumulative impact were identified through the review of secondary data, stakeholder engagement and consultation with the relevant authorities. The focus was on developments and third-party activities with the potential for significant additive or in-combination effects on the identified VECs, as well as on those raised by stakeholders. On this basis, the following cumulative sources are considered within this assessment:

- The Al Khanasri gas compressor station;
- The planned Jordan Hijaz Railway'
- The NEPCO North Substation and Overhead Transmission Lines (OHTLs) Project; and
- Other developments contributing to national and global GHG emissions

Al Khanasri Gas Compressor Station: At the time of preparation of this assessment, a gas compression facility, understood to comprise two 12 MW gas turbines (approximately 24 MW combined capacity), is

under construction within a site located approximately 100m west of the Project Site. Design information for this facility has not been published or made available to the Project. As such the assessment of impact is restricted to a qualitative assessment based on the information available. The figure below shows the gas compressor station



Figure 120: Project Site in Relation to Gas Facility

Jordan Hijaz Railway: A future railway is planned within the Project vicinity. The environmental and social team established formal communication with the Jordan Hijaz Railway (the governmental authority responsible for all railways in Jordan), which advised that communication be directed to the Ministry of Transport. The Ministry, by formal letter, provided the current planned railway route and noted that a 100m buffer is required to be maintained between the railway and Project components to satisfy the operational safety requirements of the planned railway. The current route is shown to pass directly to the south of the Project Site. Current understanding is that this is a I13a long-term Project that is not within the Government of Jordan's priorities currently and is extremely unlikely that this Project will move forward within the short to medium term (i.e. within the next 10 years). Potential for construction impacts overlapping is therefore not expected.

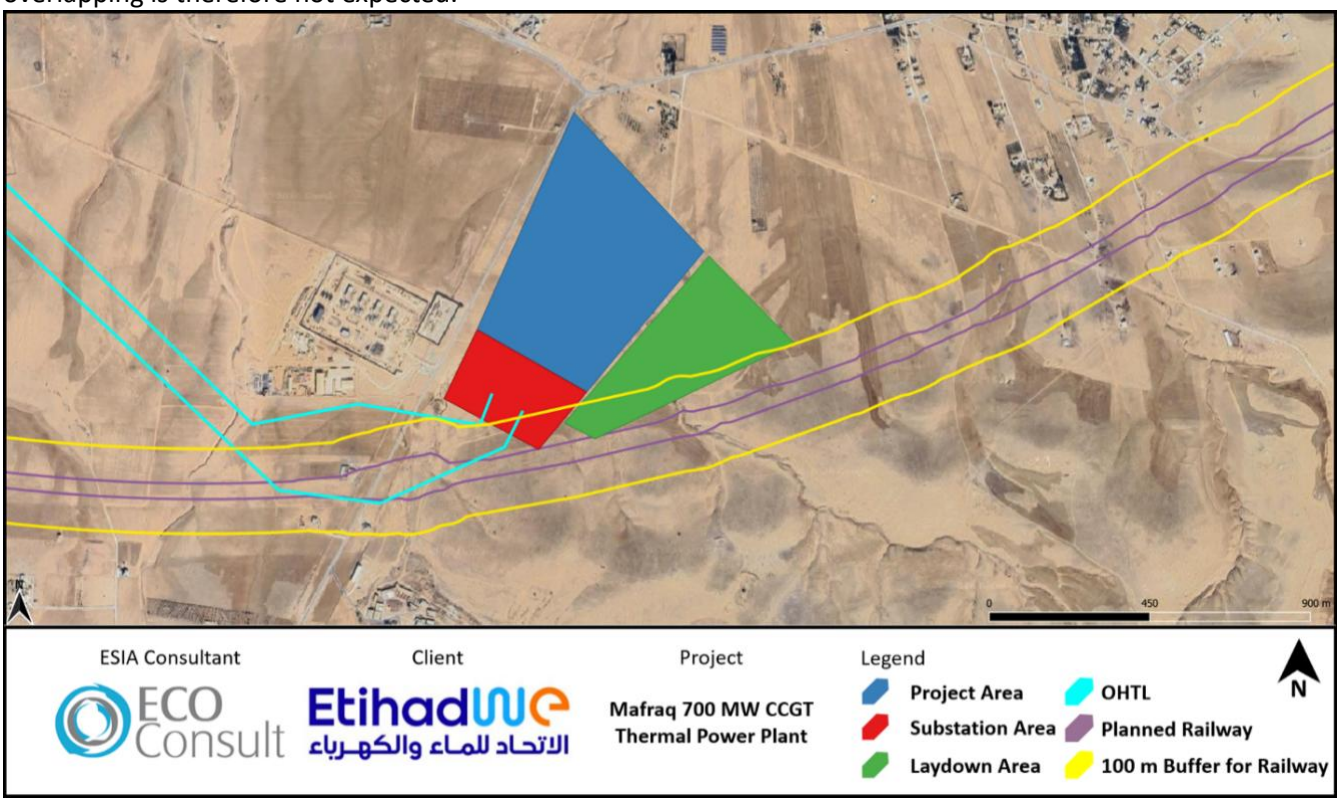


Figure 121: Proposed Railway in Relation to the Project Site

NEPCO North Substation and OHTLs Project: NEPCO is developing a new 400/132/33 kV transmission substation in the Rihab area of Mafraq Governorate, approximately 61 km northeast of Amman, together with associated OHTL connections (comprising a 31 km double line, a 3 km line, a 9 km line, and the replacement of an 11 km existing line). The project, which is classified as Category A under the EBRD ESP, is intended to relieve congestion and voltage constraints in the northern grid and to enable the connection of up to 600 MW of additional solar photovoltaic generation in the Rihab–Mafraq area. It shares the Rihab–Mafraq landscape and grid context with the Project, which connects to the national grid via its own

adjacent NEPCO 400 kV substation and OHTL. The two OHTL elements of the two Projects intersect at their west and eastern extents, approximately 3 km from the Project Site.

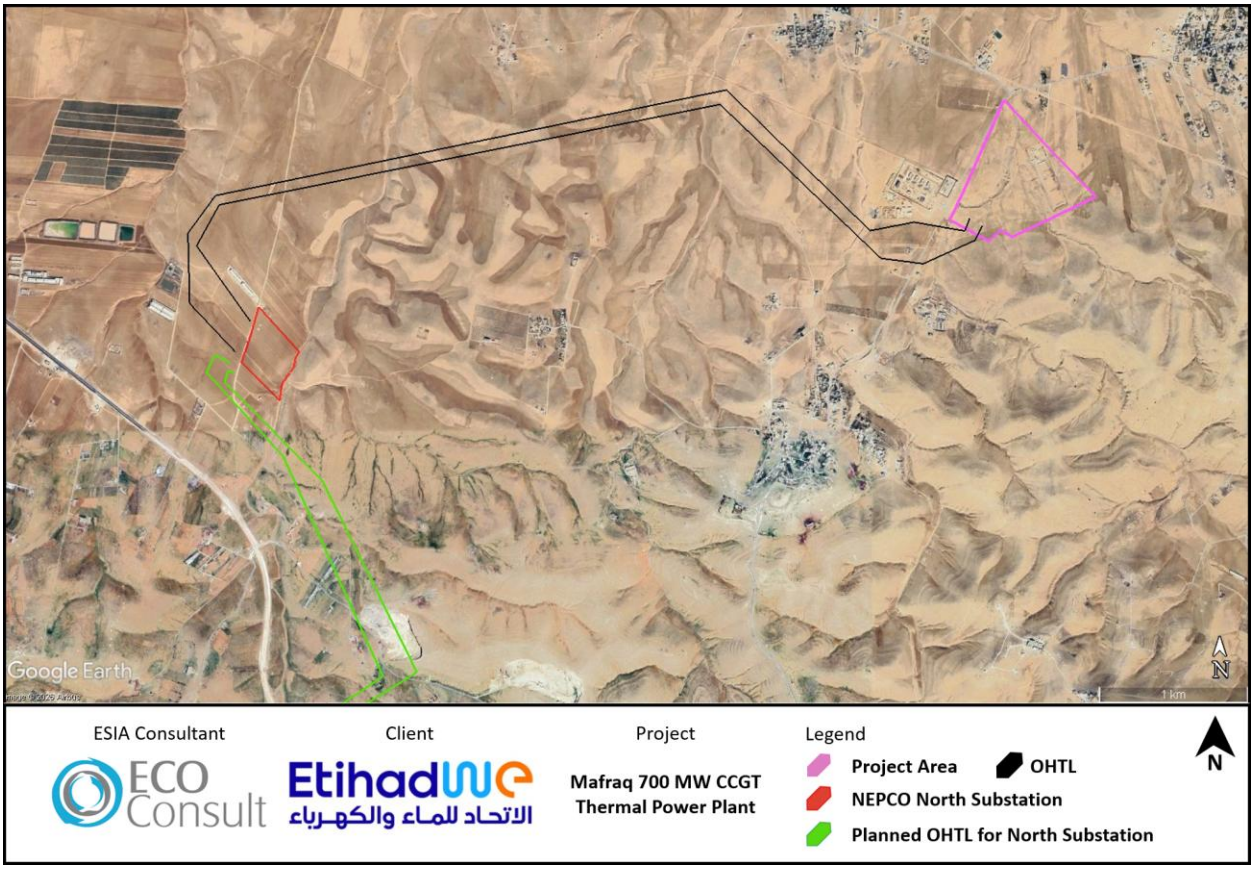


Figure 122: NEPCO North Substation in Relation to the Project Site

National and global GHG emissions: As a natural-gas-fired thermal power plant, the Project will generate GHG emissions that cumulatively add to Jordan's national emissions inventory and global atmospheric GHG concentrations. Jordan's national GHG emissions increased from approximately 26.7 $MtCO_2e$ in 2012 to over 31 $MtCO_2e$ in 2023, of which more than 80% is CO_2, driven largely by fossil-fuel consumption in electricity generation and transport. Jordan is a party to the UNFCCC and the Paris Agreement and has in place a Climate Change Regulation (No. 79 of 2019) and a Renewable Energy and Energy Efficiency Law (2012). Its 2025 Nationally Determined Contribution (NDC 3.0) maintains a target of a 5% unconditional reduction, rising to 31% with international support, with a widely cited absolute national benchmark of 30 $MtCO_2e$ by 2030.

8.13.2.3 Steps 4 and 5: Cumulative Impact Assessment, Mitigation and Monitoring

The potential cumulative impacts associated with each identified source are assessed below, together with the mitigation and monitoring measures required to manage them. Where a source has been screened based on scale, separation or the absence of interaction with the Project's residual impacts, the basis for the conclusion is recorded.

Air Quality – Al Khanasri Gas Compressor Station

The relevant VEC associated with the cumulative emission from both the Project and the gas compressor station is the ambient air quality within the communities surrounding the facilities. Because design and emissions data for the Al Khanasri gas compressor station have not been made available, a qualitative assessment of the likelihood of a significant cumulative air quality impact has been undertaken, based on the relative scale of the two facilities and the screening process embedded in the IFC General Environmental, Health and Safety (EHS) Guidelines. The compressor station's combined capacity of approximately 24 MW is small relative to the Project's approximately 700 MW generating capacity, and its emissions are correspondingly limited. The Project incorporates embedded controls, including the routine use of natural gas, low-NOx burners, the restriction of higher-emission distillate oil to a maximum of 14 days per year, and 60 m HRSG main stacks that promote dispersion. A significant cumulative air quality impact is considered unlikely with impacts no greater than predicted for the Project in isolation.

Where design and emission parameters for the compressor station become available, it is recommended that a quantitative cumulative dispersion assessment be undertaken to confirm this conclusion, however on the basis on the information currently available and the assessment undertaken for the much larger CCPP sources, the residual cumulative impact to air quality is assessed as not significant.

Land Use, Community Safety and Access – Jordan Hijaz Railway

The relevant VECs with regard to cumulative impacts to both the Project and proposed Jordan Hijaz Railway include land use, community safety and access. The principal potential for cumulative interaction arises from the spatial overlap between the planned railway corridor and the Project, and from the temporary encroachment of the Project's Temporary Laydown Area within the 100 m railway buffer required by the Ministry of Transport. The Ministry has confirmed that, because the laydown area will be used only during the Project's construction period and the railway is scheduled for a later timeframe, no additional requirements apply at this stage.

The Project will maintain the 100m buffer between permanent Project components and the planned railway route, reinstate and close out the Temporary Laydown Area on completion of construction, and continue to engage with the Ministry of Transport and the Jordan Hijaz Railway to confirm the railway program and to identify and manage any cumulative construction-phase or operational interactions (including access, traffic and safety) should the railway progress. Given the temporary nature of the overlap and the absence of concurrent construction, the residual cumulative impact is assessed as not significant.

Landscape, Biodiversity and Community – NEPCO North Substation and OHTLs Project

The relevant VECs with regard to the cumulative effects associated with the Project and the NEPCO North Substation and OHTLs Project are the shared landscape, terrestrial habitats and communities of the Rihab–Mafraq area. The NEPCO North Substation and OHTLs Project and the Project are located within the same region and grid context. They may, where their construction programs coincide, give rise to additive effects on landscape and visual amenity, terrestrial habitats (including the Irbid–Mafraq Plains), traffic and community disturbance. Both developments are subject to their own ESIAs prepared to lender standards (EBRD Category A), each of which defines mitigation for these effects.

The Project will coordinate with NEPCO, which is responsible for the adjacent 400 kV substation and OHTL, and for the wider North Substation and OHTLs Project, to align construction scheduling, traffic management, and reinstatement, and to avoid duplication of disturbance. Electrical safety and electromagnetic field (EMF) considerations along the OHTL rights-of-way are managed through NEPCO's design, safe clearances, and maintenance. Given that both developments will implement mitigation

through their respective Environmental and Social Management Systems, and noting the grid-reliability and renewable-enabling benefits of the North Substation, the residual cumulative impact is assessed as minor negative and not significant.

Climate Change – National and Global GHG Emissions

GHG emissions are inherently cumulative, contributing to national and global atmospheric concentrations irrespective of their point of release. Over its 27-year construction and operational lifetime, the Project is estimated to generate approximately 65.6 $MtCO_2e$, of which combined-cycle operation on natural gas accounts for approximately 95.8%, simple-cycle operation for approximately 4.1%, and construction for approximately 0.1%. Annual operational emissions are estimated at approximately 0.26 $MtCO_2e/y$ in simple-cycle mode and approximately 2.44 $MtCO_2e/y$ in combined-cycle mode on natural gas. These annual emissions are minor compared with Jordan's reported national emissions of over 31 $MtCO_2e$ in 2023; however, the total operational emissions over the 25-year operational life (approximately 65.6 $MtCO_2e$) are considered moderate relative to the national NDC benchmark of 30 $MtCO_2e$ by 2030.

The Project's cumulative contribution to national and global GHG emissions is reduced by embedded design measures, including combined-cycle operation (raising efficiency from approximately 35–40% in simple cycle to approximately 60%), the routine use of natural gas, low-NOx combustion, and the restriction of higher-carbon distillate oil to a maximum of 14 days per year. At the national level, the Project's contribution is set against Jordan's decarbonization trajectory, including the additional renewable generation enabled by grid reinforcements such as the NEPCO North Substation (up to 600 MW of solar PV in the Rihab–Mafraq area). GHG emissions will be monitored and reported through the operational Environmental and Social Management System, and the Project remains exposed to transition risks (carbon pricing, tightening standards and net-zero trajectories) that are assessed within the Climate Change Risk Assessment ('Chapter 8' of this ESIA). On this basis, the residual cumulative climate impact is assessed as moderate negative, consistent with the significance of GHG emissions from unabated gas-fired generation.

Overall, taking into account the scale, separation and timing of the identified cumulative sources and the mitigation embedded within the Project and the associated third-party developments, the Project is not predicted to give rise to significant cumulative impacts on the identified VECs, except for its contribution to cumulative GHG emissions, which is assessed as moderate. The Project will continue to engage with the relevant authorities and developers – including the Ministry of Transport, the Jordan Hijaz Railway and NEPCO – to identify, assess and manage any cumulative impacts that may emerge as the surrounding developments progress.

Water Demand

Water demand is a further cumulative consideration where the Project coincides with the other developments in the Rihab–Mafraq area, as regional supply is drawn from the Zaatari groundwater resources, which are already under strain from over-extraction. The Project's requirement of approximately 600 m^3/day is secured for the 25-year operational period under the Water Supply Agreement with the Water Authority of Jordan and the Yarmouk Water Company, and consumption is further limited by the Zero Liquid Discharge design; under drought conditions, however, the combined demand of the Project and the surrounding developments comes into closer competition with that of local communities and existing agricultural users. The Project will engage with the Water Authority of Jordan and the Yarmouk Water Company to confirm supply arrangements and any drought-related restrictions in advance and will prioritize water reuse and regulated tankered supply where restrictions apply, such that the residual cumulative impact on water resources is assessed as minor negative and not significant.

8.13.2.4 *Step 6: Management of Cumulative Impacts*

The sixth and final step of the IFC Good Practice Handbook approach sets out how the Project's contribution to cumulative impacts on the selected VECs will be managed over time. In accordance with the IFC Good Practice Handbook (2013), the management measures apply the mitigation hierarchy, are designed to address the cumulative effects identified under Steps 4 and 5, provide for the engagement of the other parties whose actions influence the same VECs, define the associated mitigation and monitoring programs, and manage residual uncertainty through informed adaptive management. Because cumulative impacts arise from the combined actions of several developers and authorities, their management is a shared responsibility: the Project is responsible for eliminating or minimizing its own contribution, while the avoidance of unacceptable cumulative effects on shared VECs also depends on the actions of the other parties operating in the Rihab–Mafraq area.

Mitigation Hierarchy and Management Strategy

The Project manages its contribution to cumulative impacts by applying the mitigation hierarchy: first, avoiding impacts through design (location, timing, and technology); then minimizing those that cannot be avoided; restoring or rectifying affected conditions; and, only as a last resort, compensating for residual effects. Consistent with the IFC Good Practice Handbook, offsetting is treated as a measure of last resort. It is not relied upon as the primary means of managing cumulative impacts on any selected VEC. Where project-level mitigation is sufficient to prevent unacceptable cumulative impacts, the Project is not required to initiate collaborative management of others' impacts; where it is not sufficient, the Project will engage in collaborative regional management and monitoring. The assessment presented under Steps 4 and 5 concludes that project-level mitigation, embedded within the Project's management system, is sufficient to keep the residual cumulative impact on each VEC below the level of significance, except the Project's contribution to national and global GHG emissions, which is assessed as moderate and is managed through both project-level efficiency measures and the wider national decarbonization framework.

Management Framework and Shared Responsibility

The management of cumulative impacts is delivered through the same instruments that manage the Project's direct impacts, rather than through a separate system. During construction, the measures are captured as commitments within the Construction Environmental and Social Management and Monitoring Plan (ESMMP) and its supporting plans; during operation, they are carried into the Operational Environmental and Social Management System (ESMS). The supporting plans of most relevance to the identified cumulative sources are:

- The Pollution Prevention Management Plan and the operational emissions monitoring arrangements (air quality)
- The Traffic and Transportation Management Plan
- The Biodiversity Management Plan, including the post-construction bird fatality monitoring and adaptive management program (landscape, habitats and biodiversity);
- The operational GHG monitoring and reporting arrangements and the Climate Change Risk Assessment (global climate)
- The community health and safety measures included within all of the above plans (community safety, access and third-party infrastructure)

- Water management plan

The Project will maintain constructive, coordination-focused relationships with the relevant authorities and developers, principally NEPCO, the Ministry of Transport and the Jordan Hijaz Railway. The specific management and monitoring measures for each cumulative source are set out below.

Air Quality – Al Khanasri Gas Compressor Station

The Project's contribution to cumulative air quality effects is minimized through embedded design controls and will be verified through monitoring. The following measures will be implemented:

- Maintain the embedded emission controls, comprising the routine firing of natural gas, low-Nox burners, the restriction of higher-emission distillate oil to a maximum of 14 days per year, and 60 m HRSG main stacks to promote dispersion
- Undertake a quantitative cumulative dispersion assessment once the design and emission parameters (stack height, exit parameters and emission rates) for the Al Khanasri gas compressor station become available, to confirm the qualitative conclusion reached under Steps 4 and 5
- Undertake operational ambient air quality monitoring, supported by continuous emissions monitoring (CEMS), manual stack sampling and complaint-driven monitoring under the operational ESMS. This ambient monitoring will account for all cumulative sources that contribute to the air quality at the selected receptors including the gas compressor facility when it becomes operational; and
- Adopt an adaptive management trigger whereby a confirmed exceedance of the applicable ambient air quality standard or substantiated community complaints prompt investigation and corrective action, including engagement with the compressor station operator where relevant.

Land Use, Community Safety and Access – Jordan Hijaz Railway

Cumulative interaction with the planned railway is avoided by design and managed through continued engagement. The following measures will be implemented, noting that current understanding is anticipated the railway project is not considered a national priority project and is not expected to progress in the short to medium term (i.e. not within the next 10 years):

- Maintaining the 100 m buffer required by the Ministry of Transport between permanent Project components and the planned railway route
- Reinstatement and close out of the Temporary Laydown Area on completion of construction, removing the temporary encroachment within the railway buffer; and
- Continual formal engagement with the Ministry of Transport and the Jordan Hijaz Railway to confirm the railway program and to identify any emerging interactions.

Landscape, Biodiversity and Community – NEPCO North Substation and OHTLs Project

Additive effects with the NEPCO North Substation and OHTLs Project are managed through coordination with NEPCO and through the Project's own management plans. The following measures will be implemented:

- Coordination with NEPCO on construction scheduling, traffic management and reinstatement to avoid duplication of disturbance where the construction programs coincide

- Delivery of landscape, habitat and community mitigation through the Biodiversity Management Plan
- Implementation of the post-construction bird fatality monitoring program on the Project's OHTL, using its results to determine the significance of collision and electrocution effects and to inform adaptive management, and alignment of this monitoring with NEPCO's programs to build a regional picture of effects on avifauna where practicable
- Management of electrical safety and electric and magnetic field (EMF) considerations along the OHTL rights of way through design, safe clearances and maintenance, with NEPCO responsible for its own infrastructure; and
- Adoption of an adaptive management trigger whereby monitoring that indicates elevated cumulative effects on habitats or avifauna prompts additional mitigation and coordination with NEPCO.

Climate Change – National and Global GHG Emissions

The Project's contribution to cumulative GHG emissions – the one VEC for which the residual cumulative impact is assessed as moderate – is managed primarily through avoidance and minimization at source, complemented by monitoring and by the wider national decarbonization framework. The following measures will be implemented:

- Maintaining the embedded design measures that reduce emissions intensity, including combined-cycle operation (raising efficiency from approximately 35–40% in simple cycle to approximately 60%), routine firing on natural gas, low-NOx combustion and the restriction of higher-carbon distillate oil to a maximum of 14 days per year
- Monitoring, recording and reporting GHG emissions through the operational ESMS, and managing exposure to carbon pricing, tightening standards and net-zero trajectories through the measures identified in the Climate Change Risk Assessment
- Setting the Project's contribution within Jordan's decarbonization trajectory and Nationally Determined Contribution, recognizing the additional renewable generation (up to 600 MW of solar PV in the Rihab–Mafraq area) enabled by grid reinforcements such as the NEPCO North Substation.

Monitoring, Adaptive Management and Stakeholder Engagement

Across all VECs, the monitoring commitments described above are consolidated in the Construction ESMMP and the Operational ESMS, providing a mechanism to verify the effectiveness of mitigation measures and to detect cumulative effects as surrounding developments progress. Adaptive management is applied where effects may emerge over time and are reversible, most notably for avifauna, where post-construction fatality monitoring provides the trigger for additional mitigation while recognizing that adaptive management is not a substitute for avoidance where impacts could be irreversible. Where regional monitoring programs exist or are established by others, the Project will seek to align its own monitoring with them to reduce duplication and to contribute to a shared understanding of cumulative effects. Stakeholder engagement, initiated during scoping and continued throughout the ESIA, will be maintained for the life of the Project through ongoing consultation and the Project grievance mechanism, so that community concerns regarding cumulative effects are identified, documented and addressed.

On this basis, the Project's contribution to cumulative impacts on the selected VECs will be avoided or minimized through embedded design, managed through the Project's established management system and supporting plans, and monitored and adapted over time in coordination with the relevant authorities

and developers. With these measures in place, the residual cumulative impacts are not considered significant, except for the Project's contribution to cumulative GHG emissions, which remains moderate and is managed through emissions-reduction measures at source and alignment with Jordan's national decarbonization commitments.

8.14 Transboundary Impacts

8.14.1 Introduction

Transboundary impacts are those that extend beyond the host country of a project into one or more neighboring countries, but which are not global in nature. This section considers the potential for transboundary impacts arising from the Mafraq 700 MW Combined-Cycle Gas Turbine (CCGT) Thermal Power Plant (the Project), with a focus on emissions to air, the principal pathway by which the effects of a gas-fired thermal power plant could, in principle, extend across an international boundary. Where applicable, this section draws upon the Air Quality and Dust impact assessment (see 'Chapter 6.1' above)

Greenhouse gas (GHG) emissions and their contribution to climate change are global rather than transboundary in nature and are therefore not addressed in this section; the Project's GHG emissions and associated climate considerations are assessed separately within this ESIA.

8.14.2 Transboundary Impact Assessment

Scoping

IFC Performance Standard (PS) 1: Assessment and Management of Environmental and Social Risks and Impacts recognizes the need to consider transboundary impacts. PS 1 states that the risks and impacts identification process should consider "potential transboundary effects, such as pollution of air, or use or pollution of international waterways". For a gas-fired thermal power plant, the emission of combustion pollutants to air is the impact with the greatest theoretical potential to act at a transboundary scale.

To generate a transboundary impact, Project emissions would need to disperse across an international boundary at concentrations sufficient to produce a discernible effect. The Project is located within Mafraq Governorate, in the Northwestern Badia District (Hosha Sub-District), approximately 55 km northeast of Amman, at approximately 32.41°N, 36.06°E. Mafraq Governorate shares international boundaries with Syria to the north, Iraq to the east and Saudi Arabia to the south and east. The nearest of these is the boundary with Syria to the north, which lies approximately 15 km from the Project Site; the Saudi Arabian and Iraqi boundaries are considerably more distant.

By comparison, the assessment of the Project's air quality impacts defined an Area of Influence (AoI) of a 5 km radius around the emission sources, and screening indicated that maximum ground-level concentrations occur within 1–2 km of those sources. The nearest international boundary, therefore, lies well beyond the area within which any measurable change in air quality is predicted.

A review of the impacts assessed within this ESIA was undertaken and confirmed that the majority of impacts are limited to the footprint of the Project activities and immediate surroundings, remain within national boundaries e.g. for social and community impacts, and are mitigated through the development of relevant plans. With regard to potential air quality impacts these were reviewed was undertaken to determine which, if any, have the potential to give rise to transboundary effects. The outcome is presented

in Table 72. None of the identified impacts is considered to have transboundary potential; the reasoning is set out in the table and in the sections that follow.

Table 72: Review of Potential Transboundary Air-Quality Impacts

Phase/activity	Type of impact	Receptor	Potential for transboundary impact and reasoning
Construction – use of construction plant and equipment	Change to air quality (combustion emissions)	Communities	No – emissions are temporary and localized; comparison with screening completed for a project of a similar scale and utilizing similar plant types indicates no greater than negligible significance beyond 30–45 m of the works, and no measurable change at the nearest receptors (closest residences ≈ 500 m). No wider regional or cross-border effect.
Construction – earthworks and soil movements	Dust (PM_{10} / $PM_{2.5}$, nuisance)	Communities, livestock and grazing land	No – dust is localized to the immediate vicinity of the works, temporary and reversible, and controlled through the Construction Pollution Prevention Plan. No cross-border effect.
Operation – CCGT turbine stack emissions	Change to air quality (NO_2, CO, SO_2, PM_{10})	Communities	No – dispersion modeling predicts no exceedance of any air quality standard at any receptor; maximum ground-level concentrations occur within 1–2 km of the stacks, far inside the 5 km AoI and well within the ≈ 15 km to the nearest (Syrian) boundary.

Air Quality – Construction (Plant Emissions and Dust)

During construction, emissions to air will arise from the combustion of fuel in construction plant and equipment (excavators, graders, rollers, dozers, dump trucks and temporary diesel generators) and from the generation of dust during site preparation, earthworks and soil movements at the Plant Area, Substation Area, Temporary Laydown Area and along the overhead transmission line (OHTL) and gas and water pipeline tie-in routes.

Screening based on comparable plant fleets indicates that construction combustion emissions would not give rise to air quality effects of greater than negligible significance beyond 30–45 m from the works, such that no measurable change in air quality is anticipated even at the nearest receptors (the closest residences lie approximately 500 m from the Site boundary). Dust effects are similarly confined to the immediate vicinity of the works, are temporary and reversible, and are managed through the Construction Pollution Prevention Plan.

As these effects are confined to, at most, the immediate surroundings of the works, while the nearest international boundary lies in the order of 15 km away, there is no pathway by which construction-phase air emissions or dust could produce a transboundary effect. No transboundary impact is anticipated during construction.

Air Quality – Operation (Turbine Stack Emissions)

During operation, emissions to air arise from the combustion of natural gas and, exceptionally, distillate (diesel) oil in the Project's gas turbines and are discharged through the 60 m heat recovery steam generator (HRSG) main stacks. An air quality dispersion modeling study was undertaken using the internationally recognized AERMOD model, drawing on three years of meteorological data, a digital terrain model, the Project layout and building dimensions, and stack parameters (dimensions, exit temperatures and flow rates), across a 50 km by 50 km gridded receptor domain. Four operating scenarios were assessed: combined-cycle and simple-cycle operation on natural gas (Scenarios 1 and 2), and combined-cycle and simple-cycle operation on diesel (Scenarios 3 and 4).

The modeling predicted maximum ground-level increases in NO_2, CO, SO_2 and PM_{10} within 1–2 km of the emission sources. For natural-gas operation (routine combined-cycle operation, and the simple-cycle operation anticipated for the first year), predicted contributions are well below the applicable air quality standards, with significant headroom and no exceedances either in isolation or in combination with background concentrations. For the non-routine diesel scenarios restricted to no more than 14 days per year when gas is unavailable, no exceedances of the NO_2, CO or PM_{10} standards are predicted; a potential exceedance of the short-term (1-hour) SO_2 standard identified under a conservative 1% fuel-sulphur assumption is eliminated at the 0.5% sulphur content indicated by suppliers. Overall, the magnitude of the operational air quality impact is assessed as Low, with no exceedance of any standard at any modeled receptor.

Because the maximum modeled ground-level concentrations occur within 1–2 km of the stacks and diminish rapidly with distance, falling to insignificant increments well within the 5 km AoI, predicted concentrations at the nearest international boundary in the order of 15 km to the north would be indistinguishable from background. There is therefore no potential for the Project's operational air emissions to result in a significant transboundary impact. No transboundary air quality impact is anticipated.

8.14.3 Mitigation and Monitoring

The embedded design and management measures control the Project's emissions to air and therefore also preclude any transboundary air quality effects. The principal measures are:

- Routine firing of the gas turbines on natural gas, with the use of higher-emission distillate (diesel) oil restricted to occasions when gas is unavailable and to no more than 14 days per year
- The use of dry low-NO_x combustion technology to abate NO_x emissions
- Discharge of exhaust gases through 60 m HRSG main stacks to promote dispersion
- Continuous monitoring and recording of NO_x, SO_x, CO and O_2 emissions by a continuous emissions monitoring system (CEMS), supported by manual stack emission sampling; and
- Implementation of the Construction Pollution Prevention Plan during construction and of the Pollution Prevention Management Plan and operational emissions monitoring under the Operational Environmental and Social Management System (ESMS)

These measures keep even the local near-field air-quality effects of the Project well below the applicable standards. As the nearest international boundary lies far beyond the area of any measurable effect, no additional transboundary-specific mitigation or monitoring is required.

8.14.4 Summary

The only pathway by which the Project could, in principle, give rise to a transboundary impact is the emission of combustion pollutants to air. The Project's air emissions, both the temporary, localized emissions and dust of the construction phase and the modeled operational emissions of NO_2, CO, SO_2 and PM_{10}, are confined to within, at most, 1–2 km of the source and are predicted not to exceed any applicable air quality standard at any receptor. With the nearest international boundary (with Syria, to the north) lying in the order of 15 km from the Project Site, well beyond the 5 km air quality Area of Influence, there is no credible pathway for the Project's air emissions to reach an international boundary at a concentration capable of producing a discernible effect. The Project is therefore not expected to result in any significant transboundary impact. Greenhouse gas emissions, which are global rather than transboundary, are addressed separately in this ESIA.

9. CLIMATE RISK ASSESSMENT

9.1 Introduction

This Climate Vulnerability Risk Assessment (CVRA) was conducted in the context of Jordan's recent experience of climate change, including recurring droughts, flash floods, landslides, and severe water shortages. Climate change-induced increases in temperature, decreases in precipitation, and heightened evaporation will continue to reduce water availability and further exacerbate water scarcity, posing a substantial risk to the country's people, natural resources, and economy (Ministry of Environment, 2022). In addition, as a natural gas-powered plant, the Project faces several transition-related climate risks as Jordan, alongside the global economy, shifts toward a lower-carbon future.

In an era of intensifying climate change and energy transition, a climate change risk assessment is essential to ensure that the Project remains resilient and financially viable. This assessment examines how climate-related factors could affect the Project's operations and long-term value.

This section assesses the following:

- Project's vulnerability to climate change-related physical and transition risks (Chapter 9.3 and 9.4).
- Project's impacts on climate change from the Project's Greenhouse Sas (GHG) emissions. (Chapter 9.5)

The scope of the CCRA includes the following Project components as described in 'Chapter 5':

- Permanent Primary Power Generation components: three (3) gas turbines (GT), three (3) HRSGs, one (1) ST, one (1) ACC
- Permanent Auxiliary Support Systems: Feedwater system, Cooling water system, Fogging and High Fogging systems, Water Treatment Plant, Wastewater Handling Facilities (wastewater treatment plant and evaporation pond), Natural Gas System, Backup Fuel System and Black Start Diesel Generator
- Permanent Associated Facilities: OHTL and Substation, Gas Pipeline Tie-in and Water Supply Pipeline Tie-in
- Temporary Construction Components: site offices and welfare facilities, laydown areas, temporary access routes, mobile and temporary plant and equipment, including temporary diesel generators and temporary storage and waste areas

The CCRA considers the estimated 20 months of construction (between Oct 2026 and September 2028) and 25 years of operation of the permanent Project facilities (from September 2028 to June 2053).

National climate policy details are provided in 'Chapter 3'. Physical climate and meteorological baseline is provided in 'Chapter 6'.

9.2 Methodology

9.2.1 Climate Risks to the Project

Assessment of the climate change risks to the Project has been aligned with the following established frameworks and relevant associated guidance:

- Institute of Sustainability and Environmental Professionals (ISEP) Climate Change Adaptation Practitioner Guidance, November 2022
- Equator Principles Guidance Note on Climate Change Risk Assessment, 2023
- Special Report by Intergovernmental Panel on Climate Change (IPCC) on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, 2012
- IPCC 6th Assessment Report on Climate Change: Impacts, Adaptation and Vulnerability, 2022
- United Nations Environment Programme (UNEP) Climate Risk Landscape Report, 2023
- Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) Arab Climate Change Assessment Report 2017
- Weathering Risk 2022 Climate Risk Profile Jordan
- World Bank Group Country Climate and Development Report: Jordan, 2022

Recognized climate risk assessment frameworks and methodologies such as TCFD, ISEP and IPCC apply three (3) parameters for the determination of climate risk: Hazard, Exposure and Vulnerability, known as the 'risk propeller' (Figure 123: Climate Risk PropellerFigure 123)

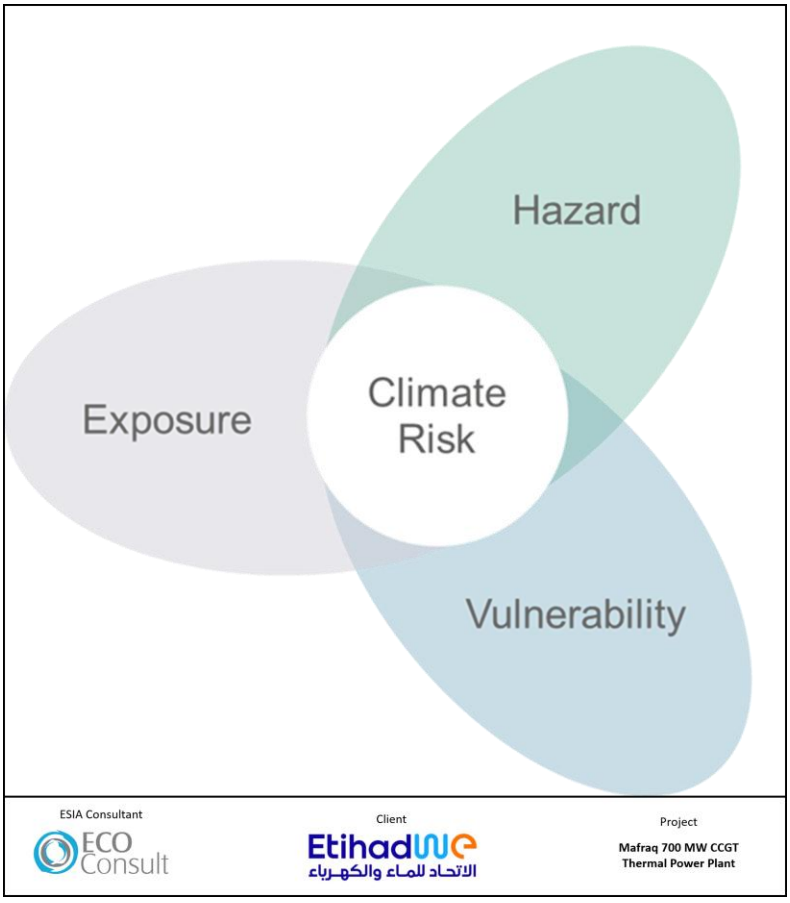


Figure 123: Climate Risk Propeller

9.1.1.1 Climate Hazards

Acute (short-term, event-driven) physical climate hazards are sudden, extreme events that can cause immediate damage or disruption. These include coastal flooding and storm surges, extreme rainfall and flash floods, heatwaves, strong winds, and wildfires, among others. Acute climate hazards may threaten the operational continuity and safety of the Project facilities.

Chronic physical climate hazards are slow-onset changes that degrade performance or increase costs over time. These include rising air and sea temperatures, changes in precipitation patterns, soil movement (shrink–swell, subsidence), accelerated corrosion, increased dust and soiling, among others.

Transition climate hazards arise from shifts toward a low-carbon, sustainable economy and include policy/regulatory changes, market and financial dynamics, and technological and supply chain evolution.

Climate hazards were screened and selected based on applicability to the Project, as presented in 'Chapter 9.4.1' and 'Chapter 9.5.1'. Selected climate hazards were prioritized according to their potential to materially affect project performance over the life of the asset, i.e. their potential material impact on project viability, cash flows and revenues, operating costs, financial conditions, asset value, compliance obligations, reputational exposure and alignment with future climate pathways.

9.1.1.2 Exposure

Exposure refers to the severity of the impact and speed of onset upon Project facilities located within the climate hazard zone. For physical risks, exposure is assessed based on the Project's geographical location and the frequency and magnitude of the climate hazard event. The exposure criteria for physical risks are provided in Table 73 below.

Table 73: Exposure Criteria for Physical Climate Risks

Level	Definition
High	Material increase in climate variable with potential shutdown of Project for >1 week
Moderate	Material increase in climate variable with potential shutdown of Project for <1 week
Low	Non-material increase in climate variable with no impact on Project operations

For transition climate risks, exposure takes into account legislated policies or changes in lender requirements, aspirational policy statements, and the speed of onset (i.e., short- or long-term). The exposure criteria for transition risks are provided in Table 74 below.

Table 74: Exposure Criteria for Transition Climate Risks

Level	Definition
High	Legislated/lender requirement with impact on the Project in the short term
Moderate	Legislated/lender requirement with impact on the Project in the long term
Low	Legislated / non-lender / aspiration requirement with potential impact on the Project

9.1.1.3 Vulnerability

Vulnerability refers to the predisposition (or sensitivity) to be adversely affected by a climate hazard, as well as the inability to cope with or adapt to it. For physical risks, vulnerability considers the design of the Project's permanent facilities and the availability of adaptation/response mechanisms (such as drainage capacity for peak rainfall, design contingencies for operating parameters, flood pumps, etc.), as well as monitoring programs and emergency preparedness. The vulnerability criteria for physical risks are provided in Table 75.

Given the early stages of design, if the vulnerability of Project facilities to climate hazards cannot be fully ascertained, CCRA provides actions for further studies and design factors that shall be considered in the Project design.

Table 75: Vulnerability Criteria for Physical Climate Risks

Level	Definition
High	Project facility design threshold exceeded, no adaptation/response mechanisms available
Moderate	Project facility design threshold exceeded, adaptation/response mechanisms available within 24 hours to mobilize/implement
Low	Project design threshold not exceeded, immediate adaptation/response mechanisms implemented

For transition risks, vulnerability takes into account safeguards and flexibility under agreements, the ability to decarbonize and management system processes. The vulnerability criteria for transition risks are provided Table 76.

Table 76: Vulnerability Criteria for Transition Climate Risks

Level	Definition
High	No safeguards under design, agreements or management system identified
Moderate	Safeguards under design, agreements/management system are being actively explored
Low	Safeguards under design, agreements/management system already implemented

9.1.1.4 Risk Rating

The risk levels can be determined for relevant climate hazards using the formula below:

Level of Risk = Exposure Level x Vulnerability Level

Table 77: Risk Matrix

		Vulnerability		
		Low	Moderate	High
Exposure	High	Low	Moderate	High
	Moderate	Low	Moderate	Moderate
	Low	Low	Low	Low

9.1.1.5 Climate Scenarios

Scenario analysis is a critical component of a climate risk assessment. A scenario describes a plausible, yet hypothetical, path of development that leads to a particular future outcome. Scenarios are not intended to provide a comprehensive description of the future, but rather to highlight central elements of a possible future and draw attention to the key factors that will drive future developments. Scenarios are not forecasts or predictions; they are “what if” narratives designed to inform and challenge strategic thinking.

IPCC AR6 primarily uses five illustrative SSP scenarios spanning a wide range of future emissions, warming, and adaptation/mitigation challenges, summarized in Table 78 below.

Table 78: IPCC AR6 Core Scenarios

Scenario and Socio-economic Pathway	Description	Approximate Forcing in 2100	Approximate Warming by 2100 (relative to 1850–1900)	Legacy RCP scenario
SSP1-1.9 (Sustainability)	Very strong mitigation; pathway consistent with limiting warming to around 1.5°C.	1.9 W/m²	~1.4°C	RCP 1.9 – Very low emissions scenario, aligned with the goal of the Paris Agreement
SSP1-2.6 (Sustainability)	Strong mitigation and international cooperation; low-emissions future.	2.6 W/m²	~1.8°C	RCP 2.6 – Low-emission scenario
SSP2-4.5 (Middle of the Road)	Intermediate socioeconomic development and moderate climate policies.	4.5 W/m²	~2.7°C	RCP 4.5 – Intermediate-Emission scenario
SSP3-7.0 (Regional Rivalry)	Fragmented world, slow economic growth, limited cooperation, high adaptation challenges.	7.0 W/m²	~3.6°C	RCP7 - a baseline outcome rather than a mitigation target
SSP5-8.5 (Fossil-Fueled Development)	Energy-intensive growth with continued heavy fossil fuel use and very high emissions.	8.5 W/m²		RCP 8.5 – High-emissions scenario

It is noted, that AR6 uses the combined SSPx-y framework rather than RCPs alone, separating forcing levels and socioeconomic pathways as multiple SSPs can, in principle, reach the same forcing level through different mitigation choices.

The figure below Illustrates the corresponding global surface temperature changes projected under these five SSPs, which were used to generate climate modelling outputs for the IPCC AR6.

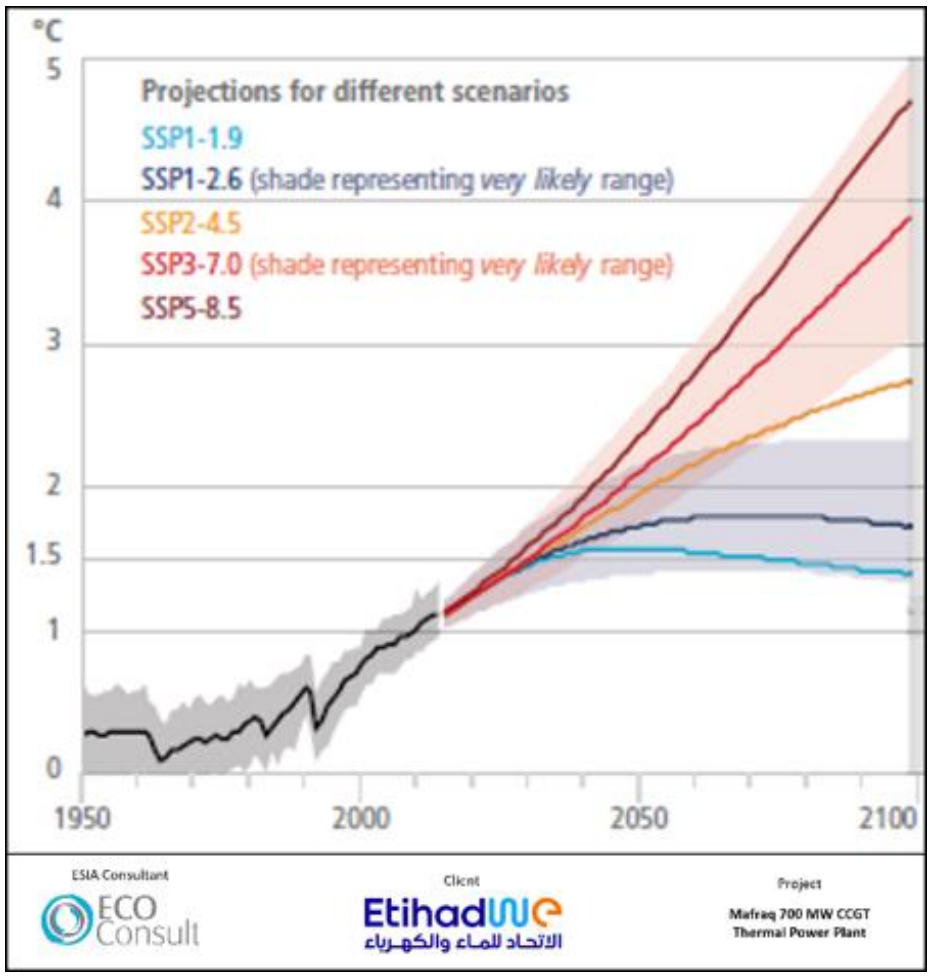


Figure 124: Global Temperature Change Projections for RCP Scenarios

For this CCRA, the following sources, based on IPCC RCPs, have been used for climate projections at the regional and country levels:

- RCP 4.5 and RCP 8.5 projections from the 2017 Arab Climate Change Assessment Report by the Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) (RICCAR, 2017)
- RCP 2.6 and RCP 6.0 projections from the 2017 Weathering Risk Climate Risk Profile: Jordan

The scenarios were selected with the key principle in mind, ensuring that the differences between scenarios are sufficiently significant to capture the impacts and uncertainties of the key risks to the Project.

Proximity of the RCPs to SSPs is noted in IPCC AR6 primarily uses five illustrative SSP scenarios spanning a wide range of future emissions, warming, and adaptation/mitigation challenges, summarized in Table 78 above. While further governate-level projections under SSPs are available from the World Bank Climate Knowledge Portal, these do not differ significantly from RCP projections from the above 2 sources used in this assessment; further SSP projections are available for only a few of the climate hazards and are presented in different time horizons than those used in this report, therefore these have not been included to avoid complexity of the presented projections.

9.1.1.6 Time Horizons

The IPCC and other regional climate modeling experiments generally run climate simulations for two (2) to three (3) future time periods, which are compared with a historical reference period. For physical risks, the following 20-year time periods are generally used: 1986–2005 (reference period), 2016–2035 (short term), 2046–2065 (medium term) and 2081–2100 (long term). This CCRA presents climate change analysis for the short- and medium-term. The long-term period from 2081 to 2100 is excluded, as the design life of the permanent Project facilities is 25 years from the start of planned operations in 2028. Transition risks are considered for short-term (next 5 years), medium-term (next 5 to 15 years), and long-term (15-25 years), with consideration of current and projected policy, market, and technological changes.

9.1.1.7 Compatibility assessment with Jordan NCCs

The assessment of the Project's compatibility with Jordan's National Climate Commitments was undertaken in accordance with Equator Principles Guidance Note on Climate Change Risk Assessments 2023 and is provided in Section 9.3 outlining both compatible and misalignment aspects along with an overall conclusion and recommendations for enhancement of compatibility.

9.2.2 Project Impacts to Climate Change

The assessment of the Project's climate change impacts from GHG emissions is based on the quantification of annual emissions during construction and during operations from both simple-cycle (with a single gas turbine) and combined-cycle (with 3 gas turbines), as described in 'Chapter 5'.

Quantification of the Scope 1 (Direct) GHG emissions followed the GHG Protocol methodology and includes:

- Continuous operations running on natural gas (both simple and combined cycles)
- Operations running on diesel fuel for 14 days (both simple and combined cycles)
- Construction emissions from plant and equipment for 20 months of construction

As the Project will not be importing electricity, Scope 2 (Indirect) emissions were not quantified.

Significance of the impact associated with the Project's GHG emissions is determined following the methodology outlined in 'Chapter 3'.

9.3 Compatibility Assessment with Jordan's National Climate Commitments

Jordan is a Party to the UNFCCC and Paris Agreement and has adopted successive Nationally Determined Contributions (NDCs), including the updated NDC 3.0 (2025), which maintains a national mitigation ambition of a 5% unconditional reduction and up to 31% reduction below the business-as-usual trajectory with international support, while also establishing a longer-term trajectory toward net zero emissions by 2050. The energy sector remains a priority sector for both emissions reduction and energy security.

A compatibility assessment recognizes that the proposed Project presents both positive and negative interactions with Jordan's climate commitments.

9.3.1 Positive Compatibility Factors

The Project demonstrates alignment with several aspects of Jordan's energy-transition strategy:

- The Project supports energy security and reliability objectives identified within Jordan's Energy Strategy and Economic Modernization Vision
- The Project utilizes natural gas rather than heavier fuel oils, resulting in materially lower GHG emissions per unit of electricity generated
- The selected combined-cycle configuration achieves substantially higher thermal efficiency than conventional thermal generation technologies and simple-cycle gas turbines
- The Project is expected to provide dispatchable and flexible generation capacity that can support increasing penetration of variable renewable energy sources within the Jordanian grid
- The Project contributes to retirement or avoidance of less efficient thermal generation and may reduce reliance on emergency diesel generation during periods of grid stress
- The selected technology represents current Good International Industry Practice (GIIP) for large-scale thermal generation in emerging markets

Accordingly, the Project can reasonably be characterized as supporting Jordan's near- to medium-term energy transition objectives and facilitating integration of renewable energy capacity.

9.3.2 Potential Areas of Misalignment

Notwithstanding the above, the Project also creates potential areas of misalignment with Jordan's long-term decarbonization objectives:

- Operational emissions of approximately 2.44 $MtCO_2e$/year during combined-cycle operation represent a significant long-term source of direct emissions
- The Project's anticipated operational life extends into the early 2050s, coinciding with the period in which Jordan is expected to pursue deeper decarbonization measures consistent with net-zero ambitions
- The Project could contribute to future carbon lock-in if flexibility for lower-carbon fuels or carbon capture technologies is not incorporated
- Future national carbon-pricing mechanisms, emissions performance standards, methane regulations or decarbonization policies could increase compliance costs

- Long-term climate scenarios consistent with 1.5°C–2°C pathways would likely require substantial reductions in unabated fossil-fuel generation

9.3.3 Compatibility Conclusion and Recommendations

On balance, the Project may be considered **conditionally compatible** with Jordan's current NDCs and energy-transition policies because it supports security of supply, enables renewable integration, employs relatively efficient gas-fired technology and replaces higher-emission alternatives.

However, compatibility decreases over time unless measures are adopted to maintain alignment with progressively more stringent national and international climate objectives.

Accordingly, compatibility is strongest in the short and medium term (to approximately 2035) and becomes increasingly dependent on future decarbonization measures during the later years of operation.

To strengthen long-term compatibility with Jordan's climate commitments, the Project should consider:

- hydrogen-readiness assessment during detailed design
- provision for future carbon capture retrofitting where technically feasible
- contractual procurement of lower-methane-intensity natural gas supplies
- periodic review of emerging national climate legislation
- implementation of Scope 3 reporting and methane-intensity tracking
- annual benchmarking against Jordan's evolving NDC targets
- adoption of internal carbon pricing for major investment decisions.

9.4 Physical Climate Risk Assessment

9.4.1 Screening of Physical Climate Hazards

Table 78 and Table 80 present physical climate hazards that were screened in as applicable to the Project with a potential to materially affect the Project performance over the life of the asset and selected for evaluation of the physical climate risk. Acute climate hazards apply to both the construction and operation phases of the Project; chronic climate hazards are experienced over a longer term and therefore apply mainly to the operation phase.

Table 79: Acute Physical Climate Hazards Applicable to the Project

Acute Hazard	Relevance	Materiality and Justification	Relevant Project Component				
			Primary Power Generation	Auxiliary Power Generation	Associated Facilities	Temporary Construction Components	Workforce
Extreme heat / heatwaves	Historic country and regional climate trends indicate increase in extreme heat and heatwave events	High. Direct impact on turbine output and efficiency, auxiliary loads, decrease in cooling efficiency, worker safety	√	√			√
Extreme precipitation / flash floods	Historic country and regional climate trends indicate increase in extreme precipitation events. The Project site is in located in proximity of a major stream (Stream 1), is crossed by 3 smaller streams (Streams 2, 3 and 4) and includes a wadi. Dry, compact soil characteristics in arid and semi-arid climates contribute to rapid runoff rates	High Potential interruption of operations, damage to plant infrastructure, access roads, substations, and associated facilities.	√	√	√ (Substation)	√	√
Landslides / mudslides	Linked to extreme precipitation and flash flood events.	Moderate: Relevant mainly for associated infrastructure and drainage system. Ground displacement, loss of support or exposure of pipelines, compound hazard of scour and instability	√	√	√ (Gas and Water Supply Pipeline Tie-ins)		
Extreme winds	Historic country and regional climate trends indicate increase in extreme wind events.	Moderate: Increase wind loading and debris damage to physical structures, worker safety	√	√	√ (OHTL and Substation)	√	√
Dust storms	Linked to extreme wind events given arid and semi-arid climatic conditions	Moderate / high: Increased maintenance, filtration requirements, equipment degradation and reduced performance, worker health and safety, operational continuity	√	√	√ (Substation)	√	√

Table 80: Chronic Physical Climate Hazards Applicable to the Project

Chronic Hazard	Relevance	Materiality and Justification	Relevant Project Facility				
			Primary Power Generation	Auxiliary Power Generation	Associated Facilities	Temporary Construction Components	Workforce
Increase in mean annual surface temperature	Project facilities are located within an area where historic climate trends indicate increase in mean annual surface temperature	High: Reduced power output and efficiency (lower air density, reducing gas turbine mass flow and increasing compressor work), cooling system constraints (reduced effectiveness of inlet fogging, increased ACC backpressure and reduced steam turbine output), thermal stress on equipment, increased O&M, higher auxiliary loads and resource use, worker health and safety	√	√	√ (OHTL and Substation)	X	√
Decrease in mean annual precipitation / water scarcity / droughts	Project facilities are located within a area where historic climate trends indicate decrease in mean annual precipitation and increase in drought events. The area is also known for widespread water scarcity. Operational continuity depends on supply of water (estimated consumption of 15 m3/hr during normal operations, peaking at~85 m3/hr during summer for limited hours	High: Water availability remains critical despite use of ACC technology and may affect operational reliability. Power output derating or even temporary shutdowns (if critical water needs cannot be met externally), decreased cooling effectiveness and efficiency, increased soil wind erosion	√	√	√	X	X
Changes in relative humidity	Project facilities are located within an area where humidity levels (relative and absolute) are known to fluctuate.	Low-Moderate: Primarily influences equipment performance and corrosion rates. Moist dust fouling of intake filters and pressure loss, accelerated corrosion and material degradation, electrical insulation and flashover risk, GT performance and cooling constraints (drop in compressor mass flow and efficiency), loss of fogging system effectiveness	√	√	√ (OHTL and Substation)		

Chronic Hazard	Relevance	Materiality and Justification	Relevant Project Facility				
			Primary Power Generation	Auxiliary Power Generation	Associated Facilities	Temporary Construction Components	Workforce
Soil erosion	Project facilities are located where historic climate trends indicate increase in soil erosion due to soil characteristics and winds.	Moderate: Relevant mainly for associated infrastructure and drainage system. Structural stability and foundation risk around structures, scour / exposure of pipelines, collapse / erosion of construction-phase excavations and slopes	√	√	√	√	√

9.4.2 Future Physical Climate Projections

Several sources are available for extracting climate change projections, with the IPCC Assessment Reports and the World Bank Climate Knowledge Portal being the most recognized and utilized. To provide more relevant data, this assessment presents projections specific to the Middle East, setting the context for Project location climatology and particular forecasts for Jordan, at the country level only, as further downscaled projections for separate governorates under RPCs and time-horizons used in this report are not available.

9.1.1.8 Extreme Heat / Heatwaves

Examining the extremes in temperature, all indices related to hot days exhibit increasing trends as expected (RICCAR, 2017). Changes in the number of very hot days (SU40) show generally the most significant increases. The latter finding is not surprising, as the number of summer days for the present climate is already high over most of the region. Changes for the SU40 indicator show strong projected warming for RCP 8.5, indicating that the increase in extreme temperatures in coastal areas would be lower than in the inland areas of the region for both RCP 4.5 and 8.5 scenarios (Figure 125).

Concurrent with rising annual mean temperatures at the country level, the annual number of very hot days (defined as days with temperatures above 35°C) is projected to rise with high certainty all over Jordan, with the highest long-term increases in the west, including Jordan's populated northwest under RCP6.0 (Weathering Risk, 2017) (Figure 126).

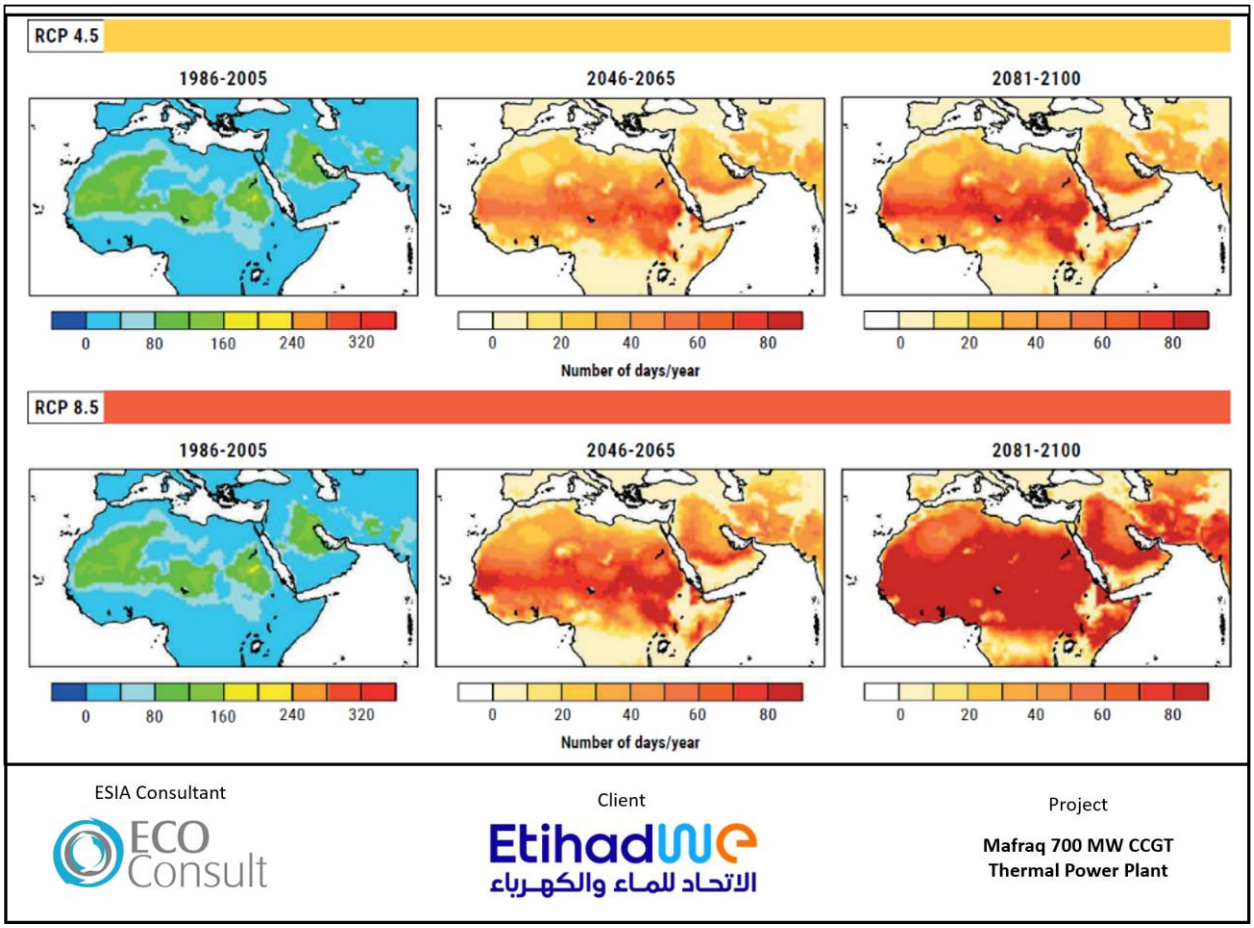


Figure 125: Mean Change in Number of Very Hot Days (days/year) under RCP 4.5 and RCP 8.5 – Regional Level

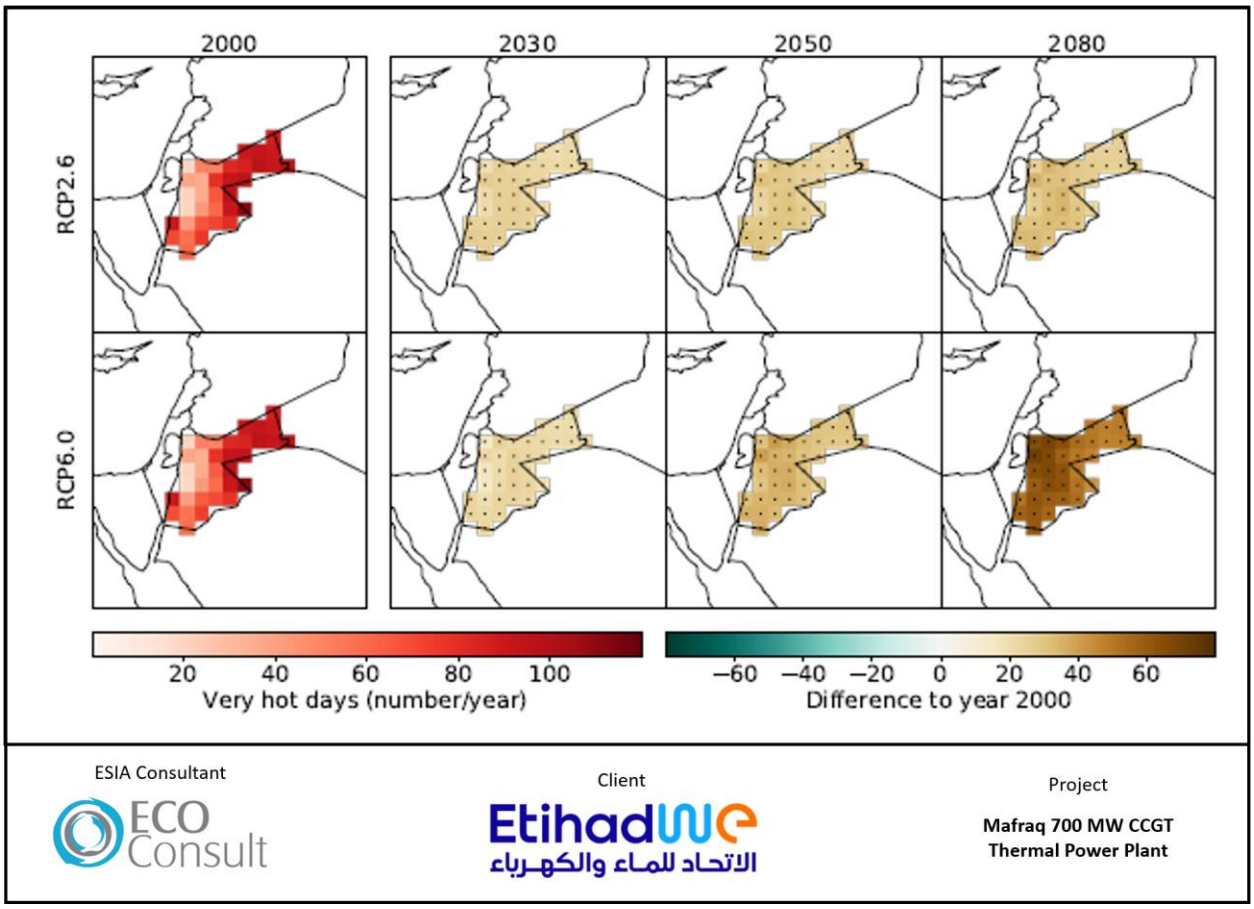


Figure 126: Number of Very Hot Days (days/year) Projections under RCP 2.6 and RCP 6.0 – Country Level

Under RCP 2.6, the number of very hot days is expected to increase by 20-26 days in most parts of Jordan, with a maximum of 28 additional very hot days per year in the southeast by 2030, compared to 2000. Thereafter, the number of days surpassing the 35°C threshold will continue to grow steadily. In 2050, there will be between 23 and 32 additional very hot days annually, while by 2080, the increase will range between 25 and 35 days annually, compared to 2000.

Under RCP 6.0, very hot days are projected to increase by 2030, as they do under RCP 2.6, by an additional 15 to 25 days. Until 2080, however, the increase will be stronger: comparatively smaller increases in hot days are projected for the northeast, amounting to around 45 additional days per year, while northwestern and central Jordan will experience a rise of up to 71 very hot days annually by 2080.

9.1.1.9 Extreme Precipitation / Flash Floods

Projections of precipitation extremes vary considerably across the region. Changes in the annual number of 10 mm precipitation days (R10) indicate decreasing trends over time compared to the baseline period. Similarly, results for the annual number of 20mm precipitation days (R20) as shown in the figures below for the end of the century are similar to the R10 index, suggesting a projected overall reduction in rainy days with these intensities over the region. The simple precipitation intensity index (SDII) shows an increasing trend across most of the country.

At the country level, the trend toward more frequent extreme precipitation events cannot be confirmed (Weathering Risk, 2017). All models agree on a declining trend in heavy precipitation, though the projected decline is much higher in one model than in the others.

Under RCP 2.6, heavy precipitation days will slightly decrease to between 5.1 and 6.6 days by 2030, and between 4.5 and 6.3 days by 2050. Under RCP 6.0, the frequency of heavy precipitation is expected to decline comparatively significantly. Heavy rainfall events are projected to decrease to 5-5.9 days per year by 2030. Due to a growing discrepancy between the models, modeling uncertainty strongly increases from 2030 onwards. Hence, while the best estimate projects 5.5 heavy precipitation days per year by 2050, the very likely range is 3.9-5.7 days per year. Projections for the year 2080 are similar (3.8 to 5.6 days/year). Particularly under RCP 2.6, geographically explicit projections of heavy precipitation events are uncertain in many regions.

Overall, country variations are expected to be relatively small. Certainty is significantly higher under RCP 6.0, with heavy precipitation events projected to decline nationwide. The most substantial decrease can be expected in the arid east across all time frames, and in the very south of Jordan in the long term. By 2080, the projected median decrease is expected to be around 1.1 to 1.4 days in the populated Mountain Heights Plateau, 1.6 days in the northeast, and up to 2.2 days in the very south, compared to the year 2000.

Jordan's national-scale climate projections do not show a large rise in broad river-flood exposure under the RCPs covered by the national profile, but local flash-flood risk remains material and may intensify in specific catchments and downstream urbanized areas, especially where high-intensity storms interact with inadequate drainage infrastructure. This is supported by the national profile, the Amman–Zarqa Basin studies, and the national flood-hazard mapping products. Spatial distribution of the flood hazard map (World Food Programme, 2019) showed that districts in the northwest of the country are the most susceptible to floods.

Based on the Project-specific Hydrology Study (WSP, 2026), flood exposure is primarily concentrated along the left-side peripheral zones adjacent to Stream 1 and inside the Project area; flooding is predominantly influenced by Stream 2 and Stream 3 (moderate to significant hazard level). Areas of extreme flood depth have been identified near Streams 1 and 2 (extreme hazard level), particularly at the downstream junction, where targeted mitigation measures will be required to reduce risk (Figure 131).

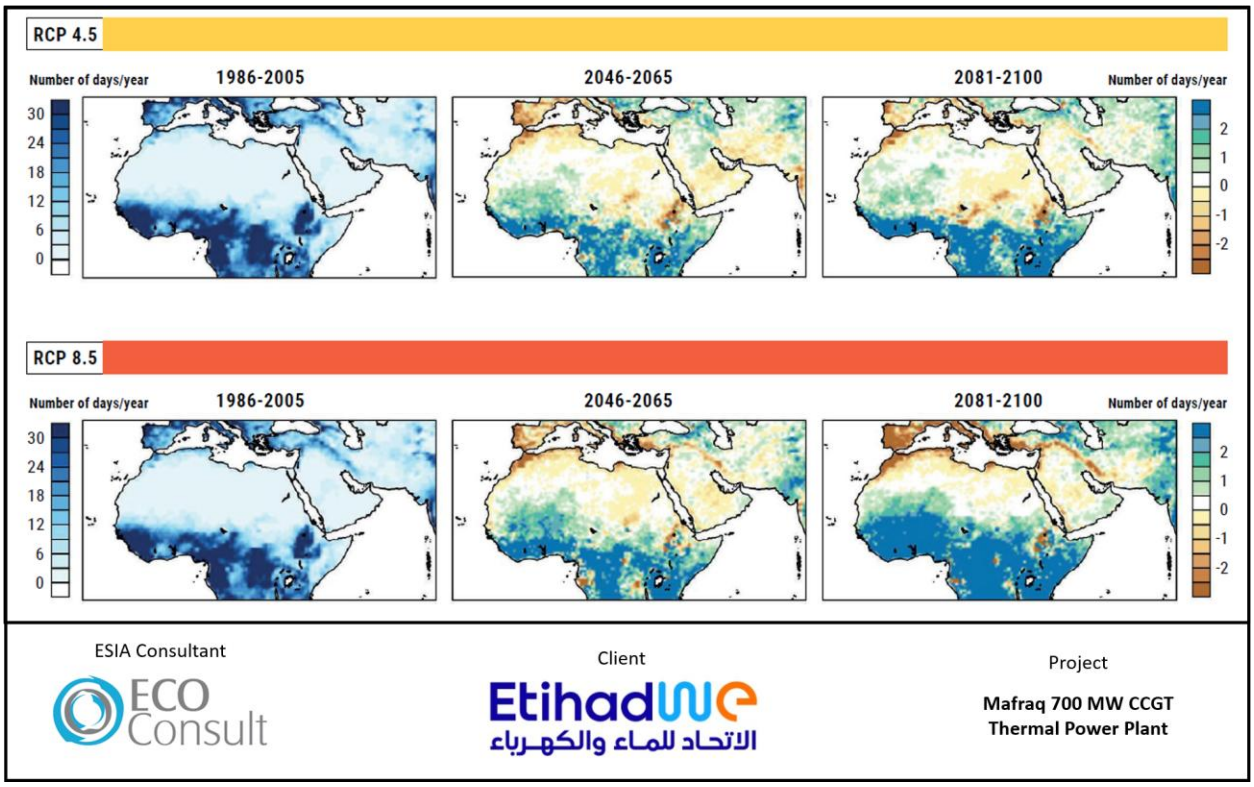


Figure 127: Mean Change R10 Precipitation Days (days/year) under RCP 4.5 and RCP 8.5 – Regional Level

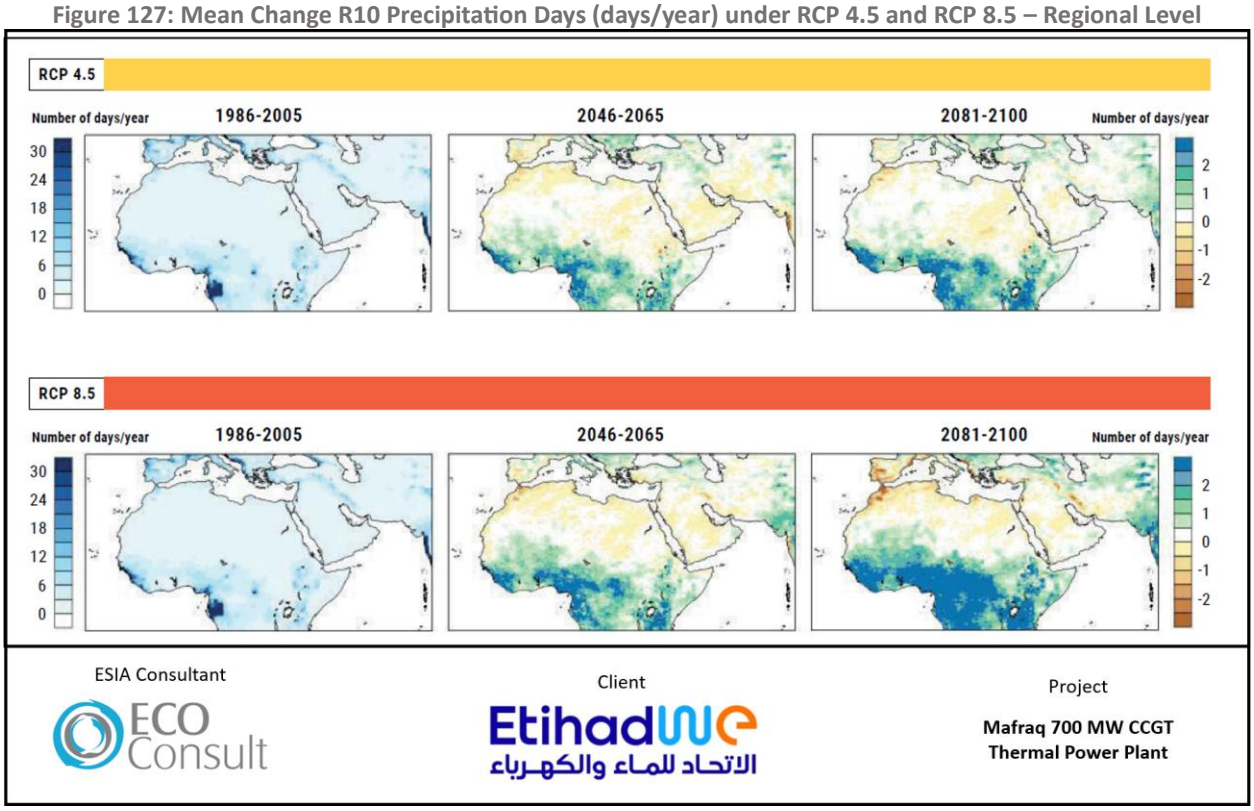


Figure 128:Mean Change R20 Precipitation Days (days/year) under RCP 4.5 and RCP 8.5 – Regional Level

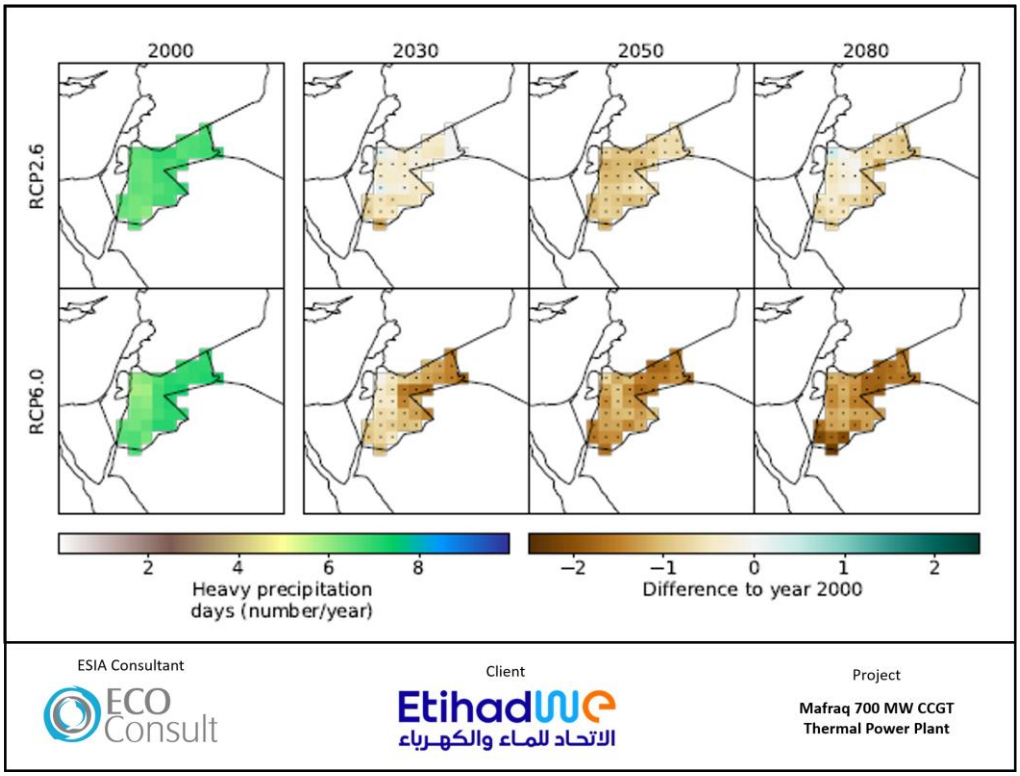


Figure 129:Days with Heavy Precipitation (days/year) Projections under RCP 2.6 and RCP 6.0 – Country Level

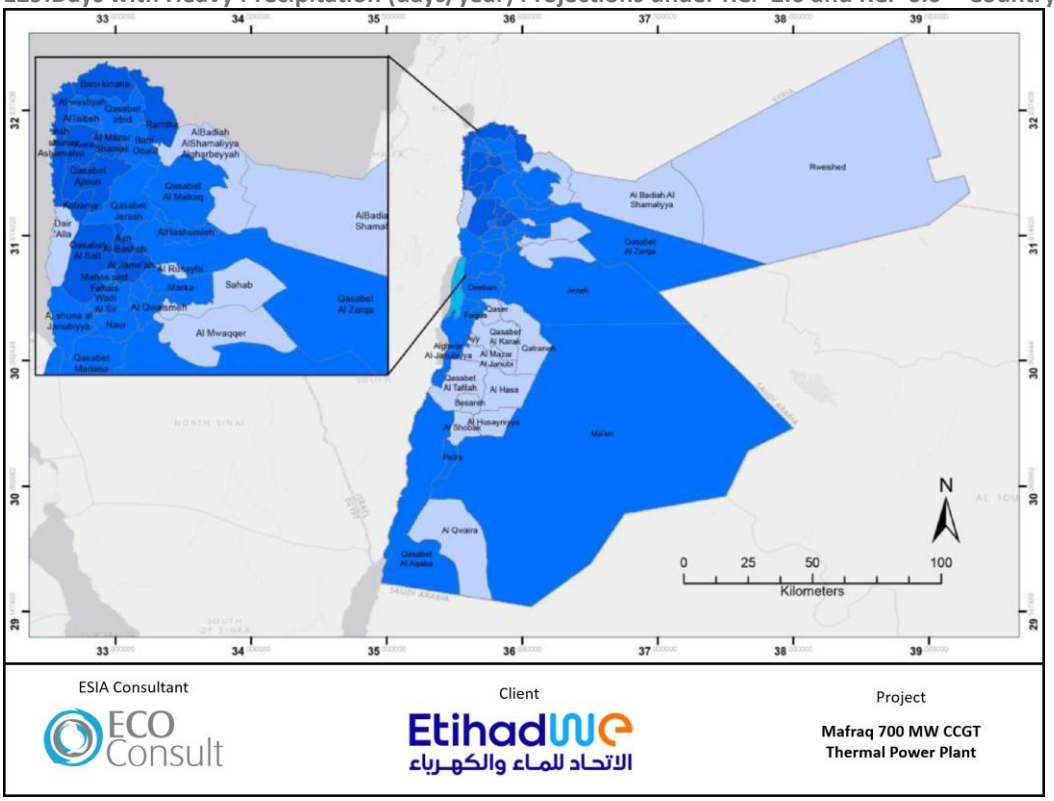


Figure 130:Flood Hazard Map – Country Level

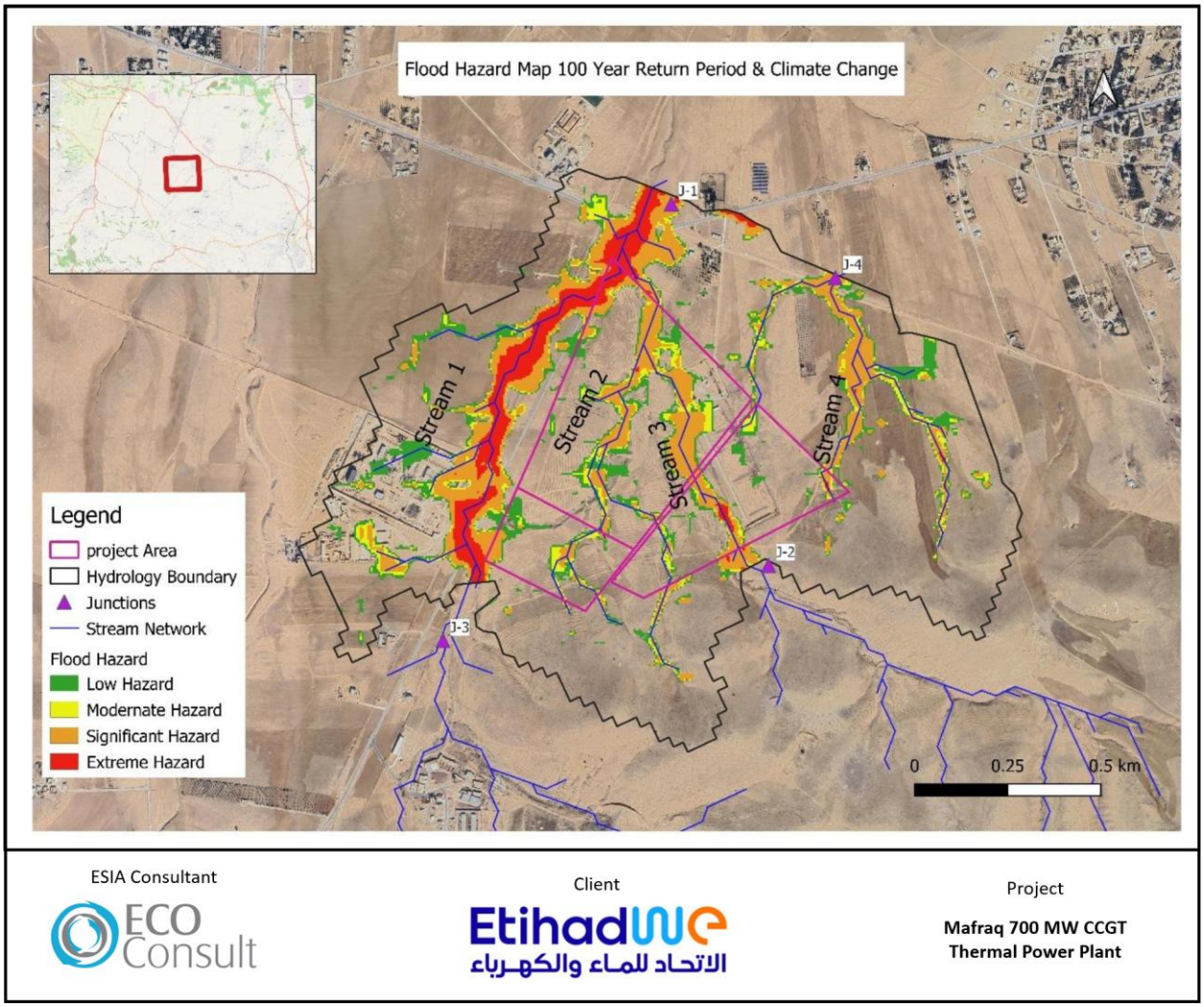


Figure 131: Flood Hazard Map for 1 in 100-Year Event with 20% Climate Change Allowance – Project Level

9.1.1.10 Landslides / Mudslides

Landslides in Jordan are currently linked to intense rainfall events and flash floods, particularly in upland and wadi areas. Climate projections indicate that landslide and mudslide risk in Jordan is likely to increase across all emissions scenarios, despite an overall decline in mean annual rainfall. The primary driver of this trend is the projected increase in precipitation intensity and variability, which leads to more frequent exceedance of slope-failure thresholds. Under moderate and high emissions scenarios (RCP4.5–RCP8.5), regional studies show a significant increase in rainfall-induced landslide occurrence associated with heavier, short-duration rainfall events and increased flash-flood activity. Under high-emission scenarios, both the magnitude and impact of landslides are expected to increase, posing heightened risks to infrastructure, particularly in upland and urbanizing areas (Wang et al., 2023).

9.1.1.11 Extreme Winds

Climate projections for Jordan indicate considerable uncertainty in future wind patterns; however, a consistent signal emerges across scenarios that extreme wind intensity is likely to increase, even where the frequency of storm events decreases.

Moderate emission scenarios (RCP4.5–RCP6.0) indicate mixed changes, with spatial variability and moderate increases in extreme wind indicators. These changes are driven by shifts in large-scale atmospheric circulation and storm-track dynamics. For Jordan, this implies a potential increase in high-impact wind events (e.g., convective storms and dust-related winds), despite uncertain changes in overall frequency (Doensen et al., 2025). Under high-emission scenarios such as RCP8.5, regional modeling suggests a substantial increase in the intensity of extreme wind events, including cyclone-related winds, while overall storm frequency may decline.

9.1.1.12 Dust Storms

In Jordan, a study found that over 31 years, the average number of dust storms was ~17.2 per year, with much higher values in the south/east of the country (e.g., ~182 in Al-Jafr, ~102 in Safawi over the whole period) and most storms occurring in spring (Ghanem, 2020). A comprehensive review of the Middle East and North African region reveals that dust storms are already increasing in frequency/intensity due to a combination of aridity, wind erosion, land-use changes, and climate drivers (Chibani, 2022).

A 2025 forthcoming study (Abadi et al., 2025) explicitly covers the Middle East and dust storms. The outputs of three CMIP6 models were analyzed over the period 2015–2100. Additionally, surface dust concentration was studied in two sub-periods: 2024–2060 and 2061–2100, under three scenarios, optimistic (RCP 2.6), intermediate (RCP 4.5) and pessimistic (RCP 8.5). The spatial distribution of changes in dust concentration from 2024 to 2060 indicates that all climatic scenarios predict the activation of new dust sources, particularly in Oman and Yemen. Moreover, all scenarios agree that the expansion of dust source areas will accelerate during the 2061–2100 period compared to the 2024–2060 period. The combined models indicate a positive trend in surface dust concentration (0.05 μg m−3 per year), suggesting an increase in dust activity over the Middle East. The mean monthly values of temperature, relative humidity, wind speed, and precipitation, projected from nine models across the fourteen dust-source areas and the entire Middle East from 2015 to 2100, showed strong consistency and low discrepancies between model outputs. However, across all dust sources, greater discrepancies in precipitation between the models occurred during the cold period, as did greater discrepancies in temperature and surface wind speed during the warm period.

9.1.1.13 Increase in Mean Annual Surface Temperatures

Regional projections (RICCAR, 2017) indicate that temperatures in the Arab region are expected to rise over the course of this century. The general temperature change under RCP 4.5 shows an increase of 1.2°C–1.9°C at mid-century and 1.5°C–2.3°C by the end of the century. For RCP 8.5, temperatures increase to 1.7°C–2.6°C for mid-century and 3.2°C–4.8°C toward end-century (Figure 132). The range of these values reflects variation in results across different areas of the region. The higher increase at mid-century is shown in the non-coastal areas. When focusing on seasonal changes, results show no clear tendency for temperature to increase more in any particular season. The warming is roughly evenly distributed across all seasons.

At the country level (Weathering Risk, 2017), the air temperature over Jordan is very likely to rise by between 1.7°C and 4.5°C by 2080, relative to the year 1876 and depending on the future GHG emissions scenario. The increase in air temperature is expected to affect the entire country with high certainty. Under the lower-emissions scenario, RCP 2.6, the temperature increase will be slightly greater in southern and northeastern Jordan. By 2030, temperatures are expected to increase by 0.77°C in central Jordan and up to 0.97°C in the south compared to 2000. Temperature rises between 2030 and 2080 are expected to be small. By 2080, models project a rise of up to 1.3°C and 1.4°C in northeastern and southern Jordan, respectively, and of up to 1.1°C to 1.2°C for the rest of the country.

Under the medium-to-high emissions scenario RCP 6.0, temperature changes by 2030 will develop very similarly to those under RCP 2.6 (increasing by between 0.8°C in central Jordan and 1°C in the northeast and south). In the long term, however, RPC 6.0 projects a temperature increase of 2.4°C to 2.9°C by 2080, compared to 2000. Again, the arid south will be most affected, with an increase of up to 2.9°C. Temperatures are expected to rise by approximately 2.6°C in the northeastern desert and by around 2.4°C in the more densely populated semi-arid northwest of the country.

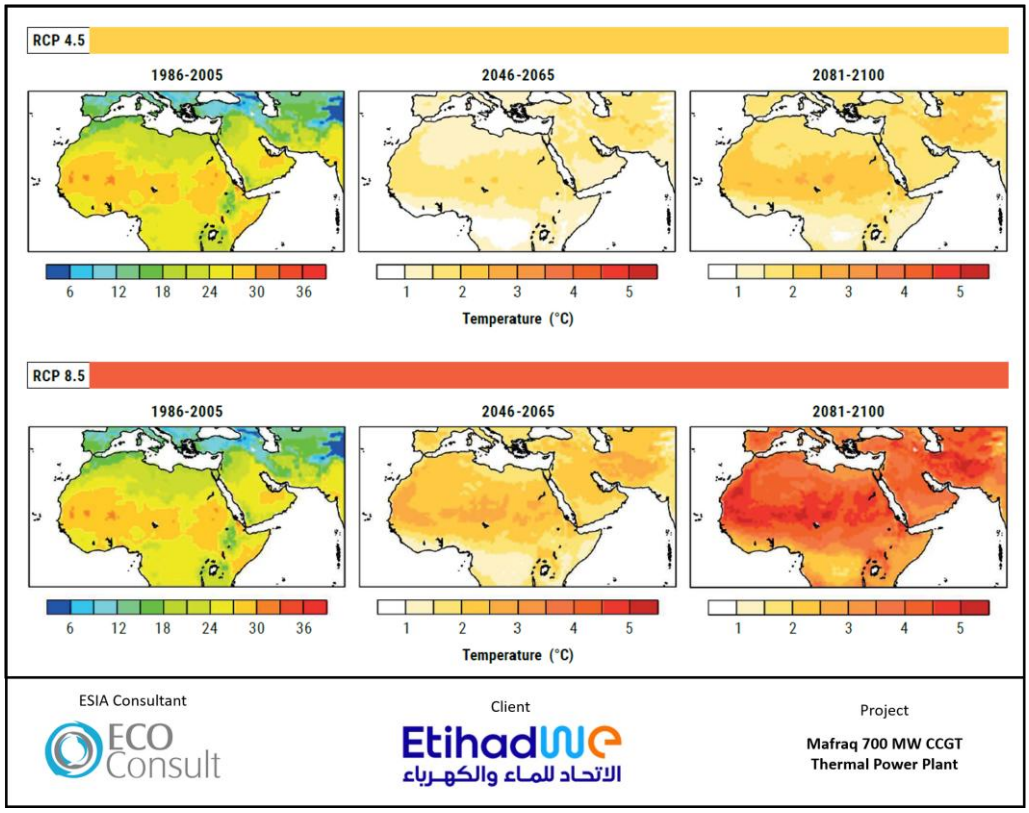


Figure 132: Mean Change in Annual Temperature (°C) under RCP 4.5 and RCP 8.5 – Regional Level

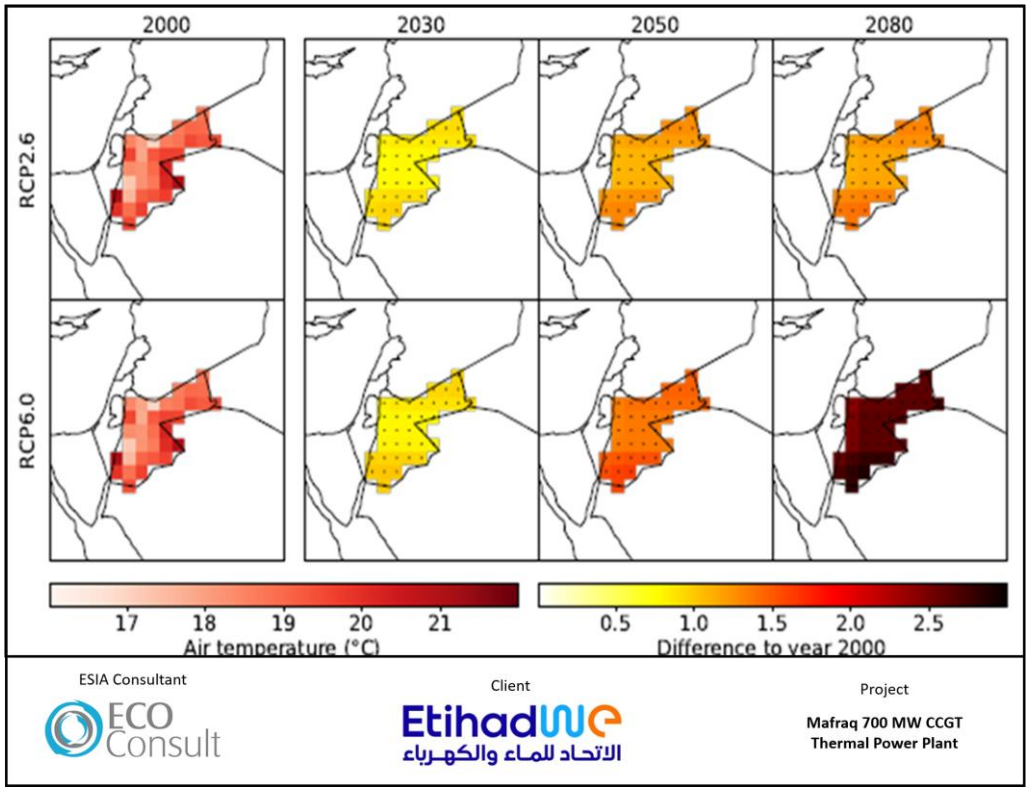


Figure 133:Annual Temperature (°C) Projections Under RCP 2.6 and RCP 6.0 – Country Level

9.1.1.14 Decrease in Annual Mean Precipitation / Droughts

Precipitation changes vary considerably across the region, with no universal trend evident in annual or seasonal results (RICCAR, 2017). Decreasing trends can be seen in most of the Arab region at mid-century. By the end of the century, both scenarios suggest a reduction in average monthly precipitation to 8–10 mm in coastal areas. At the seasonal level, the more substantial precipitation changes are projected for countries along the Mediterranean coast during the winter months.

Higher GHG emissions will lead to a drier future for Jordan (Weathering Risk, 2017). All models project an apparent decrease in mean annual precipitation over Jordan, in comparison to the year 2000.

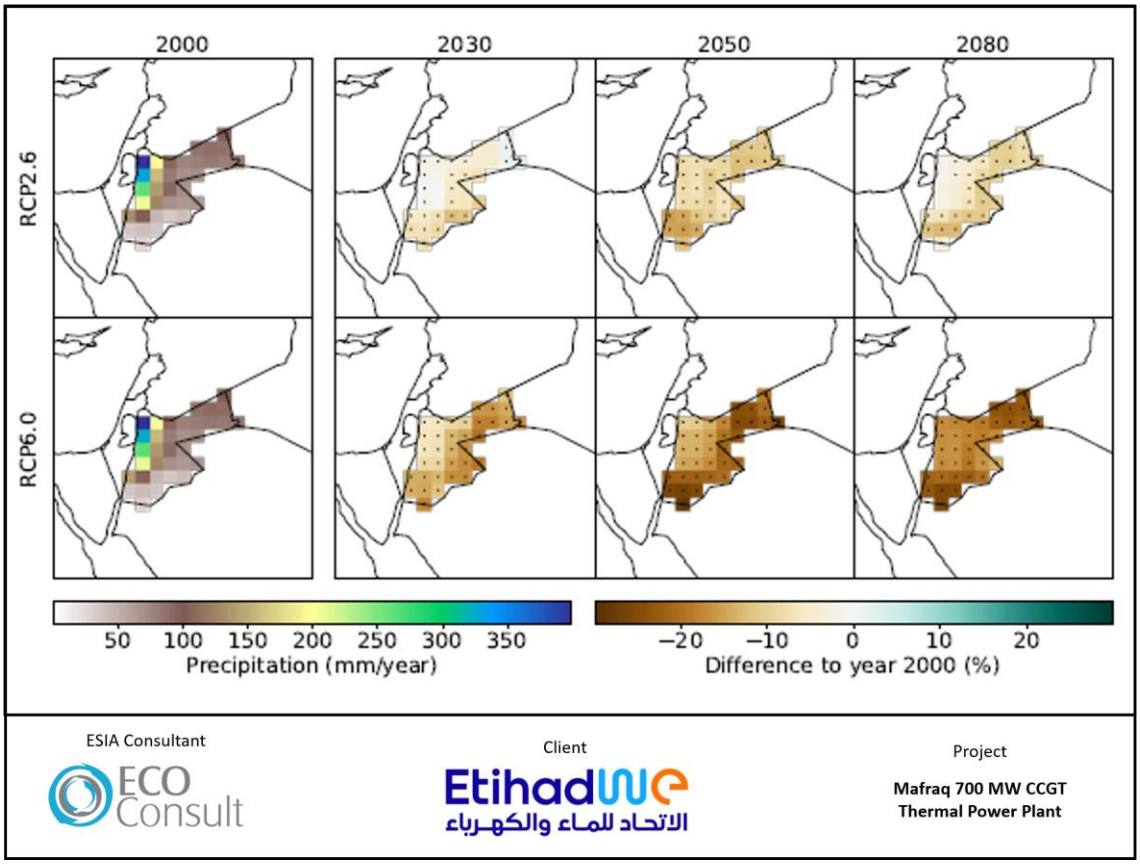


Figure 135:Annual Precipitation (mm/year) Projections under RCP 2.6 and RCP 6.0 – Country Level

However, future decreases in precipitation projections are subject to uncertainties and natural year-to-year variability. The mean model projections for RCP 2.6 show a decrease until about mid-century, though this decrease is highly uncertain. Annual precipitation is expected to decrease by between 1.6 and 14.2 mm (best estimate: -3 mm) by 2030 and by between 7.2 and 13.9 mm (best estimate: -10.8 mm) by 2050, compared to 2000. Despite interannual variability, long-term median precipitation stabilizes from 2050 onward.

Under RCP 6.0, precipitation will decrease more strongly than under RCP 2.6. Annual rainfall is expected to decline by between 2 and 20.3 mm until 2030 (best estimate: -12.5 mm), and by between 12.8 and 23.22 mm by 2050 (best estimate: -17.1 mm). By 2080, precipitation is expected to decline by 12.5 to 26.1 mm annually (best estimate: -20 mm), compared to 2000 (very likely range).

Jordan is projected to face worsening drought conditions driven by climate change, particularly due to rising temperatures and reduced rainfall. While precise numeric forecasts are not continuously published, the trend is clear: droughts will likely be more prolonged, deeper, and cover a larger area.

Climate model projections for Jordan indicate a robust increase in drought risk across all emissions scenarios. Under RCP2.6, moderate drying is projected, while RCP4.5 and RCP6.0 indicate substantial decreases in precipitation combined with rising temperatures and evapotranspiration, leading to intensified water deficits. Under RCP8.5, severe reductions in precipitation (up to ~34%) and significant declines in surface runoff and groundwater recharge are projected, resulting in chronic drought conditions. Spatial projections show that eastern and southern regions are particularly vulnerable, and basin-scale studies indicate strong heterogeneity in drought impacts. Overall, climate change is expected to

significantly exacerbate Jordan's already critical water scarcity and increase the frequency and severity of drought events.

Research indicates that Jordan will experience increasing drought severity under climate change. A recent study found that, for the period 2070-2099 under RCP 8.5, droughts will become longer in duration, more spatially extensive, and somewhat less frequent (Alkhasoneh and Rowe, 2025). Projected changes indicate a significant rise in temperature and a tendency toward drought, accompanied by anticipated reductions in precipitation. Future drought characteristics indicate a substantial increase in severity, with a decrease in frequency but an increase in duration, and an expanding spatial extent of drought conditions.

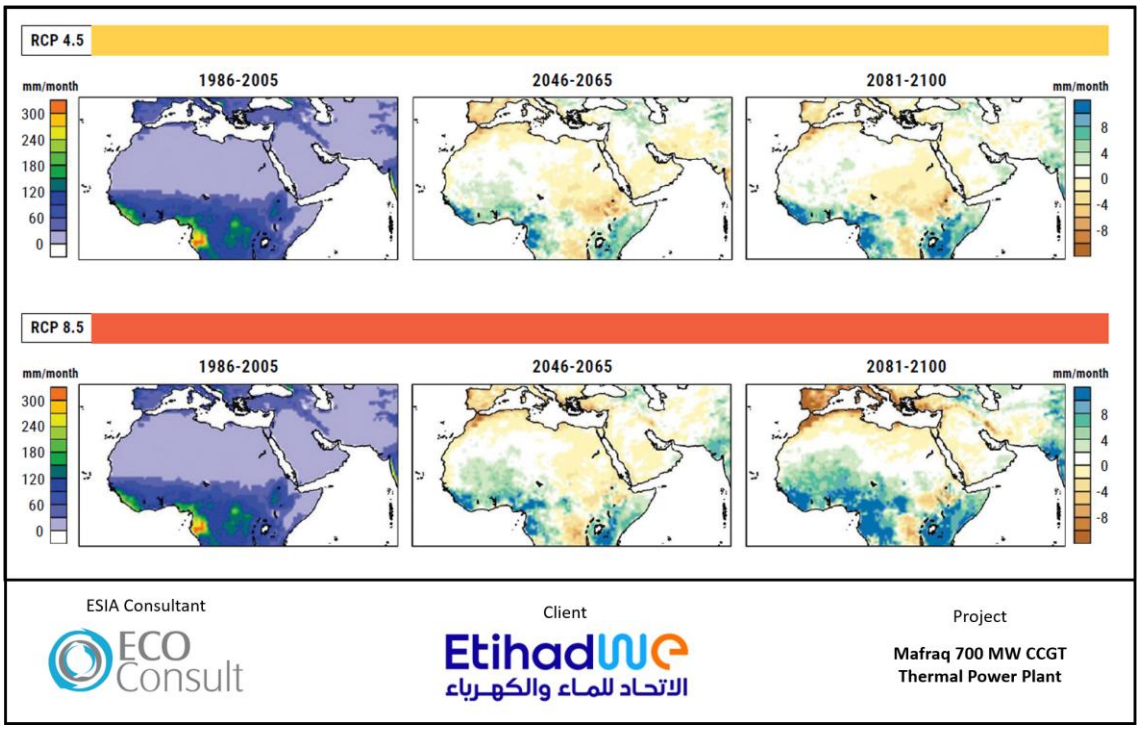


Figure 134:Mean Change in Annual Precipitation (mm/month) under RCP 4.5 and RCP 8.5 – Regional Level

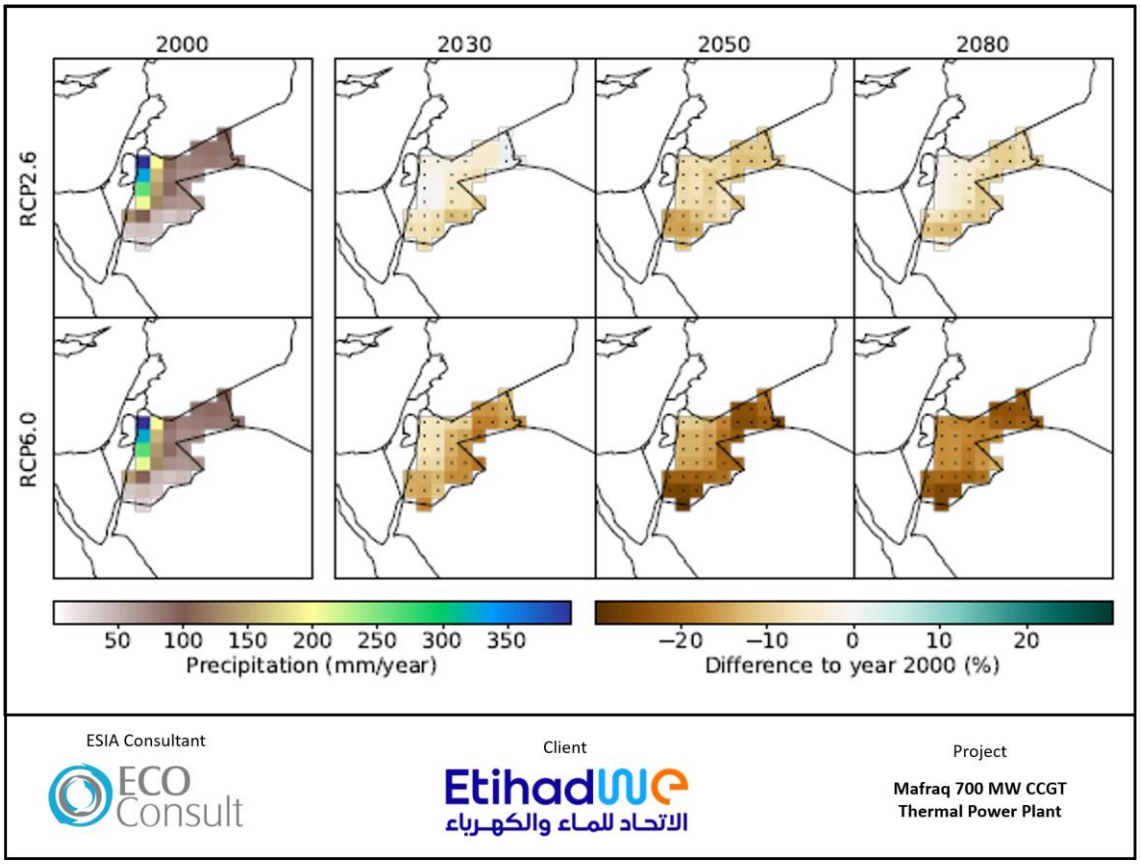


Figure 135:Annual Precipitation (mm/year) Projections under RCP 2.6 and RCP 6.0 – Country Level

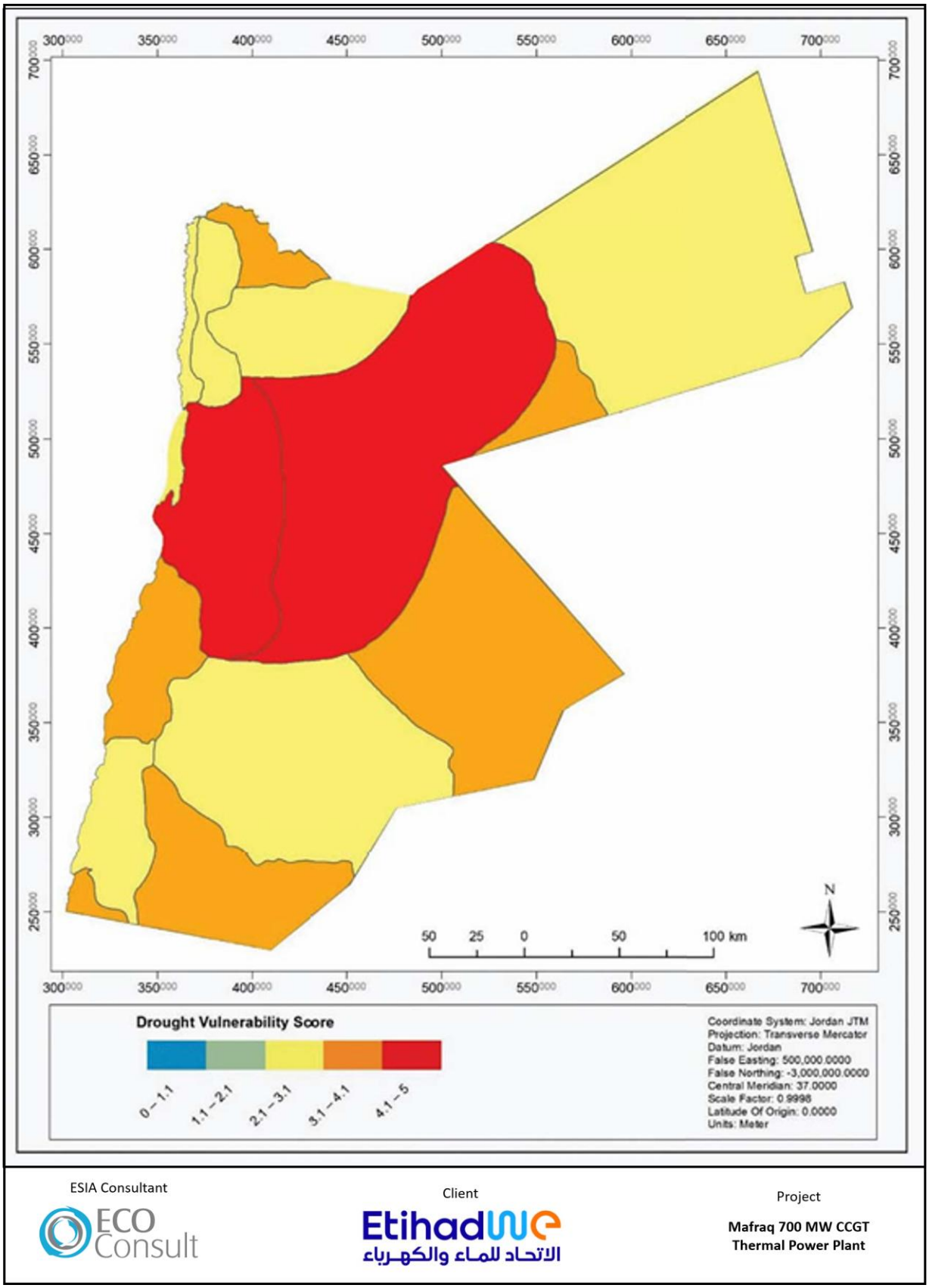


Figure 136:Drought Vulnerability Map – Country Level

9.1.1.15 Changes in Relative Humidity

Climate projections for Jordan and the wider Eastern Mediterranean indicate a consistent decrease in relative humidity across all emissions scenarios. While absolute atmospheric moisture is expected to increase with rising temperatures, concurrent declines in precipitation and increases in evapotranspiration result in a net reduction in near-surface relative humidity, particularly over land. Under higher emissions scenarios (RCP4.5–RCP8.5), this drying signal intensifies, contributing to increased aridity, soil moisture deficits, and drought frequency. The Mediterranean region is identified as a climate change hotspot, with strong warming and declines in precipitation reinforcing reductions in relative humidity and amplifying desertification processes.

Although direct humidity projections for Jordan alone are limited in most national reports, the consistent findings from regional (Mediterranean / MENA) climate models and Jordan-specific risk profiles are:

- Absolute humidity (water vapor content) tends to increase due to higher temperatures
- Relative humidity tends to decrease over land, especially in arid and semi-arid zones
- Result: stronger drying of air and soils, contributing to drought and desertification

This outcome is explicitly linked to rising temperatures, declining precipitation, and increased evapotranspiration (Weathering Risk, 2017). Relative humidity in Jordan is expected to decrease, despite increasing atmospheric moisture, due to rising temperatures and declining precipitation. Spatial patterns are consistent with precipitation decline and aridity patterns reported in national and regional projections:

- Lowest humidity with the largest decline due to strongest aridification in the Eastern Desert and southern regions of Jordan
- Relatively higher baseline humidity, although still declining under all scenarios in the Northwest and highlands of Jordan

9.1.1.16 Soil Erosion

Erosion projections depend heavily on land-use management, such as terracing, conservation agriculture, and grazing control, which are policy/behavioral variables rather than purely climate variables. Therefore, outcomes vary widely depending on adaptation. The local drivers of erosion (wind vs. water, surface geology, vegetation cover, land management) differ widely across Jordan, meaning that national-average projections may mask significant subregional variability. Much of the modeling involves spatial hazard mapping (identifying areas where erosion risk is currently high) rather than future scenario modeling, which links climate change (e.g., precipitation intensity, vegetation change) to changes in erosion rates.

Jordan's climate risk profile notes that unsustainable land use, overgrazing, and drier conditions under climate change are likely to exacerbate soil degradation and erosion (Weathering Risk, 2017). A recent study (Abuhamoor et al., 2025) aimed to provide a detailed spatial assessment of soil erosion risk across Jordan and identify zones prone to erosion, thereby supporting informed decision-making in land management. The Revised Universal Soil Loss Equation (RUSLE) model, integrated with Geographic Information System (GIS) tools, was employed to estimate soil loss and map erosion severity. The model incorporated essential factors including rainfall erosivity, soil erodibility, slope length and steepness, vegetation cover, and conservation practices. Erosion rates were categorized into three classes: low (0–10 tons ha/year), moderate (10–50 tons ha-1 year-1), and high (>50 tons ha-1 year-1). Results revealed that

94% of Jordan's land is subject to low erosion risk, 5% to moderate risk, and approximately 1% to high risk. The areas most vulnerable to erosion are in the northern and central highlands, as well as parts of the Jordan Valley, primarily due to their steep topography and higher precipitation.

A global assessment of soil erosion under climate change (to 2070) reveals that water erosion could increase by more than 60% in many regions under high-emissions scenarios (Borelli et al., 2020). The study suggests that socioeconomic developments impacting land use will either decrease (by 10% under RCP 2.6) or increase (by 2% under RCP 4.5 and 10% under RCP 8.5) water erosion by 2070. Climate projections, for all global dynamics scenarios, indicate a trend, moving toward a more vigorous hydrological cycle, which could increase global water erosion (+30 to +66%).

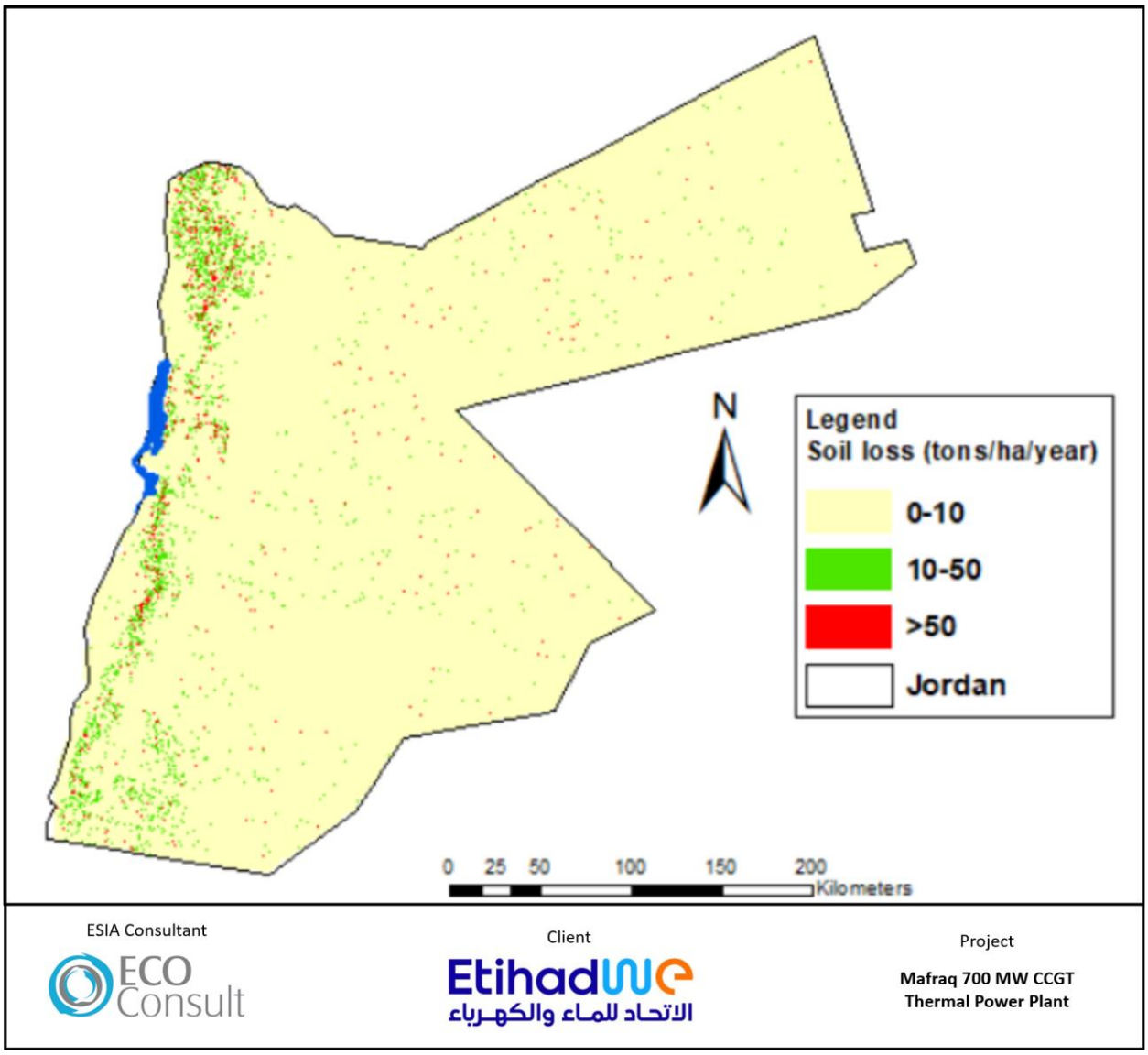


Figure 137: Soil Erosion Map – Country Level

9.4.3 Exposure Assessment for Physical Climate Risks

Exposure assessment of the Project facilities is summarized in the table below. These are based on available climate projections for each applicable climate hazard, with exposure levels assigned as per the criteria in 'Chapter 9.1.1.2'.

Table 81: Exposure Assessment for Physical Climate Hazards

Climate Hazard	Exposure Level[1]	Projection
Acute Climate Hazards		
Extreme heat / heatwaves	High	RCP 2.6: Between 23 and 32 additional very hot days annually by 2050 RCP 6.0: 45 additional very hot days per year by 2050
Extreme precipitation / flash floods	High	RCP 2.6: decrease in heavy precipitation days to 5.1 - 6.6 days by 2030, and to 4.5 - 6.3 days by 2050 RCP 6.0: decrease in heavy precipitation days to 3.9 and 5.7 days by 2050 Flood hazard rating for the Project area is 'moderate' to 'significant', influenced by Stream 2 and Stream 3, and 'Extreme' near Stream 1. Dry, compact soil characteristics in arid and semi-arid climates contribute to fast runoff rates
Landslides / mudslides	Moderate	Extreme rainfall is projected to decrease, thereby reducing the risk of landslides and mudslides induced by extreme precipitation Dry, compact soil characteristics in arid and semi-arid climates contribute to rapid runoff rates
Extreme winds	Moderate	RCP 4.5 and 6.0: potential increase in high-impact wind events, despite uncertain changes in overall frequency RCP 8.5: regional modeling suggests a substantial increase in the intensity of extreme wind events
Dust storms	Moderate	All climatic scenarios for 2024-2060 predict activation of new dust sources
Chronic Climate Hazards		
Increase in mean annual surface temperature	High	RCP 2.6: increase by 0.77°C in central Jordan and by up to 0.97°C in the south by 2030; increase to 1.3°C for northeastern Jordan and 1.4°C for southern Jordan, respectively, and by up to 1.1 to 1.2°C for the rest of the country by 2080 RCP 6.0: increase by 0.8°C in central Jordan and 1°C in the northeast and the south by 2030; increase by 2.9°C by 2080
Decrease in mean annual precipitation / water scarcity / droughts	Low	RCP 2.5: Decrease in annual precipitation by 1.6 - 14.2 mm (best estimate of -3 mm) by 2030, and by 7.2 - 13.9 mm (best estimate of -10.8 mm) by 2050. RCP 6.0: decrease in annual precipitation by 2 - 20.3 mm until 2030 (best estimate of -12.5 mm), and by 12.8 - 23.22 mm by 2050 (best estimate of -17.1 mm). RCP 8.5: droughts longer in duration, more spatially extensive, though somewhat fewer in frequency by 2070
Changes in relative humidity	Low	Relative humidity is expected to decrease, despite increasing atmospheric moisture, due to rising temperatures and declining precipitation under all scenarios
Soil erosion	Moderate	RCP 2.6: decrease in water soil erosion by 10%; RCP 4.5: increase in water soil erosion by +2%; RCP 8.5: increase in water soil erosion by +10%

Climate Hazard	Exposure Level[1]	Projection
[1] **Exposure levels:** **High - Material increase in climate variable with potential shutdown of Project for >1 week** **Moderate - Material increase in climate variable with potential shutdown of Project for <1 week** **Low - Non-material increase in climate variable with no impact on Project operations**		

9.4.4 Vulnerability Assessment and Mitigation for Physical Climate Risks

As noted earlier, vulnerability entails an understanding of safeguards accounted for in the design of Project permanent facilities, which could not be ascertained at this time due to the early stages of the Project, and limited engineering information available. Therefore, Table 82 lists recommendations for actions to be completed prior to detailed design to ensure adequate contingencies and tolerances are built into the design.

Table 82: Actions Prior to Completion of Detailed Design

Climate Hazard	Action Prior to Completion of Detailed Design
All hazards	▪ A review of physical climate hazards and exposure levels identified within this CCRA shall be undertaken to demonstrate that the risks are addressed through the inclusion of appropriate design safeguards and tolerances of Plant including worker accommodation.
All hazards	▪ Selection of one or more of the four Representative Concentration Pathway (RCP) climate scenarios and the associated future climate projections for inclusion within the overall Project Basis of Design.
All hazards	▪ As part of the detailed design, a natural hazards risk assessment will be completed for temporary and permanent facilities in relation to natural hazards (earthquakes, floods, landslides, extreme storm events, etc.). Risk assessment will consider risks to local communities and the Project workforce. ▪ Selection of site, temporary and permanent facilities shall take into account the findings and mitigation measures of the natural hazards risk assessment.
Extreme heat / heatwaves **Increases in mean annual surface temperatures**	▪ With a view to projected changes, confirm the suitability of the Primary and Auxiliary Power Generation Components and above-ground Associated Facilities design criteria to operate in the following outdoor ambient temperature conditions: ▪ Ambient temperature: 40°C ▪ Maximum Ambient Temperature: 45°C ▪ Minimum Ambient Temperature: -8°C ▪ Design considerations: ▪ External components of permanent facilities to make allowances for the projected increases in ambient temperature ▪ Power supply to account for increased demand during extreme heat events ▪ Shading of structures and use of materials rated for higher ambient temperatures ▪ Selection of pumps, inverters, and switchgear with extended temperature operating ranges
Changes in relative humidity	▪ Confirm the suitability of the Primary and Auxiliary Power Generation Components design criteria to operate within 4 – 100% relative humidity with reference site condition of 55% relative humidity ▪ Confirm the suitability of Fogging and High Fogging system activation at below 80% humidity ▪ The design shall be corrosion and erosion resistant and material selection shall be adequate to achieve the lifetime of the plant

Climate Hazard	Action Prior to Completion of Detailed Design
Extreme precipitation and flash floods	▪ The flood model has been assessed for an extreme-event scenario equivalent to a 100-year flood, including a 20% climate-change allowance. The current hydrological and hydraulic assessment is primarily constrained by the lack of site-specific datasets. Therefore, recommendations include: ▪ For the detailed design stage, it is essential to undertake targeted data collection and refined modeling to confirm and finalize the mitigation design. ▪ A high-resolution topographic survey (preferably LiDAR or drone-based) should be conducted over the full site and adjoining drainage corridors, along with installation of at least one automatic rainfall gauge to begin building a local rainfall record. ▪ Updated topography, revised land-use information, and EPC-level grading plans should be incorporated into a fully rebuilt HEC-HMS and HEC-RAS model, followed by calibration and validation once local rainfall or flood Level observations become available. ▪ The EPC contractor should also perform detailed sensitivity analysis on rainfall, CN values, roughness, and channel geometry to quantify uncertainties and refine peak-flow estimates. ▪ Structural and geotechnical design of embankments and diversion channels must be developed, covering slope stability, settlement, erosion protection, and riprap sizing. ▪ The internal stormwater network—swales, collector drains, berms, and outfalls—should be designed in detail, ensuring all internal runoff is directed toward the northeast discharge point and/or EPC-designed infiltration/evaporation ponds. Plot-level mitigation should address residual ponding zones, with micro-grading and small detention features incorporated where required. ▪ During construction, temporary works must avoid blocking natural or proposed drainage paths.
Landslides / mudslides Soil Erosion	▪ An erosion risk assessment will be conducted assuming that soil erosion in key exposed areas will increase relative to present conditions by 2050 due to more intense rainfall events, reduced vegetation cover and increased aridity. A 10-30% increase in erosion by 2050 will be considered if land-use remains unchanged and climate drivers worsen ▪ Erosion and scour protection shall be provided in the form of riprap, soil nail, prefabricated drainage mat, shotcrete facing, and mattresses for wadi areas and areas susceptible to erosion ▪ Erosion and sedimentation control barriers shall be installed and maintained during the Project lifecycle to reduce erosion on slopes due to rainfall and superficial runoff ▪ Design considerations: ▪ Design of pipeline tie-ins, foundations, drainage systems, and access roads to include margins for increased sedimentation, scour, bank collapse/slide risk due to higher erosion rates
Extreme wind Dust storms	▪ Design wind speed for ACC shall be minimum => 5 m/s. The site-specific design wind speed shall be considered for ACC Structural design. ▪ The entire system shall be designed to withstand extreme wind gust speeds Each fan shall be free from harmful surge or pulse effects arising from gusts of wind or from parallel operation with other fans. ▪ The main equipment and systems should have dust- and rain-protection. Necessary provisions shall be made for operation and maintenance, accessibility, weather/dust protection and noise protection of the Gas Turbines (e.g. dust collection with filters for air inlet). Internal building floors shall have anti-dust finish. Cable entry areas shall be sealed by a suitable method to guarantee that the cubicle/panel has the required fire rating and is dust-proof. Main generator busducts shall be pressurized with instrument air (clean and dry) to exclude dust.

Climate Hazard	Action Prior to Completion of Detailed Design
	▪ Design considerations: ▪ Reinforcement of roof and cladding fixings ▪ Definition of wind-speed shutdown thresholds ▪ Dust suppression/prevention and dust storm response measures to be developed and implemented for construction phase activities (transportation and earthworks)
Decrease in mean annual precipitation / water scarcity / droughts	▪ Confirm suitability of the design criteria of the Water Treatment System of storage capacity for a period of seven (7) days, equal to Plant's Demineralized water requirements (including fogging and high fogging water requirements) operating at Guaranteed Power Capacity ▪ Design considerations for the Water Treatment Plant: - Membranes and pumps to be designed with operational flexibility - Use high-pressure RO membranes tolerant of higher osmotic loads

9.4.5 Physical Climate Risks Levels

Safeguards accounted for in the design of Project permanent facilities could not be ascertained at this time due to the early stages of the Project, and limited engineering information available. Actions in Table 81 will be included in the Project ESMMP and will be completed prior to detailed design to ensure adequate contingencies and tolerances are built into the design, thereby enhancing the resilience of the Project facilities to physical climate hazards.

Upon completion of the detailed design, this CCRA will be revisited to finalize the vulnerability assessment and determine physical climate risk levels.

9.5 Assessment of Transition Climate Risks

9.5.1 Screening of Transition Climate Hazards

Table 83 presents the results of the climate hazards that were screened for applicability to the Project with a potential to materially affect the Project performance over the life of the asset and selected for evaluation of the transition climate risk.

Table 83: Screening of Transition Climate Hazards

Climate Hazard	Relevance	Materiality and Justification	Relevant Project Component
Policy and Legal			
Domestic climate policy changes (carbon pricing, emission cap or required offsets)	The Project is designed to operate on natural gas during normal operations and distillate fuel as back-up.	High: Direct impact on operating costs and project economics. Higher fuel/operating costs (cost per MWh up), high compliance costs, potential need for emission control investments or purchasing carbon credits	Entire Project

Climate Hazard	Relevance	Materiality and Justification	Relevant Project Component
Policy and Legal			
International climate policy drivers (UNFCCC commitments, stringent climate targets, stranded asset in net-zero scenario, methane regulations)	The Project is designed to operate on natural gas during normal operations and distillate fuel as back-up	High: Potential reduction in operating life and increased compliance obligations: Reduced plant operating life or early retirement of the asset, capital expenditures for CO_2 capture/hydrogen retrofits, pressure for carbon neutrality or fuel switch	Entire Project
Technology			
Renewable energy and cleaner power technology competition	The Project plays a grid balancing role, however share of renewables in the grid is expected to increase	Underutilization of the plant, reducing dispatch or load factors, revenue uncertainty post-PPA, potential retrofit costs to burn hydrogen or co-firing to stay relevant, technological obsolescence if not adaptable	Entire Project
Market			
Energy market demand shifts	The Project plays a grid balancing role, however share of renewables in the grid is expected to increase	High: Operational life extends into period of expected deep decarbonization. Higher operating costs due to electricity demand and fuel price volatility, load curtailment due to oversupply from renewables	Entire Project

9.5.2 Future Policy, Technology and Market Projections

9.1.1.17 Policy and Legal

Jordan is a party to the UNFCCC and Paris Agreement frameworks, has a Climate Change Regulation (No. 79 of 2019) and a Renewable Energy & Energy Efficiency Law (2012) in place, and is developing 2050 low-carbon strategies.

By the 2030s, the government may introduce carbon pricing mechanisms or stricter GHG emission standards to meet international commitments, which could directly affect fossil-fuel power projects. A national carbon tax or mandatory emissions cap (both currently absent) can be applied to power plants, either significantly increasing fuel costs or requiring the Project to purchase carbon credits/offsets later in its life. In the long term, global and regional decarbonization goals targeting net-zero emissions by 2050 imply that unabated gas-fired generation may face stringent constraints or early phase-out pressure by the 2040s. If Jordan augments its climate commitments in line with international expectations, the Project could be required to incorporate carbon capture technology, co-fire low-carbon fuels (e.g., hydrogen), or even retire before its design life ends. These policy and legal shifts pose a risk that the asset will become "stranded" (unable to operate fully over its intended life) if it cannot meet future regulatory requirements economically.

9.1.1.18 Technology

The transition to a low-carbon economy involves technological shifts that pose both competition and adaptation challenges for the Project. Over the medium term (5–15 years), rapid improvements in renewable energy technology and energy storage are anticipated. Declining costs and improved performance of solar PV, wind, and battery systems could make these technologies increasingly competitive with gas power on both cost and reliability fronts. For example, if large-scale battery storage becomes capable of cost-effectively shifting solar power to meet evening peaks by the 2030s, the Project may run at lower capacity factor. Concurrently, advances in low-carbon fuels (such as green hydrogen or biomethane, which can be combusted in modified gas turbines) may become industry standards. In the long term (2040s), if global decarbonization trajectories hold, carbon capture and storage (CCS) might be expected on fossil plants, or gas turbines themselves may need to be retrofitted for hydrogen firing to remain operational in a net-zero world. The technical feasibility and cost of these retrofits remain uncertain, creating a risk that the plant's current technology will become outdated or misaligned with climate compliance requirements.

9.1.1.19 Market

Over the medium and long term, broader market forces related to the low-carbon transition may challenge the Project's economic assumptions. The primary market risk is that shifting energy supply-demand dynamics and fuel markets will reduce the Project's competitive position or create financial strain. During the plant's middle years (5–15 years out), Jordan's power sector is expected to see growth in renewable energy capacity (at least +200 MW by 2029 per national plans), potentially flattening or reducing growth in gas-fired generation needs. Increasing renewable penetration, coupled with energy-efficiency improvements and potential climate-driven changes in electricity consumption patterns, could lead to lower dispatch or capacity utilization for mid-merit gas plants, especially if overall demand growth slows or excess capacity emerges. Additionally, global climate action may influence the cost and availability of natural gas: for instance, international efforts to reduce fossil fuel production or impose methane emissions regulations could raise gas prices or limit long-term supply security.

Looking toward the long-term (2040s), a confluence of market factors could erode the Project's economic rationale. If zero-marginal-cost renewable generation (solar/wind), combined with improved battery storage, becomes widespread, the marginal cost of gas-fired electricity may be higher than that of alternatives for many hours of the year. Post-PPA market prospects for the plant around mid-century appear uncertain; with decarbonization imperatives, it might be challenging to secure new power contracts without demonstrating substantial emissions reductions.

9.5.3 Exposure Assessment for Transition Climate Risks

Exposure assessment of the Project is summarized in Table 84. It is based on potential scenarios for changes in climate policies and priorities, technological advances and market shifts, with exposure levels assigned as per the criteria in Chapter 9.1.1.2.

Table 84: Screening of Transition Climate Hazards

Climate Hazard	Exposure Level[1]	Projection
Policy and legal	Moderate	Short-term: Minimal regulatory compliance exposure as no carbon pricing or strict GHG mandates are in place yet, so minimal compliance cost exposure in the short term Medium- to long-term: Carbon pricing (carbon tax) or new GHG regulations (emissions cap or required offsets) could be introduced into Jordan's evolving climate policy framework. As mid-century net-zero goals approach, regulatory pressure to decarbonize the power sector could intensify. Global and regional decarbonization goals targeting net-zero emissions by 2050 imply that unabated gas-fired generation may face stringent constraints or early phase-out pressure by the 2040s.
Technology	Moderate	Short-term: Renewable energy penetration is increasing, but initial impact is low; gas-fired generation remains essential for grid stability Medium- to long-term: rapid improvements in renewables and storage are expected. By ~2035, low-carbon technologies (e.g. hydrogen-ready turbines, battery firming) could be industry standards.
Market	Moderate	Short-term: Expected power demand growth in Jordan and priced predictably in the short term. Limited competition from other power generation sources. Medium- to long-term: Market dynamics may shift as more renewables come online and fuel prices become more volatile due to global climate policies. Gas retains a grid-balancing role, but trends point to declining competitiveness. By the 2040s, market preference may strongly favor zero-carbon generation.
[1] Exposure Levels: **High - Legislated/lender requirement with impact on the Project in the short term** **Moderate - Legislated/lender requirement with impact on the Project in the long term** **Low – Non-legislated / non-lender / aspiration requirement with potential impact on the Project**		

9.5.4 Vulnerability Assessment and Mitigation for Transition Climate Risks

Vulnerability assessment for transition climate risks is summarized in Table 85. It is based on limited design, contractual and management processes known at this stage, with vulnerability levels assigned as per the criteria in 'Chapter 9.1.1.3'.

Table 85: Vulnerability Assessment for Transition Climate Hazards

Climate Hazard	Vulnerability Level[1]	Safeguards / Management System Processes
Policy and Legal	Low (short-term) High (medium- to long-term)	Short-term: Jordan's current energy policy supports gas power as a transition fuel, with new CCGT capacity part of its 2030 strategy. Medium- to long-term: Vulnerability increases amid rising uncertainty about policy phasing in. No contractual safeguards are known at this stage in the PPA against future climate policy changes (and associated increases in operational / compliance costs).
Technology	Low (short-term) High (medium- to long-term)	Short-term: selected, proven CCGT technology ensures high efficiency and reliability. Renewable energy penetration is low; gas-fired generation remains essential for grid stability. The plant can operate at high capacity factors with negligible competition from new tech in early years.

Climate Hazard	Vulnerability Level[1]	Safeguards / Management System Processes
		Medium- to long-term: No design safeguards are known at this stage to ensure the Project plant's adaptability to new fuels and cleaner technologies (e.g., hydrogen-ready turbines). Post-PPA, the plant faces relegation to backup status.
Market	Low (short-term) High (medium- to long-term)	Short-term: Natural gas supply is secured and priced predictably. Limited competition from other power generation sources ensures high dispatch Medium- to long-term: No contractual safeguards are known if demand for the Project's gas-generated power is reduced, if the power is dispatched only sparingly, or if the plant is relegated to backup. The Project may lack a viable market beyond the PPA term unless decarbonized.
[1] Vulnerability Levels: **High - No safeguards under design, agreements or management system identified** **Medium - Safeguards under design, agreements/management system being actively explored** **Low – Safeguards under design, agreements/management system already implemented**		

9.5.5 Transition Climate Risk Levels

The Project transition climate risk levels are summarized in Table 86 with risk levels assigned as per the criteria in 'Chapter 9.1.1.4'.

Transition climate risks for the Project are low in the short term, given medium exposure and low vulnerability, supported by supportive national energy policies and modern plant technology.

Transition climate risks for the Project are expected to increase over time from low to medium (given medium exposure and high vulnerability). By the mid-2030s, policy signals could start incorporating carbon costs, renewable energy and storage technologies will become stronger competitors, and markets might see shifting economics. Toward the late 2040s and 2050s, without mitigation measures, transition risks will increase.

It is noted that the transition risk projections are uncertain and depend on the pace of global and national climate action. However, they underscore the importance of developing resilience strategies. It is recommended that the Project closely monitor climate policy developments and consider incorporating technological flexibility, so the Project can better navigate its transition risks and support both Jordan's energy needs and its climate commitments over the coming decades.

Table 86: Transition Climate Risk Levels

Transition Climate Risk	Short-Term (0–5 years)	Medium-Term (5–15 years)	Long-Term (15-25 years)
Policy & Legal	Low risk (stable): Jordan's current energy policy supports gas power as a transition fuel, with new CCGT capacity part of its 2030 strategy. No carbon pricing or strict GHG mandates in place yet, so	Moderate risk (emerging): By the 2030s, national climate commitments may drive new emission constraints as global decarbonization efforts intensify. These could impose added costs or reporting requirements on gas plants,	Moderate risk (rising): Approaching mid-century net-zero goals, regulatory pressure to decarbonize the power sector could become strong. The Project may face stringent emissions limits or early decommissioning mandates

Transition Climate Risk	Short-Term (0–5 years)	Medium-Term (5–15 years)	Long-Term (15-25 years)
	minimal compliance cost or regulatory risk. Government backing safeguards the Project in this period.	raising operating expenses late in the PPA term. Risk remains moderate if policies are phased and gas retains a transitional role, but uncertainty grows	post-2045. Compliance may require costly retrofits, or the asset may become stranded by 2045–2050. The extent depends on future policy stringency and Jordan's adoption of global climate regimes
Technology	Low risk (stable): The selected CCGT technology ensures high efficiency and reliability. Renewable energy penetration is increasing, but the initial impact is low; gas-fired generation remains essential for grid stability (especially as Jordan integrates 200 MW of renewables by 2029). The plant can operate at high capacity factors with negligible competition from new technology in the early years.	Moderate risk (emerging): Rapid improvements in renewables and storage are expected by the 2030s, potentially eroding the Project's competitive edge. Falling renewable costs and improved batteries may reduce the plant's dispatch share during periods of low-cost renewable generation. By ~2035, low-carbon technologies could become industry standards, pressuring the Project to remain technologically relevant. Risk to utilization and asset competitiveness grows if not adaptable to new fuels or grid roles.	Moderate risk (rising): By the 2040s, clean-technology dominance could render unabated gas plants technologically obsolete. The Project may require major upgrades to align with industry norms and climate targets. Without such adaptation, the plant could face significant operational constraints or lack a viable market beyond the PPA term. Transitioning technologies create uncertainty for asset life extension or re-contracting prospects.
Market	Low risk (stable): Power demand growth in Jordan and the 25-year PPA support stable Project revenues early on. Natural gas supply is secured (via Fajr pipeline agreements and priced predictably in the short term. Limited competition from other power generation sources ensures high dispatch.	Moderate risk (emerging): Over 5–15 years, market dynamics may shift as more renewables come online and fuel prices become more volatile due to global climate policies. The plant might see declining utilization in off-peak periods. Risk remains moderate if gas retains its grid-balancing role, but trends indicate declining competitiveness.	Moderate risk (rising): By the 2040s, market preference may strongly favor zero-carbon power generation. If power market decarbonization accelerates, gas plants might be dispatched only sparingly or relegated to backup. Post-PPA, the plant could face difficulty securing new contracts or refinancing unless decarbonized.

9.6 Project Impacts on Climate Change

9.6.1 Scoping

Construction, commissioning, and operational activities that will generate Greenhouse Gas (GHG) emissions will include:

- Use of construction plant and equipment with internal combustion engines to undertake:

- Site preparation, structural excavations, civil and mechanical works at the Plant Area and the Substation Area
- Site preparation, excavations and civil works at the temporary Laydown area, and formation of temporary construction and permanent access roads to the Project site and associated facilities
- Site preparation works at the tower locations along the OHTL route
- Installation of the Gas and Water pipeline tie-ins, including trenching, pipe lay, welding and backfilling
- Reinstatement of the areas disturbed during construction

- Use of generators to power the construction and commissioning activities at the Project Site and Associated Facilities
- Onsite and offsite traffic movements associated with construction- and commissioning-related logistics
- Operation of the CCPP turbines, under both routine and non-routine conditions, to generate electricity
- Onsite and offsite traffic movements associated with operations and maintenance-related logistics

During operations, the Auxiliary/Support Systems and Associated Facilities will be powered by the Plant itself; therefore, the impacts from these systems and facilities are considered within the overall impacts from the operation of Primary Power Generation Components.

Potential climate change impacts associated with the use of the black start generators during operations are scoped out on the basis of the anticipated very limited, short-term use over the Project's 25-year lifetime.

Potential climate change impacts from the Project's Scope 2 (Indirect) GHG emissions are also scoped out, as the Project will not import electricity.

Given the Project's early stages and the absence of value chain details, a qualitative discussion is added on the Project's material Scope 3 (Indirect) GHG Emissions sources.

The impacts of the Project on air quality and water resources are discussed in 'Chapter 8'.

9.6.2 Project Impacts on Climate Change (Scope 1 GHG Emissions)

Emissions that have a direct greenhouse effect include Carbon Dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (N_2O). Their respective Global Warming Potentials (GWPs) are based on the IPCC AR6 Assessment Report.

More than 80% of Jordan's GHG emissions are CO_2 emissions, driven largely by fossil fuel consumption in electricity generation and transport. According the latest published National GHG Inventory, the national emissions increased from approximately 26.7 $MtCO_2e$ in 2012 to over 31 $MtCO_2e$ in 2023 (Ministry of Environment, 2025). Jordan's electricity system is predominantly fueled by natural gas, supplemented by oil shale and renewable energy (International Energy Agency, 2025).

Jordan's updated 2021 Nationally Determined Contributions (NDC) 1.0 estimated national GHG emissions under a Business-as-Usual (BAU) scenario at approximately 44 $MtCO_2e$ by 2030. The country's mitigation commitment was to reduce emissions by up to 31% below BAU levels, corresponding to a reduction of approximately 14 $MtCO_2e$, resulting in emissions of approximately 30 $MtCO_2e$ by 2030. The target comprised a 5% unconditional reduction and a further 26% reduction contingent upon international support.

Jordan's 2025 NDC 3.0 extends these targets toward 2035 and maintains the structure of a 5% unconditional reduction and up to a 31% reduction with international support. The NDC 3.0 does not provide an equivalent absolute BAU emissions forecast or absolute target emissions value for 2035. It describes the percentage reduction targets and the transition toward a 2050 net-zero trajectory, but does not provide a corresponding $MtCO_2e$ value. The NDC target of 30 $MtCO_2e$ by 2030 is generally the most adopted absolute national benchmark for contextualizing project emissions.

This assessment focuses on climate change impacts associated with the Project's Scope 1 (Direct) GHG emissions during:

- 20 months of construction and commissioning (October 2026 September 2028)
- 25 years of operation:
  - In a simple-cycle mode with the gas turbines continuously operating for the 1st year of operations (Phase 1, September 2028 – September 2029), during commissioning and maintenance activities, or whenever the steam-water cycle is unavailable
  - In a combined-cycle mode with the gas turbines continuously operating for the remaining 24 years (Phase 2, September 2029 – June 2053)

Receptor Sensitivity

Jordan is considered one of the most climate-vulnerable countries in the Middle East due to its arid climate, limited natural water resources, and high dependence on climate-sensitive sectors such as water supply, agriculture, energy, and infrastructure. Climate change is already exacerbating existing environmental stresses through rising temperatures, more frequent and intense heatwaves, prolonged drought conditions, declining and increasingly variable rainfall, and an increased occurrence of extreme weather events, such as flash floods. These changes are occurring in a country that is already among the most water-scarce nations globally, making water security a critical climate vulnerability.

Jordan's vulnerability is further amplified by rapid population growth, urbanization and the growing demand for water, energy and food. Climate-related impacts are expected to affect public health, agricultural productivity, ecosystem resilience, and economic development, while placing additional pressure on critical infrastructure and natural resources.

Receptor sensitivity is determined as **High** based on the following justification:

- The climate in Jordan is regarded as vulnerable to physical climate change impacts, particularly those associated with increasing temperatures, water scarcity, drought and extreme precipitation events
- Effects of climate change are already being experienced throughout the country, including secondary effects on livelihoods, ecosystems and infrastructure.

Magnitude of Effect

During construction, GHG emissions will be generated by plant and equipment with internal combustion engines, as well as by vehicles transporting materials, equipment, and workforce to the Project construction sites. The projected GHG emissions from the construction phase are presented in Table 87 and are based on typical construction equipment and vehicle types and quantities for a Project of this nature and scale. Construction GHG emissions are expected to be orders of magnitude smaller than operational GHG emissions and are not expected to significantly differ from the indicative conservative values presented.

Table 87: Quantification of GHG Emissions: Construction Phase

Type of equipment[1]	Q-ty[2]	Emission Rate (tonnes/day @10hour days)[3]		Total GHG emissions (tonnes/year)		Total GHG emissions (tonnes CO_2e /year)[4]
		CO_2	CH_4	CO_2	CH_4	
Air Compressors	10	0.21027	0.00002	532.0	0.00552	532.15
Cranes	10	0.91758	0.00030	2321.5	0.07510	2323.72
Dumpers/Tenders	10	0.13071	0.00001	330.7	0.00355	330.80
Excavators	10	0.86478	0.00028	2187.9	0.07074	2190.01
Forklifts	10	0.39137	0.00013	990.2	0.03202	991.12
Generator Sets	10	0.12503	0.00001	316.3	0.00345	316.42
Graders	10	0.82303	0.00027	2082.3	0.06736	2084.28
Off-Highway Tractors	10	1.00764	0.00033	2549.3	0.08246	2551.79
Off-Highway Trucks	10	2.32260	0.00075	5876.2	0.19003	5881.85
Plate Compactors	10	0.04546	0.00000	115.0	0.00119	115.06
Pumps	10	0.13071	0.00001	330.7	0.00372	330.80
Rollers	10	0.46911	0.00015	1186.9	0.03840	1188.00
Rough Terrain Forklifts	10	0.43992	0.00014	1113.0	0.03600	1114.08
Rubber-Tired Dozers	10	1.70557	0.00055	4315.1	0.13952	4319.24
Rubber-Tired Loaders	10	0.74333	0.00024	1880.6	0.06084	1882.43
Trenchers	10	0.28554	0.00009	722.4	0.02336	723.11
Welding machines	10	0.19890	0.00001	503.2	0.00248	503.30
4 x 4 Petrol Vehicle	10	0.03528	0.00000	89.3	0.00000	89.26
4 x 4 Diesel Vehicle	10	0.04206	0.00000	106.4	0.00000	106.41
Bus	10	0.11222	0.00000	283.9	0.00000	283.92
Total (tonnes CO_2e/year)						27,857.75

Notes:
[1] The types of equipment represent typical construction plant and vehicle spread based on experience from other similar Projects
[2] The GHG quantification is based on an indicative number of each type of plant and vehicle to contextualize the Project construction emissions
[3] Assume 100% operational load (i.e., operational hours per day) for 235 working days a year
[4] Global Warming Potentials: CO2 = 1, CH4 = 29.8

During operations, GHG emissions will be generated by the dual-fuel gas turbines, which are designed to operate in both simple- and combined-cycle modes, as described in Chapter 5.

The projected GHG emissions from the operation of the Plant in simple-cycle mode are presented in Table 88 and are based on continuous operation of three (3) turbines on natural gas under routine conditions, and on backup fuel for 14 days under non-routine conditions.

Table 88: Quantification of GHG Emissions: Simple-cycle Mode

Parameter	Unit	Routine Conditions	Non-routine Conditions
Fuel Type	-	Natural Gas	Diesel
Power Produced (Turbine size / output)	MW	170 (single gas turbine)	152 (single gas turbine)
Turbine Efficiency	%	36.5%	36.5%
Total Fuel Consumption	kg/s	10.0	10.5
Annual Operational Hours	h	8,760	336
Annual Fuel Consumption	t/y	315,360	12,701
CO_2 Emission Factor	tCO_2/t fuel	2.6928	3.1863
CH_4 Emission Factor	tCH_4/t fuel	0.00024	0.00043
N_2O Emission Factor	tN_2O/t fuel	0.0000048	0.0000258
CO_2 Emissions	t/y	849,201.4	40,468.6
CH_4 Emissions	t/y	75.7	5.5
N_2O Emissions	t/y	1.5	0.3
Total CO_2e Emissions per turbine	tCO_2e/y	851,870.1	40,720.8
Total CO_2e Emissions (3 x turbines)	**tCO_2e/y**	**2,555,610.3**	**122,162.3**
GHG Intensity	**gCO_2e/kWh**	**572.0**	**797.3**

The projected GHG emissions from the operation of the Plant in the Combined Cycle mode are presented in Table 89 and are based on continuous operation of three (3) natural gas-fired turbines on natural gas under routine conditions, and on backup fuel for 14 days under non-routine conditions.

Table 89: Quantification of GHG Emissions: Combined-cycle Mode

Parameter	Unit	Routine Conditions	Non-routine Conditions
Fuel Type	-	Natural Gas	Diesel
Power Produced (Turbine size / output)	MW	741 (3 gas turbines)	741 (3 gas turbines)
Turbine Efficiency	%	52.5%	52.2%
Thermal Input	MW	1,411.4	1,411.4
Annual Operational Hours	h	8,760	336
Annual Fuel Consumption	t/y	902,856	40,077
CO_2 Emission Factor	tCO_2/t fuel	2.6928	3.1863
CH_4 Emission Factor	tCH_4/t fuel	0.00024	0.00043
N_2O Emission Factor	tN_2O/t fuel	0.0000048	0.0000258

Parameter	Unit	Routine Conditions	Non-routine Conditions
CO_2 Emissions	t/y	2,431,211.2	127,696.1
CH_4 Emissions	t/y	216.7	17.2
N_2O Emissions	t/y	4.3	1.0
Total CO_{2e} Emissions (3 x turbines)	**tCO_{2eq}/y**	**2,438,851.5**	**128,492.0**
GHG Intensity	**gCO_{2e}/kWh**	**375.7**	**516.1**

The breakdown of Project GHG Emissions during construction and operations is presented in and Table 90 below.

Table 90: Project GHG Emissions

Project Phase / Operational Mode	Duration	Annual GHG emissions (KtCO2e/y)	Total GHG emissions ($KtCO_2e$)
Construction	20 months	27.9	46.4
Operations in Simple Cycle (natural gas)	1 year	255.6	2,555.6
Operations in Simple Cycle (back-up fuel)	14 days /year	122.2	122.2
Operations in Combined Cycle (natural gas)	24 years	2,438.9	59,751.9
Operations in Combined Cycle (backup fuel)	14 days/year	128.5	3,148.1
Total GHG Emissions ($KtCO_2e$)			**65,624.1**

Over the course of 27 years, the Project will generate a total of 65,624.1 $KtCO_2e$ of GHG emissions, with operations in combined-cycle mode representing 95.8% (62,899.9 KtCO2e), operations in simple-cycle mode representing 4.1% (2,677.8 KtCO2e), and construction representing 0.1% (46.4 $KtCO_2e$) of total Project GHG Emissions.

As operation on back-up fuel for both simple and combined cycles is envisaged only under non-routine conditions (i.e. interruptions to gas supply) for 14 days per year, the GHG contributions from non-routine conditions account for 5% (3,270.2 $KtCO_2e$) of total operational GHG emissions, while 95% (62,307.5 $KtCO_2e$) are contributed by operations under routine conditions running on natural gas.

Carbon dioxide (CO_2) emissions account for the largest share of GHG emissions, at 99.7% in both simple- and combined-cycle operations when running on natural gas, and 99.4% in both modes of operation when running on backup fuel. Methane (CH_4) and nitrous oxide (N_2O) emissions account for less than 1% each during operations in both modes under routine and non-routine conditions.

Based on the GHG quantification undertaken, the magnitude of Project impact on climate change is assessed as **Medium Negative,** with the following justification:

- Project GHG emissions will directly contribute to an increase in atmospheric GHG concentrations in the atmosphere. While annual emissions during operations (0.26 $MtCO_2e/y$ for simple-cycle and 2.44 $MtCO_2e/y$ for combined-cycle operations on natural gas) are considered minor in comparison to reported national GHG emissions of 31 $MtCO_2e$ in 2023, the total operational emissions under routine conditions over the course of 25 years (65.6 $MtCO_2e$) are considered moderate in comparison to the NDC target of 30 $MtCO_2e$ by 2030.

- The effects of changes to the atmospheric GHG concentrations would be long-term and irreversible, extending beyond the Project's design life. The effects of resulting climate change have the potential to indirectly impact livelihoods, ecosystems and infrastructure.
- The assessment detailed in 'Chapter 4' demonstrates that GHG emissions reduction and efficiency considerations were primarily addressed through the selection of a modern gas-fired CCGT plant, identified as a proven technology offering higher efficiency and lower emissions per unit of electricity compared to conventional thermal generation, while also supporting grid stability and integration of increasing renewable capacity. Within the technology alternatives, a clear trade-off was identified between thermal efficiency and operational reliability:
  - Although the H-class (58.7%) and F-class (57.2%) configurations offered higher efficiencies, they were not selected due to failure to meet output requirements (H-class at 612 MW) and the risk of grid instability, outages and trips under known system constraints. The selected E-class configuration (52.5% efficiency; ~741 MW output) therefore represents a compromise, accepting slightly lower efficiency (and correspondingly higher emission intensity) in order to meet capacity requirements and comply with grid limitations, including constraints on maximum power loss during turbine trips, thereby avoiding instability that could result in additional emissions from alternative supply or system disruption
  - At the equipment level, the Ansaldo V94.2 model was selected as the most efficient within the E-class options, optimizing performance within the chosen technology class
  - A further trade-off is identified in the adoption of Air-Cooled Condensers (ACC), which significantly reduce water demand compared to wet cooling (avoiding substantial evaporative losses), but incur an estimated 1–1.5% efficiency penalty
  - Gas-fired generation remains essential for grid stability (especially as Jordan integrates 200 MW of renewables by 2029).
- The Project plays an important strategic role in supporting grid reliability and its transition to renewable technologies. The country relies heavily on imported energy for power generation, and the government has announced a comprehensive portfolio of investments, including more than 200 MW of renewable energy projects by 2029 and approximately 1,400 MW of new CCGT capacity by 2030. Without the Project, there is a risk that the objectives of Jordan's "Energy Strategy" and the "Economic Modernization Vision" will not be met, including objectives related to energy security and diversification of supply, which are underpinned by the efficient, reliable supply provided by CCGT.
- The Project design discussed in 'Chapter 5' incorporates measures to minimize GHG emissions and maximize plant efficiency and generating capacity, in line with GIP for combined cycle gas turbine (CCGT) facilities:
  - The primary mitigation is the selection of a combined-cycle CCGT configuration, which integrates gas turbines with a steam cycle to maximize energy recovery. This design significantly improves overall plant efficiency from approximately 35–40% in simple-cycle mode to around 60% in combined-cycle mode, thereby reducing GHG emissions per unit of electricity generated
  - The Heat Recovery Steam Generators (HRSG) system is designed with economizer, evaporator and superheater sections, optimizing heat recovery from exhaust gases and maximizing steam production efficiency. The associated steam turbine provides additional power output

(approximately 240 MW under ISO conditions) without increasing fuel consumption, further enhancing overall Plant efficiency

- The Project also incorporates an Air-Cooled Condenser (ACC) system, which condenses steam from the steam turbine and returns it to the feedwater cycle. This closed-loop system enables continuous reuse of condensate, improves thermal performance, and reduces water losses, thereby maintaining stable and efficient plant operation

- Each gas turbine is equipped with low NOx burners. Additionally, each gas turbine is equipped with inlet air cooling (fogging and high-fogging systems), which reduce inlet air temperature, increase air density, and decrease compressor work to improve turbine efficiency and increase power output, particularly under high ambient temperatures, thereby increasing overall plant capacity without additional fuel consumption

- The plant design further includes closed-loop cooling water systems, feedwater system redundancy, and water recycling within auxiliary systems (e.g. reuse of demineralization plant drains), which support efficient and reliable operation of the thermal cycle and help maintain optimal performance over time

- The gas turbines are designed for dual-fuel operation, with natural gas as the primary fuel and distillate oil as a backup fuel. Natural gas will be used under normal operating conditions, supported by a dedicated pipeline connection, while distillate oil use is limited to contingency scenarios. This design approach ensures that routine operations are based on the primary fuel source while maintaining operational resilience. While a worst-case sulphur content of up to 1% within the supplied distillate oil is specified in the design, typical sulphur content of distillate oil supplied is expected to be less than 0.5% based on experience with existing suppliers

- Operational Measures Supporting GHG Emission Reduction include:

  - The Plant is designed to operate predominantly in combined-cycle mode using natural gas, which represents the most efficient and lowest-emission operating configuration described in the Project design. Simple-cycle operation is limited to commissioning, maintenance, or temporary unavailability of the steam cycle, thereby minimizing lower-efficiency operation

  - Use of distillate oil as backup fuel is explicitly constrained to a maximum of 14 days per year, ensuring that higher-emission backup fuel use remains limited.

Impact Significance, Mitigation, and Residual Impacts

Prior to mitigation (taking into account receptor sensitivity and the magnitude of the effect ranking), the significance of the impact of Project GHG emissions on climate change is considered **Moderate Negative**.

Mitigation to reduce the potential Project impacts on climate change is defined below:

- Construction-phase GHG emissions are considered negligible, and the mitigation measures outlined in 'Chapter 8.1' to reduce the potential significance of air quality impacts from construction plant, equipment, and vehicles will also mitigate GHG emissions.

- The largest proportion of GHG emissions is associated with the operational phase and is mitigated through Project design that reflects a balanced approach prioritizing lower-emission CCGT technology, routine gas operation, system reliability, and water efficiency, while acknowledging and managing the inherent trade-offs between efficiency, capacity, grid constraints, and resource availability.

- Operations Phase ESMP will include:
  - Planned maintenance of combustion equipment pursuant to the manufacturer's specifications
  - Emission monitoring and reporting, including monitoring via Continuous Emission Monitoring System (CEMS), manual stack emission sampling and fugitive emissions monitoring

With the mitigation incorporated into the Project ESMS, applied, verified and reported, the residual impact significance is considered to remain **Moderate Negative**. The justification for maintaining the impact significance is due to:

- High sensitivity of the climate in Jordan as a receptor, with effects of climate change already being experienced throughout the country
- Moderate magnitude of the effect, which accounts for the projected contribution of GHG emissions by the Project throughout its operational lifetime, coupled with the Project's strategic role in the country's energy transition and mitigation through design
- As operational GHG emissions are mitigated through design, the mitigation measures for the operational phase are limited to maintenance and monitoring activities and are not expected to significantly reduce the pre-mitigation significance.

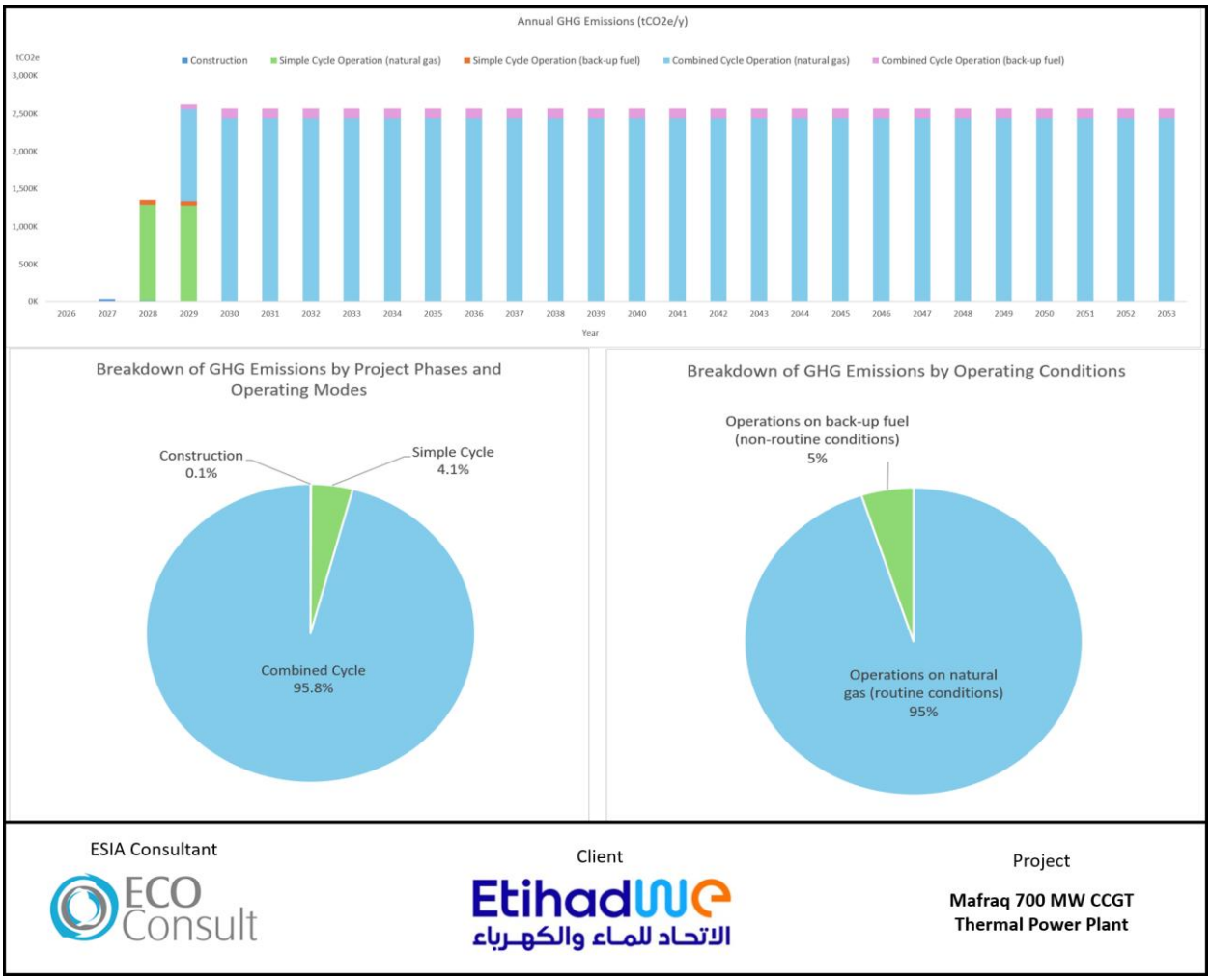


Figure 138: Breakdown of Project GHG Emissions

9.6.3 Project Impacts on Climate Change (Scope 3 GHG Emissions)

For a natural-gas-fired CCPP, the most important operational Scope 3 source is expected to be GHG emissions from the upstream natural-gas chain—extraction, gathering, processing, compression, transmission and, where relevant, liquefaction, shipping and regasification. This is reported under GHG Protocol Category 3: fuel- and energy-related activities not included in Scope 1 or 2. The conclusion is driven by the plant's continuous fuel demand and the potential importance and variability of methane leakage across gas supply chains.

During construction, Category 2: capital goods is expected to be the principal Scope 3 category, reflecting cradle-to-gate emissions from the manufacture of the plant, buildings and infrastructure—particularly concrete, reinforcing and structural steel, turbines, HRSGs, the steam turbine, generators, transformers, cables, piping and the air-cooled condenser. The GHG Protocol requires capital goods to include total cradle-to-gate emissions in the year of acquisition rather than depreciating those emissions, and requires Category 1 and Category 2 to be separated using the reporting entity's financial-accounting treatment. The current project description confirms extensive civil works, imported and locally sourced equipment, construction plant, temporary diesel generation and transport through Aqaba and Jordan's highway network.

The rankings below in Table 91 are qualitative screening judgements, not quantified significance determinations. “Potentially material” means that the category could affect the completeness of the inventory, procurement decisions, lender review or supply-chain risk management.

Opportunities for influence are provided as recommendation to guide design and procurement decisions.

Table 91: Potential Scope 3 Emission Sources – Construction Phase

Scope 3 Category	Preliminary materiality	Rationale	Opportunities for influence
Category 2 — Capital goods	**High / potentially material**	Likely to contain the bulk of construction-phase Scope 3 emissions. Includes cradle-to-gate manufacture of permanent civil works, buildings, foundations, tanks, roads, gas and water connections, substation/OHTL assets where acquired by the Project, and major mechanical and electrical equipment.	- Specifications for concrete mixes with technically suitable lower-clinker content - Optimization of foundation and structural quantities - Specifcation for recycled-content or lower-emission steel where available - Request for product-specific EPDs or verified cradle-to-gate data - Evaluation of refurbishment, modularization and design-life - Application of carbon as a scored tender criterion
Category 1 — Purchased goods and services	**Medium, but boundary-sensitive**	Includes purchased goods and services not capitalized: design and consultancy, security, catering, temporary facilities, construction water, consumables and outsourced construction services. Where the turnkey EPC service or construction materials are treated as project capital, associated production emissions should instead be reported in Category 2.	- EPC and key subcontractors to disclose Scope 1 and 2 data, fuel and electricity consumption, material quantities and subcontractor data - Reduction targets, audit rights and monthly carbon reporting - Disaggregated EPC spend and quantities so the inventory is useful for engineering decisions rather than relying only on spend factors
Category 4 — Upstream transportation and distribution	**Medium–High**	International heavy equipment may arrive through Aqaba, followed by long-distance road transport to Mafraq; abnormal loads, low vehicle utilization and air freight would increase emissions. The project anticipates both national and international suppliers and use of Aqaba Port, but detailed procurement logistics are not yet available.	- Preference to marine over air freight - Prohibition of routine air freight except documented emergencies, consolidate loads - Maximizing vehicle utilization and backhauling - Selection of efficient carriers - Establishment of delivery windows and route plans - Comparison of local sourcing on a whole-life basis, since local origin does not automatically mean lower emission
Category 3 — Fuel and energy activities	**Medium**	Covers extraction, refining/processing and delivery of diesel, petrol, natural gas and purchased electricity used during construction and commissioning. The current	- Metering of contractor fuel and temporary electricity - Use grid power where it produces a substantiated reduction

Scope 3 Category	Preliminary materiality	Rationale	Opportunities for influence
		Project design anticipates trucks, excavators, cranes, graders, rollers, dozers, concrete pumps, welding equipment, above-ground diesel tanks and temporary diesel generators.	- Specifications for efficient equipment, anti-idling, maintenance and load management - Coordination of earthworks to minimize haulage - Obtaining commissioning fuel quantities separately
Category 5 — Waste generated in operations	**Low–Medium; potentially material if spoil is large**	Likely emissions arise from third-party treatment of excess spoil, concrete, metals, timber, packaging, municipal waste, wastewater and hazardous waste. The Project identifies these streams, but quantities and destinations are not yet defined. Large off-site disposal of excavated material could increase both waste-treatment and transport emissions.	- Completion of a cut-and-fill balance - Design for on-site reuse of suitable excavated material - Segregation of metals and clean concrete - Requirement for supplier take-back and reduced packaging - Waste avoidance and minimization and recording - Use of licensed facilities and chain-of-custody records
Category 7 — Employee commuting	**Medium during peak construction**	Potentially relevant because peak construction employment is currently estimated at approximately 1,500, although source locations, shifts, camp arrangements and transport modes remain uncertain.	- Include centralized buses, high-occupancy transport, safe shift scheduling and worker accommodation close to site where environmentally and socially appropriate - Require the EPC contractor to report workforce origin, mode and distance data

Table 92: Potential Scope 3 Emission Sources – Operations Phase

Scope 3 Category	Preliminary materiality	Rationale	Opportunities for influence
Category 3 — upstream natural-gas and backup-fuel chain	High	This category includes CO_2 and methane from gas extraction, gathering, treatment and processing; compressor and pipeline energy; fugitive and vented methane; and the fuel's transport to the plant boundary. If a portion of the supply is LNG, it should also include liquefaction, shipping and regasification. Upstream distillate production and delivery are included for backup-fuel use.	Request the following in gas procurement or side agreements: - supply-origin and route disclosure - measurement-based methane intensity and CO_2 intensity - LDAR, venting and flaring policies - OGMP 2.0-equivalent reporting or other independently verifiable data - annual reconciliation of supplied volume and upstream emissions - notification of material source changes - preferential use of lower-methane supply where commercially and contractually feasible
Categories 1 and 2 — operational procurement and replacements	Medium	Category 1 covers water, treatment chemicals, lubricants, filters, cleaning products, laboratory supplies, outsourced O&M and non-capital spares. Major replacement turbines, transformers or other capitalized overhauls belong in Category 2. The current design includes chemical dosing, water treatment, filters, oils, cleaning activities and long-term O&M arrangements, creating a recurring but much smaller value chain than the gas supply.	- Include supplier EPDs - Use of durable and repairable components - Use of remanufactured parts where certified - implement take-back of oils and filters - Efficient maintenance intervals and carbon/data clauses in the O&M contracts

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

This section presents the Environmental and Social Management Plan (ESMP) for the various Project phases and the overall requirements for the Environmental and Social Management System (ESMS).

10.1 Institutional Framework and Procedure Arrangements

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

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

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

10.1.1 Staffing Requirements

Defining roles and responsibilities of the involved entities identifies where and when each entity should be engaged, their degree of involvement, and the tasks expected of the entity. This in turn eliminates any overlap of jurisdiction or authority and ensures proper communication and effective management of ESMP and ESMS components.

The table below identifies the staffing requirements that are expected for the Project. This should be expanded further in the ESMS Manual that is required as part of the ESMS (as discussed in further detail below). This should include an organizational structure that identifies the lines of authority and roles and responsibilities of all entities involved.

Table 93: Roles and Responsibilities of Entities Involved in ESMP

Project Role	Entity	Responsibilities	Staffing Requirements
Parent Company of the Sponsor	EtihadWE	▪ EtihadWE is the parent company of EUDC.	TBD
Project Sponsor	EUDC	▪ Sponsor of the Project and support the Project Company in the development and implementation of the Project; and ▪ Provide oversight and support to the Project Company, as applicable, in relation to Project implementation and compliance with applicable requirements.	TBD
Project Owner / Project Company	SPV	▪ Selection of EPC Contractor and Project Operator; ▪ Implement mitigation and monitoring requirements as applicable for such entity as detailed in the ESMP; and	Appoint competent E&S Staff to include: ▪ E&S Manager ▪ Health, Safety, Environment, and Security

		▪ Ensure overall compliance of EPC Contractor and Project Operator with the requirements of the ESMP and ESMS.	(HSES) Manager ▪ HSES Inspectors ▪ CLO (male and female)
EPC Contractor	TBD	▪ Appoint a competent HSE team; and ▪ Implement mitigation and monitoring requirements as detailed in the ESMP and ESMS requirements.	Appoint competent E&S Staff to include: ▪ HSES Manager ▪ HSES Supervisor / Engineer ▪ HSES Officers ▪ One (1) HSES Supervisor over each four (4) Subcontractor HSES Officers ▪ HSES Trainer ▪ Permit to Work (PtW) Coordinator ▪ Doctor, Nurse, Paramedic ▪ Labor Officer ▪ CLO to work in coordination with Developer CLOs
Project Operator	TBD	▪ Appoint a competent HSE team; and ▪ Implement mitigation and monitoring requirements as detailed in the ESMP and ESMS requirements;	Appoint competent E&S Staff to include: ▪ HSES Manager ▪ HSES Supervisor / Engineer
Owner's Engineer	TBD	▪ Appointment of an Owner's Engineer is to be confirmed with the Sponsor. If appointed, the Owner's Engineer would provide technical oversight and monitoring of the EPC Contractor on behalf of the Project Company, within the scope defined under its appointment.	Appoint an E&S Manager to support Project Owner / Company staff
Ministry of Environment	Granting environmental clearance to the Project	▪ Undertake compliance monitoring	N/A
NEPCO	N/A	▪ Provides information on the OHTL route, design, ▪ Assign contractor for construction of OHTL ▪ Undertake O&M activities for OHTL during operation ▪ Manage land acquisition process for the OHTL including grievance management	Internal NEPCO staff
WAJ/YWC	N/A	▪ Responsible for managing and securing water-supply infrastructure for the Project, assessing the availability of water resources, setting applicable discharge standards and conducting	Internal staff

		water-quality inspections, where relevant. ▪ Assign contractor for construction of water pipeline ▪ Undertake O&M activities during operation	
Jordanian Egyptian Fajr for Natural Gas Transmission and Supply Company	N/A	▪ Operates gas infrastructure adjacent to the Project and is relevant to the proposed gas connection, gas-supply arrangements, operational safety, emissions, emergency planning and cumulative-impact assessment.	Internal staff
IFIs	TBD	▪ Appoint Lender Environmental and Social Advisor (LESA) to undertake monitoring on Developer, EPC Contractor and Project Operator to ensure compliance with IFI E&S requirements.	N/A

10.1.2 Training and Awareness

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

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

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

In addition, training effectiveness should be evaluated periodically, for example through refresher sessions, follow-up assessments, or competency checks, to ensure continuous improvement and retention of key HSES knowledge.

Table 94: Training Elements

Training	EPC Contractor	Project Operator

Basic visitor HSES induction training	✓	✓
Worker HSES induction training	✓	✓
Emergency response training	✓	✓
Toolbox Talks (TBT)	✓	✓
Specialized training	✓	✓

10.1.3 Inspection and Monitoring

HSES inspection and monitoring must be undertaken to ensure compliance of involved entities with the mitigation and monitoring requirements as detailed in the ESMP and ESMS requirements. This should be completed by the Developer, EPC Contractor, and Project Operator as applicable.

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

- Daily HSES Site tours, which includes inspection and monitoring at the site and preparation of a daily observation report stating therein the corrective measures on observed safety deficiencies, unsafe acts and conditions;
- Weekly site inspections to be carried out using the weekly site inspection checklists template based on requirements of the ESMP and ESMS; and
- Quarterly HSES and Developer Labor Audits to be undertaken by Developer on EPC Contractor to ensure compliance with ESMP requirement and ESMS. HSES and labor/working conditions audits should be undertaken quarterly during the construction phase and annually during the operation phase.

Table 95: Inspection and Monitoring Elements

Inspection and Monitoring	Developer	EPC Contractor	Project Operator
Daily HSE Tour		✓	
Weekly Site Inspections		✓	✓
Quarterly HSES and Developer Labor Audit	✓		
Monitoring of E&S Parameters		✓	✓

10.1.4 Meetings

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

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

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

Table 96: Required Meetings

Meetings	Developer	EPC Contractor	Project Operator
Weekly HSES Meetings		✓	✓
Monthly HSES Meeting	✓	✓	✓
Quarterly Management HSES reviews	✓	✓	✓

10.1.5 Reporting

HSES reporting will be required to summarize the following:

- Annual Monitoring Report (AMR). This should be quarterly during construction but could be changed to semi-annually based on IFI requirements. Similarly during operation, this will be required annually but could be changed to semi-annually based on IFI requirements;
- Quarterly Audit Reports;
- E&S Incident and Deviation Management Reports (Upon Occurrence); and
- E&S Monthly Report (including Key Performance Indicators (KPI)).

Reporting should be submitted to the Developer as applicable by the relevant entities as identified below.

Table 97: Reports

Reporting	EPC Contractor	Project Operator
Reporting	Monthly	Monthly

10.2 Environmental and Social Management System (ESMS)

The ESIA is considered a key document in assessing and managing environmental and social risks related to the Project. The key output of the ESIA is the ESMP which aims to provide high level mitigations and requirements for managing the environmental and social risks anticipated from the Project.

Throughout the Project's construction and operation phase a Environmental and Social Management System must be implemented by all relevant parties (i.e. Developer, EPC Contractor and Project Operator). The ESMS must be project and site specific and must build on and take into account the requirements of the ESMP presented throughout this document.

Summarized below is the overall framework, structure and key requirements for the ESMS for the key entities involved in the Project.

10.2.1 Developer

- ESIA including ESMP
- ESMS Manual that should include: (i) E&S Policy; (ii) Security Policy; (iii) Human Resources (HR) / Labor Policy; and (iv) Occupational Health and Safety Policy.
- Stakeholder Engagement Plan (SEP) including stakeholder grievance mechanism;

- Community Development Plan.

10.2.2 EPC Contractor

- ESIA including ESMP
- ESMS Manual (in line with Developer) that should include: (i) HSES Policy; (ii) Human Resources / Labor Policy and Procedures; (iii) HSES Organizational Structure and Responsibilities; (iv) HSES Monitoring and Reporting Requirements; (v) HSES Meeting Requirements; (Vi) HSES Training Requirements
- Occupational Health and Safety Management Plan;
- Labor and Working Conditions Management Plan;
- Worker Accommodation Management Plan;
- Pollution Prevention and Control Management Plan;
- Gender Based Violence/Sexual Exploitation and Harassment (GBV/SEAH) Prevention and Response Plan;
- Worker Influx Management Plan;
- Subcontractor Management Plan;
- Erosion Control and Reinstatement Plan;
- Hazardous Materials Handling and Storage Plan;
- Waste Management Plan;
- Traffic and Transportation Management Plan;
- Security & Human Rights Management Plan;
- Emergency Preparedness and Response Plan;
- Cultural Heritage Chance Find Procedure;
- Air Quality Management Plan;
- noise Management Plan;
- Water and Wastewater Management Plan;
- Training Management Plan;
- Community Health and Safety Management Plan;
- Biodiversity Management and Monitoring Plan;
- Commissioning Plan; and
- Demobilization Plan.

10.2.3 Project Operator

- ESIA including ESMP
- ESMS Manual (in line with Developer) that should include: (i) HSES Policy; (ii) Human Resources Policy and Procedures; (iii) HSES Organizational Structure and Responsibilities; (iv) HSES Monitoring and Reporting Requirements; (v) HSES Meeting Requirements; (Vi) HSES Training Requirements.
- Occupational Health and Safety Management Plan;
- Labor and Working Conditions Management Plan;
- Pollution Prevention and Control Management Plan;
- Gender Based Violence/Sexual Exploitation and Harassment (GBV/SEAH) Prevention and Response Plan;
- Subcontractor Management Plan;
- Hazardous Materials Handling and Storage Plan;
- Waste Management Plan;
- Traffic and Transportation Management Plan;
- Security & Human Rights Management Plan;
- Emergency Preparedness and Response Plan;
- Air Quality Management Plan;
- Noise Management Plan;
- Water and Wastewater Management Plan;
- Training Management Plan;
- Community Health and Safety Management Plan; and
- Biodiversity Management and Monitoring Plan.

10.3 Compilation of the Framework Environmental and Social Management Plan (ESMP)

The tables below present the ESMP for the: (i) planning and construction, and (ii) operation phase respectively and which include the following:

- The E&S attribute (e.g. air quality) that is likely to be impacted;
- A summary of the potential E&S impact and/or likely issue;
- The identified management measures that aim to eliminate and/or reduce the potential impact to acceptable levels. Management measures include mitigation actions, further requirements, additional studies, etc.;

- Monitoring actions to ensure that the identified mitigation measures are implemented. Monitoring actions include inspections, review of reports/plans, reporting, etc.;
- The frequency for implementing the monitoring actions, which include once, continuously throughout the construction/operation period (depending on the mitigation measure identified this could include daily, weekly, or monthly), or upon occurrence of a certain issue;
- Parameters and location of monitoring actions as identified and applicable; and
- Responsible entity for implementing the mitigation measures and monitoring actions identified.

Table 98: ESMP for the Planning / Pre-Construction Phase

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
Air Quality and Dust	▪ Use of construction plant and equipment to undertake construction activities across the Project Site (Plant Area, Substation Area and Temporary Laydown Area) and Associated Facilities based on indicative plant and equipment types and numbers, including trucks and buses used for transportation ▪ Generation of dust associated with site preparation, earthworks and spoil movement across the Project Site and along the OHTL and gas and water pipeline tie-ins routes	▪ Incorporate the following dust management measures within the Air Quality and Noise Management Plan prior to the commencement of works: ▪ Identification of dust-generating construction activities and identification and classification of potentially affected sensitive receptors ▪ Review and evaluate dust management practices for minimizing dust impacts to residents, occupants, and animals, and minimize the potential for sedimentation of watercourses/water bodies due to dust. Practices may include, but are not limited to: ▪ 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 ▪ 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 ▪ Where wet suppression techniques are considered, an evaluation will be required to provide suitable justification, including the proposed source of water (with preference for reclaimed water use) ▪ Protocols for engagement with residents and local land users to provide advance warning of works taking place where relevant, including the duration and likely dust impacts. In the case of work required in response to an emergency, the local residents and land users shall be advised as soon as reasonably practicable that emergency work is taking place. ▪ Ensure the Project Grievance Mechanism includes the process for handling and responding to dust complaints, including requirements associated with conducting reviews of dust management practices and dust monitoring in response to complaints.	Mitigation	▪ Dust monitoring program to include: ▪ Records of inspections and findings to be kept and maintained ▪ Triggers for increasing the frequency of site inspections, e.g. when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions ▪ Reporting and communication process related to dust visual monitoring results	Once prior to commencement of construction	EPC Contractor
Noise	Operation of the CCPP during the operations phase	▪ Undertake detailed far-field noise modeling incorporating vendor-specific acoustic data and identifying noise controls and specifications to be included in the detailed design where required to ensure compliance with the applicable Project noise limits (daytime and night-time). Controls to be specified within the design will include, but are not limited to, acoustic enclosures, silencers (e.g. for inlet and exhaust systems), optimized equipment layout and/or lower noise equipment. Acoustic data to be included within vendor guarantees.	Mitigation	Submission of noise modeling	Once prior to commencement of construction	EPC Contractor
	▪ Use of construction plant and equipment to undertake construction activities across the Project Site (Plant Area, Substation Area and Temporary Laydown Area) and Associated Facilities based on typical plant and equipment types and numbers	▪ Develop an Air Quality and Noise Management Plan aligned with the applicable Project standards that includes all feasible and reasonable methods to limit noise emissions and minimize the noise impact on people/properties in the vicinity of the Project site and Associated Facilities. The plan shall include at a minimum: ▪ Estimation of the frequencies, duration, days of the week, planned working hours, and predicted noise levels anticipated within the vicinity of the Project construction activities. ▪ Protocols for engagement with residents to provide advance warning of works taking place where relevant, including the duration and likely noise impacts. In the case of work required in response to an emergency, the local residents shall be advised as soon as reasonably practicable that emergency work is taking place. ▪ Ensure the Project Grievance Mechanism includes the process for handling and responding to noise complaints, including requirements associated with conducting noise monitoring in response to complaints. This should include consideration for an accelerated process to handle and respond to critical construction-related noise grievances.	Mitigation	▪ Ensure the Project Grievance Mechanism includes the process for handling and responding to noise complaints, including requirements associated with conducting noise monitoring in response to complaints. This should include consideration for an accelerated process to handle and respond to critical construction-related noise grievances.	In response to complaints	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
		▪ Incorporate consideration of noise impacts in the detailed planning for the construction camps and temporary project facilities to inform siting, layout, equipment selection, and noise abatement measures (where required).				
Biodiversity	▪ Permanent land conversion at the Plant Site (including the existing wadi), Substation Site and at the bases of the towers along the OHTL route ▪ Temporary removal of vegetation and surface material within the water and gas pipeline rights-of-way, and across the Temporary Laydown Area, noting the rights-of-way and laydown area will be reinstated ▪ Attraction of wildlife, particularly avifauna, during evaporation pond operations ▪ Avifauna collision risk from the OHTL	▪ Prepare a Biodiversity Management Plan (BMP) for construction and operation to include the following controls: ▪ Develop a spur-thighed translocation plan that should include the following principles ▪ Conduct a comprehensive survey for the Greek Tortoise (*Testudo graeca*) across the study site prior to the construction phase. Field clearances must be timed to coincide with the species' active periods, specifically during its primary peak in March, April, and May, or its secondary lesser peak in September. ▪ All identified individuals of the Greek Tortoise must be translocated by a reptile expert out of the Project Area before construction begins. In direct coordination with the RSCN and the MoA, the tortoises must be safely relocated to a suitable, nearby habitat, such as the Al Khanasri Rangeland Reserve. ▪ Active monitoring for the Greek Tortoise must be maintained throughout the construction and excavation phases. Because this globally threatened species is highly vulnerable to road traffic, workers must exercise extreme caution during leveling and construction activities. Any tortoises observed within the active footprint must be immediately removed from the working area in accordance with the requirements above. ▪ Demarcation of all areas where construction will occur to ensure that all earthworks will be strictly limited to the required areas and existing vegetation is retained as far as possible during site preparation ▪ As will be required by RSCN, specific requirements to ensure OHTL pylons are wildlife-friendly must be implemented, meaning that the distance between energized components is enough to prevent electrocutions and/or that these are appropriately insulated, following good international industry practice ▪ Specific requirements relating to the design of the evaporation pond to ensure measures to deter wildlife and avifauna are integrated into the design ▪ In accordance with the “Land Use Regulation for Area Outside of Organized Boundaries for 2026”, commit to landscaping 25% of the total Project area.	Mitigation	Submission of BMP	Once prior to commencement of construction	EPC Contractor
Physical Terrestrial Environment	▪ Disruption and changes to surface drainage: ▪ Accidental spills and incidents associated with the uncontrolled handling of waste and materials, including concrete, affecting soils and groundwater ▪ Accidental spills to soils and groundwater associated with the evaporation pond due to loss of integrity during operations	▪ Undertake a review of potential spill risks covering construction and operations phases. The outcome of these studies will be used to complete a spill risk assessment and document the safeguards, e.g., engineering, process, procedural, etc., and be integrated into the Pollution Prevention Management Plan ▪ Prepare a Pollution Prevention Management Plan which includes: (i) Assessment of contamination risk at the Project Site using a risk-based approach, This should include an assessment of UXO risk given the presence of the firing range within the Project Site; (ii) Hazardous materials (selection, management, and use), drainage, wastewater (including all camp and construction site wastewater), and surface water discharges to comply with applicable standards and avoid the risk of pollution; (iii) Specific requirements relating to the design and maintenance of the evaporation pond to ensure measures to minimize potential for contamination to soils and groundwater, e.g. due to a spill or loss of integrity, are integrated into the design, including ongoing monitoring requirements; (iv) The diesel tank specifications will include XXX; (v) Sludge from the evaporation pond will be disposed at approved areas with the closest being the Ekaider Landfill.	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor
		▪ Prepare a Water Management Plan that details water required during construction and commissioning (demand and quality), how it will be sourced, describing and assessing the treatment, reuse, and discharge activities, ensuring avoidance of pollution and erosion, as well as management of water reuse, e.g. for agricultural	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
		purposes. This will also include investigating the feasibility of constructing rainwater harvesting structures onsite.				
	▪ Disruption and changes to surface drainage: ▪ Accidental spills and incidents associated with the uncontrolled handling of waste and materials, including concrete, affecting soils and groundwater ▪ Accidental spills to soils and groundwater associated with the evaporation pond due to loss of integrity during operations	▪ In accordance with Article 5 of the "Instruction for Protection of Agricultural Sites No. (11) of the Year 2022", obtain an excavation permit for soil transport from Mafraq Directorate of Agriculture before commencement of excavation works and commit to separation of topsoil.	Mitigation	Submission of Permit	Once prior to commencement of construction	EPC Contractor
		▪ Groundwater risks will be assessed upon completion of the EPC contractor's geotechnical survey to inform the development of site-specific construction controls to minimize the potential for contamination through spills	Mitigation	Submission of geotechnical survey	Once prior to commencement of construction	EPC Contractor
		▪ Prepare an Erosion Control and Reinstatement Plan that will be included in the construction and installation contractor's specification. The plan will confirm: ▪ The controls for the avoidance/reduction of impacts to biodiversity and soil erosion ▪ Topsoil/surface material storage and preservation ▪ Microhabitat disturbance management ▪ Defined terrestrial habitat restoration goals, including erosion controls ▪ Adaptive management requirements to respond to temporary construction works such as temporary storage of material, borrow pit for construction material, temporary access road routing, and usage.	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor
	▪ Disruption and changes to surface drainage: ▪ Accidental spills and incidents associated with the uncontrolled handling of waste and materials, including concrete, affecting soils and groundwater ▪ Accidental spills to soils and groundwater associated with the evaporation pond due to loss of integrity during operations	▪ Impacts to surface water flows will be restricted to the Project Site, specifically the Plant and Substation Areas, the design of which have yet to be finalized. The design will incorporate new drainage channels and embankments designed to divert runoff away from the site and to provide appropriate flood protection equivalent to a 1 in 100-year rainfall event (including a 20% climate change allowance). The detailed design of the drainage and flood protection system will include consideration of the Site access and egress and will be undertaken in consultation with the relevant competent authorities including the Ministry of Transport.	Mitigation	Submission of detailed design	Once prior to commencement of construction	EPC Contractor
		▪ Construction and operations phase drainage from the Project sites will include: ▪ Rainwater systems, which will be designed to segregate rainfall from sources of contamination ▪ Drainage from areas with hazardous materials, e.g., in areas where hazardous waste or fuel is stored. Drainage from these locations will either be handled as waste and disposed of by licensed facilities, treated on-site and recycled or sent to the evaporation pond	Mitigation	Submission of detailed design	Once prior to commencement of construction	EPC Contractor
Landscape and Visual Amenity	▪ Construction requires extensive clearance of vegetation and topsoil, grading and earthworks, wadi re-routing and excavation, temporarily and, in places, permanently altering the landform and drainage of the site ▪ The permanent presence of the plant, buildings, stacks, substation and evaporation pond introduces new industrial structures into an open, low-rise landscape for the operational life of the Project	▪ Optimization of the layout, height and massing of the plant, buildings and structures to the extent possible to reduce visibility from the closest communities ▪ Selection of recessive, non-reflective colors and finishes for large structures, stacks and the substation to reduce their contrast with the arid landscape ▪ A lighting design that minimizes light spill and sky glow, using directional, shielded and appropriately controlled lighting consistent with safety and security requirements ▪ Definition of topsoil and surface-material storage, and of stockpile siting and height limits, to reduce visual intrusion during construction ▪ Dust suppression measures during clearance, earthworks and vehicle movements to protect visual amenity and surrounding vegetation ▪ Landscape reinstatement goals, including reinstatement of landform, drainage and vegetation in temporary working areas on completion of construction ▪ Continued engagement with the surrounding communities on the appearance and location of the Project facilities ▪ Confirmation of the reinstatement approach for the wadi re-routing and temporary working areas prior to construction	Mitigation	Submission of detailed design	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	▪ Permanent operational and security lighting introduces a continuous source of night-time light and sky glow into the surrounding dark landscape					
Archaeology and Cultural Heritage	▪ Construction ground disturbance works may result in accidental damage to or loss of an unknown subsurface archaeological/cultural heritage resource. ▪ The effect of damage to or loss of an encountered archaeological/cultural heritage resource would be direct, long-term and irreversible. However, the likelihood of encountering and/or accidentally damaging or destroying an archaeological/cultural heritage resource of importance or value is low	▪ The EPC Contractor shall develop a Chance Find Procedure that takes into account the following: ▪ Stop Work Protocol: in the event that an archaeological/cultural heritage resource is encountered, the construction activities shall be suspended, and an area within a minimum 25-meter radius shall be secured with barriers, provided with warning signs in both Arabic and English languages and protected from excessive vibration, dust and other construction impacts. Where more chance finds in the vicinity are suspected or encountered, the protected area shall be expanded accordingly. ▪ Immediate notification to the Department of Antiquities (DoA) via formal communication. ▪ Notification to all construction personnel of the chance find and issuance of instructions prohibiting entry into the barriered area or disturbance of the chance find in any way. ▪ Suspension of the work at the chance find site until the DoA assessment has been concluded and a clearance to resume work has been granted. ▪ Permission for construction activities to continue at other parts of the site unless another chance find is encountered, in which case the same Stop Work Protocol shall apply. ▪ The site induction shall include a module on the requirements of the Chance Find Procedure. All EPC Contractor and subcontractor personnel shall receive training on worksite boundaries, recognizing potential archaeological/cultural heritage assets or sites, the Stop Work Protocol, and reporting requirements prior to the start of construction work on-site. ▪ The EPC Contractor shall select and appoint a sufficient number of qualified archaeologists to carry out a watching brief at all construction fronts across the Project site and Associated Facilities.	Mitigation	Submission of chance-find procedure	Once prior to commencement of construction	EPC Contractor
Land Use, Resettlement and Livelihoods	▪ Temporary and permanent loss of, or restricted access to, private land (adverse): the temporary occupation of private land for construction rights-of-way and working strips along the OHTL and pipeline routes, and the permanent easements required for these facilities, restricting owners' and users' use of the affected land ▪ Disruption to agricultural and grazing livelihoods (adverse): temporary loss of agricultural income, and disruption to grazing access and to the seasonal movements of nomadic	▪ Mitigation to prevent and reduce these adverse effects is defined below. The overarching mitigation is the development and implementation, prior to construction, of a Land Acquisition Framework (LAF). The LAF will be prepared in accordance with Jordanian law and Good International Industry Practice, including IFC Performance Standard 5 and the applicable lender land acquisition and resettlement requirements, to ensure that all affected people, whether they hold legal, customary or informal land rights, are treated fairly and left no worse off. ▪ The Project to prepare a Resettlement Policy Framework, which will make the following commitments: ▪ Confirmation, through continued engagement with the Ministry of Transport, of the acceptability of the substation and OHTL locations within the 100 m railway buffer, and confirmation with the MoA of the reserve land allocation, prior to construction ▪ Confirmation that the military shooting range is relocated outside the Project boundary, with related structures removed and the land cleared and remediated, prior to construction in the affected area. This should include a contaminated land / UXO clearance.	Mitigation	Submission of LAF	Once prior to commencement of construction	EPC Contractor NEPCO

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	and semi-nomadic Bedouin herders and their livestock in the vicinity of the OHTL corridor ▪ Permanent land-use restriction within easements and rights-of-way (adverse): ongoing restrictions on the use of privately owned land within the OHTL and pipeline easements and safety corridors, limiting cultivation, structures and certain activities over the operational life					
Community Health, Safety, Security and 3rd Party Infrastructure and Services	▪ Construction hazards and disturbances: open trenches and unprotected excavations (including along the water, gas pipeline and OHTL routes) present a hazard to community members and livestock, particularly where they intersect grazing movements, pedestrian routes; safety hazards associated areas of the site that are not fenced; the potential for spills or fire associated with the on-site storage of fuels, oils and chemicals; and increased exposure to flooding where temporary works alter natural wadi drainage patterns ▪ Worker influx: the temporary influx of non-local workers, which, if not carefully managed, could increase the transmission of communicable diseases, anti-social behavior, Gender-Based Violence, Harassment, Sexual Exploitation and Abuse (GBVH/SEAH), or tensions between the workforce and local communities ▪ Community infrastructure and services: localized	▪ Inclusion of Project Community Health, Safety and Security measures within the relevant ESMS Plans, to be prepared by the EPC Contractor in consultation with the affected municipalities and relevant local authorities prior to mobilization. The plans will include measures to: ▪ Address construction hazards and disturbance, including clear fencing of working areas with signage and lighting around offsite open excavations and trenches, machinery yards and laydown areas; timely reinstatement; safe and controlled storage of materials; ▪ Erosion and surface water controls aligned within the Pollution Prevention Management Plan to maintain natural drainage as far as possible and avoid increasing flood risk to surrounding areas using temporary measures prior to the installation of permanent controls ▪ Manage worker influx, including workforce accommodation planning to avoid strain on local services, provision of medical facilities within any accommodation camps, and the implementation of a worker code of conduct and a GBVH/SEAH code of conduct for all Project workers, contractors and sub-contractors ▪ Address pressures on community infrastructure and services, including solid waste and wastewater management, aligned with municipal capacity and coordination with public health and emergency response services.	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	pressure on health services, water, supply, sanitation, waste management and emergency response capacity, particularly for the smaller municipalities of Al-Basiliyah and Hosha					
	▪ Community infrastructure and services: localized pressure on health services, water, supply, sanitation, waste management and emergency response capacity, particularly for the smaller municipalities of Al-Basiliyah and Hosha	▪ Develop a Waste Management Plan before the start of construction that addresses pressures on waste infrastructure and services, aligned with municipal capacity and coordination. This will be supported by: ▪ Completing a detailed waste forecast for the construction and operation phases prior to construction ▪ Completing a due diligence of waste contractors (transporters and receiving and disposal facilities) to ensure all contractors used comply with applicable project standards ▪ Develop a Waste Management Plan that details: principles of waste minimization and management, processes for assessment and selection of waste management subcontractors, waste identification and classification system, temporary site storage, segregation and handling requirements, waste transportation and chain-of-custody documentation requirements, estimation of the frequencies, duration, days of the week, planned working hours for noisy activities and predicted noise levels, waste tracking, monitoring and reporting requirements, including assurance activities such as inspection, reporting and auditing	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor
	▪ Security arrangements: potential risks to communities arising from the conduct of public or private security personnel, including the use of excessive force, intimidation or inappropriate interactions, if security is not managed in line with international good practice ▪ Security arrangements: the ongoing presence and conduct of operational security personnel	▪ Develop a Security Management Plan to manage community risks associated with Project security in line with international good practice (for example the Voluntary Principles on Security and Human Rights), including the screening, training and monitoring of security providers on behavioral standards, human rights and the proportionate use of force, clear protocols for respectful engagement with local communities and engagement with public security forces to ensure alignment and coordination over Project security measures	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor
	▪ Traffic, access and road safety: increased vehicle movements on the existing public road and highway network, creating collision and safety risks for pedestrians, herders, livestock and other road users, together with temporary access restrictions and accelerated deterioration of local roads	▪ Develop a Traffic and Transportation Management Plan, based on a forecast of construction traffic flows and routes, to be prepared by the EPC Contractor in coordination with the relevant authorities and approved prior to mobilization, taking into account community access, key sensitive receptors, speed control, alternative routes and the safety of other road users, pedestrians and livestock	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	▪ Traffic and transport: ongoing, lower-level movements associated with the operational workforce and the delivery of distillate oil, chemicals, consumables and the removal of wastes					
	▪ Major accident hazards and process safety: the potential for fire, explosion or hazardous release associated with the natural gas system and tie-in, distillate oil storage, chemical storage and the high-temperature and high-pressure steam and water systems, with the potential to affect the nearest receptors located within approximately 500 m of the Project Site	▪ Develop an Emergency Preparedness and Response Plans (EPRP) in conformance with all statutory requirements and government authorizations for the construction and operations phases. The EPRP for the Construction Period shall be prepared before the start of construction activities. The EPRP for the Operational Period shall be submitted prior to the start of operations. ▪ The EPRP will define clear notification, response, investigation and reporting arrangements for emergency events. In the event of an emergency, the Project will notify the relevant government authorities within the statutory timeframe and, in all cases, as soon as practicable, implement appropriate corrective and mitigation measures, maintain competent emergency response resources across the Project and contractor workforce, communicate emergency procedures to EPC Contractors and subcontractors, and conduct regular joint drills to test preparedness and share lessons learned.	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor
	▪ Community infrastructure and services: localized pressure on health services, water, supply, sanitation, waste management and emergency response capacity, particularly for the smaller municipalities of Al-Basiliyah and Hosha	▪ Confirmation that the Project Grievance Mechanism includes clear, accessible and culturally appropriate channels for communities to raise community health, safety and security concerns ▪ NEPCO to undertake engagement with existing utility owners and operators and the community as required to manage crossings of existing services and utilities, outlining the processes for notification on potential service disruptions	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor
	▪ Major accident hazards and process safety: the potential for fire, explosion or hazardous release associated with the natural gas system and tie-in, distillate oil storage, chemical storage and the high-temperature and high-pressure steam and water systems, with the potential to affect the nearest receptors located within approximately 500 m of the Project Site	▪ Undertake a Quantitative Risk Assessment covering gas release, fire/explosion, thermal radiation modeling and consequence assessment in conformance with international best practice and statutory and lender requirements to inform the Project design. Relevant outcomes to be integrated into the Emergency Preparedness and Response Plans (EPRP) as required.	Mitigation	Submission of Risk Assessment	Once prior to commencement of construction	EPC Contractor
	▪ Aviation safety and obstacle risk: the potential for tall Project structures, including the emission	▪ Obtain aviation safety clearance from the Jordanian Civil Aviation Regulatory Commission (CARC) and Jordanian Air Force (JAF) manage the Project's tall structures and construction equipment as aviation obstacles, to be secured prior to the commencement of construction. This will include:	Mitigation	Submission of safety clearance and Non-objection	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	stacks, gas turbine buildings and the associated 7 km OHTL towers, together with tall construction cranes during the construction phase that could constitute obstacles to civil and military aviation, given the proximity of regional flight paths and a military airbase operating in the area	▪ Confirming the maximum allowable structure heights with CARC following formal submission and review of the exact Project coordinates and elevations, and reflecting any resulting height limits in the final Project design ▪ Securing a No Objection Certificate (NOC) from CARC before construction commences, applicable to both permanent structures and temporary construction equipment, supported by submission of a Navigational Obstacles Study Request together with official coordinates and site elevations certified by the Royal Jordanian Geographic Center (RJGC), land registration documents and site plan, and detailed structural and engineering plans ▪ Obtaining mandatory approval from the JAF and obtaining data on restricted military airspace and prohibited zones, given the military airbase operating in the area ▪ Fitting all structures exceeding 40 meters in height with aviation warning lighting and specialized markings, with the emission stacks featuring alternating red and white banding and taller structures fitted with higher-intensity, multi-layered lighting systems in the configurations specified by CARC ▪ Obtaining independent CARC approval for all construction cranes deployed during the construction phase, each fitted with certified aviation warning lighting				
		▪ NEPCO is to install high-visibility aerial warning spheres on the transmission towers of the associated 7 km OHTL and, depending on the final tower heights, full line-marking systems	Mitigation	Submission of detailed design	Once prior to commencement of construction	NEPCO
Local Employment and Local Content	▪ The Project will generate a substantial volume of temporary employment, of up to approximately 1,500 personnel at peak, and a significant value of procurement and subcontracting opportunities over the approximately 20-month construction period, given the scale of the works and the number of contractors involved ▪ If managed effectively, these opportunities could make a major positive contribution to local livelihoods, household income stability and local business activity ▪ Conversely, the magnitude of potential adverse effects is also major if expectations are not met or if recruitment and procurement are not transparent and inclusive, since the real or perceived exclusion of local workers or suppliers could lead to significant dissatisfaction	▪ Registration of the EPC Contractor and the Developer on the Ministry of Labour's National Employment Program (NEP), a government, performance-based wage-subsidy and placement program designed to stimulate private-sector hiring of Jordanians, especially youth and women, which blends temporary wage support, social security and transport top-ups, and on-the-job and short classroom training tied to signed work contracts	Mitigation	Submission of registration documentation	Once prior to commencement of construction	EPC Contractor
		▪ Development of a Project Local Employment and Local Procurement Procedure as part of the Labor and Working Conditions Management plan before the start of construction, prepared by the EPC Contractor in consultation with the local municipalities and district and sub-district authorities prior to mobilization, to design the most effective, transparent and fair processes for each Project locality, integrating the NEP process. The Procedure will: ▪ Follow the employment targets set within the "Regulation for Obligatory Employment of Jordanian Workforce from Surrounding Communities in Construction Projects No. (131) of 2016". Local community will be prioritized as follows: (i) local communities as identified within ESIA, followed by (ii) Northwestern Badia District; followed by; (iii) Mafraq Governorate ▪ Consider inclusive Local Advisory Committees (LACs), established through the sub-district and municipalities with oversight from the local governors, to support transparency and defuse grievances, and draw on positive local employment examples from past infrastructure projects (as required by the local communities) ▪ Set realistic targets for local employment and local procurement, prioritizing residents of the directly affected communities ▪ Specify the number and types of roles targeted for local employment (unskilled, semi-skilled and skilled) and the procedures for verification and record-keeping ▪ Capacity building and skills development, working with the Ministry of Labour, the NEP and relevant vocational training centers to provide skills training and pre-employment preparation, particularly targeting youth (including disabled youth) and women, so that they can qualify for construction-related jobs and contracts ▪ Advance communication with local authorities of the expected local procurement selection criteria, through the municipalities and district and sub-district offices, so that local businesses can prepare and obtain additional training where required	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	▪ Operation will generate only a small number of permanent jobs, of around 60 personnel over 25 years, and a correspondingly limited volume of ongoing procurement, so the scale of both beneficial and adverse effects during operation is low ▪ The main operational sensitivity arises not from operation itself but from the sharp reduction in employment on completion of construction, and from the risk that expectations of long-term employment are not met	▪ Consider a Corporate Social Responsibility (CSR) program for the local communities during construction and operation. This is to be undertaken through a structured and transparent approach that is built on a proper needs assessment. Such needs assessment is available through the LDUs from the local authorities.				
Labor Management, Working Conditions and Occupational Health and Safety	▪ The construction workforce is large, of up to approximately 1,500 personnel at peak, and will be engaged through numerous contractors and subcontractors over an intensive construction period of around 20 months, increasing the complexity of oversight and the likelihood of inconsistent labor and OHS practices ▪ The construction and commissioning activities are inherently high-risk, and the consequences of an OHS failure can be severe, including serious injury or fatality ▪ Extreme heat, sand and dust storms, high winds and potential flash flooding elevate the risk of heat stress and other harm unless actively managed ▪ The potential engagement of foreign and migrant workers, and the possible use of temporary accommodation, introduce risks relating to recruitment practices, equal treatment	▪ Mitigation to prevent and reduce these adverse effects is defined below. The overarching measure is the development and implementation, prior to construction, of a comprehensive Labor and Working Conditions Management Plan, together with an associated Occupational Health and Safety Management Plan, applying to the Project Developer, the EPC Contractor and all subcontractors and third-party employers, and designed to comply with Jordanian labor law and with Good International Industry Practice, including the ILO Core Labour Standards, IFC Performance Standard 2 and the World Bank Group Environmental, Health and Safety Guidelines. ▪ The EPC Contractor shall develop and implement a Labor and Working Conditions Management Plan, incorporating human resources policies and procedures covering all categories of workers (including direct, contracted, day and part-time workers), which makes the following commitments: ▪ Written contracts issued to all workers in a language they understand (Arabic and the worker's language), setting out the terms and duration of employment, wages and wage calculation, working hours, overtime, rest days, deductions, benefits, grievance procedures and termination, with day workers registered in a day-labor log recording written day-rate terms ▪ Fair wages at least equal to the national minimum wage, paid in full and on time, with transparent pay slips, overtime paid at legal rates and no unlawful deductions ▪ No worker shall be required to pay recruitment or placement fees, and there shall be no retention of workers' identity or travel documents, which remain in the workers' possession at all times ▪ Working hours shall be managed in accordance with the law, with normal hours not exceeding 8 hours per day or 48 hours per week, at least one 24-hour rest period each week, and overtime only under legal exceptions and paid at premium rates ▪ Migrant and foreign workers shall be engaged on terms substantially equivalent to those of comparable non-migrant workers, through licensed and ethical recruitment, with no forced, bonded, trafficked or child labor ▪ Social protection arrangements, including Social Security Corporation (or equivalent accident insurance), shall cover all workers, with workers informed of their injury insurance and compensation rights ▪ Injury compensation and medical care arrangements shall be made, including immediate first aid and transport, notification and compensation in accordance with	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	and living conditions that, if unmanaged, could be significant ▪ The principal operational risks arise during maintenance and outage activities, when higher-hazard tasks are undertaken, and additional contractors may be engaged	the law, and the logging of incidents to the Ministry of Labour within the prescribed period ▪ Protection of workers in adverse weather, including compliance with any ministerial working-hour prohibitions during extreme heat, in accordance with Regulation 31/2023 Article 9, with stop-work or rescheduling when heat bans are announced and compliance documented				
		▪ The EPC Contractor shall develop and implement an Occupational Health and Safety Management Plan meeting national and international standards, which will: ▪ Identify and assess the hazards associated with each construction and commissioning activity and apply the hierarchy of control, eliminating hazards at source where practicable, applying engineering and administrative controls, and providing appropriate personal protective equipment at no cost to workers ▪ Address the site's natural-hazard and climatic risks, including heat-stress management through hydration, rest, shading, acclimatization and work-rest scheduling, weather monitoring and early-warning protocols, and location-specific safe-work procedures such as suspending works in flood-prone areas when rainfall thresholds are reached ▪ Provide OHS induction and task-specific training to all workers, supervisors and visitors, covering high-risk activities such as work at height, lifting operations, confined-space entry, hot works, electrical and energized-systems work and the commissioning of high-temperature and high-pressure systems ▪ Establish emergency prevention, preparedness and response arrangements, including first aid, medical provision and evacuation, and the documentation, investigation and reporting of occupational accidents, incidents, diseases and near-misses ▪ The Occupational Health and Safety Management Plan shall be supported by: ▪ A Project-wide Worker Code of Conduct, provided and explained in the worker's language and signed by all workers, prohibiting discrimination, harassment, GBVH and SEAH, forced and child labor, and requiring respect for freedom of association ▪ Worker Accommodation Standards, where workers are housed in temporary facilities, ensuring adequate space, potable water, sanitation, ventilation, protection against heat and cold, catering, waste management, lighting, fire safety and access to medical care, consistent with the requirements of this ESIA and with the IFC guidance on Workers' Accommodation, and managed so as not to restrict workers' freedom of movement or association ▪ A dedicated, confidential worker Grievance Mechanism, separate from and additional to the community grievance mechanism, communicated to all workers at recruitment, allowing anonymous complaints and providing timely resolution without retaliation, and extended to the workers of third parties, where these cannot provide their own ▪ Measures for the inclusion and protection of women workers, including gender-appropriate and separately provided sanitary, changing and welfare facilities with lockable doors, equal pay, maternity rights and a zero-tolerance approach to GBVH and SEAH ▪ Arrangements to recognize workers' right to freedom of association and, where this is restricted, to allow alternative mechanisms such as elected worker representatives or committees through which workers can raise concerns regarding working conditions	Mitigation	Submission of Plan	Once prior to commencement of construction	EPC Contractor
Cumulative Impacts – Land Use, Community Safety and Access	▪ The relevant VECs with regard to cumulative impacts to both the Project and proposed Jordan Hijaz	▪ Maintaining the 100 m buffer required by the Ministry of Transport between permanent Project components and the planned railway route	Mitigation	Submission of detailed design	Once prior to commencement of construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	Railway include land use, community safety and access. ▪ The principal potential for cumulative interaction arises from the spatial overlap between the planned railway corridor and the Project, and from the temporary encroachment of the Project's Temporary Laydown Area within the 100 m railway buffer required by the Ministry of Transport.	▪ Continual formal engagement with the Ministry of Transport and the Jordan Hijaz Railway to confirm the railway program and to identify any emerging interactions; and				

Table 99: ESMP for the Construction Phase

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
Air Quality and Dust	▪ Use of construction plant and equipment to undertake construction activities across the Project Site (Plant Area, Substation Area and Temporary Laydown Area) and Associated Facilities based on indicative plant and equipment types and numbers, including trucks and buses used for transportation ▪ Generation of dust associated with site preparation, earthworks and spoil movement across the Project Site and along the OHTL and gas and water pipeline tie-ins routes	▪ When storage, transport, and handling of bulk materials are made in the open air and exposed to the wind, the necessary dust abatement measures shall be implemented. ▪ All dust-generating materials transported to and from the construction worksites shall be covered by sheeting. ▪ The following shall be implemented to the extent possible/practicable: ▪ Minimize the storage time of spoil stockpiles ▪ Align stockpiles to the prevailing wind to minimize surface area exposed to wind erosion ▪ Minimize stockpile height and use gentle slopes and compact stockpile surfaces ▪ Store materials away from the site boundary and downwind of sensitive receptors ▪ Minimize the height and fall of excavation materials during handling ▪ Plan construction layouts so that machinery and dust-causing activities are located away from receptors, as far as is possible ▪ Consider the feasibility of erecting solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site ▪ Where possible/practicable, fully enclose site or specific operations where there is a high potential for dust production and the site is expected to be active for a prolonged period with adjacent receptors ▪ Keep site fencing, barriers, and scaffolding clean using wet methods (where feasible to do so) ▪ Remove materials that have the potential to produce dust from site as soon as possible unless being reused on site ▪ Cover, seed, or fence stockpiles to prevent wind whipping ▪ Prohibit bonfires and burning of waste materials ▪ Where applicable, revegetate earthworks and exposed areas/soil stockpiles to stabilize surfaces as soon as practicable. Use Hessian, mulches, or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable ▪ Only remove the cover in small areas during work, and not all at once ▪ Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place ▪ Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery ▪ For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust ▪ Use dust sweepers on the access and local roads (water-assisted where feasible to do so) ▪ Avoid dry sweeping of large areas	Mitigation	▪ Location, frequency, and approach for undertaking onsite and offsite visual inspections during construction activities to confirm the effectiveness of dust control measures and the need, if required, for additional dust reduction measures and management practices to adequately control dust emissions ▪ Records of inspections and findings to be kept and maintained ▪ Triggers for increasing the frequency of site inspections, e.g. when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions ▪ Reporting and communication process related to dust visual monitoring results ▪ Ensure the Project Grievance Mechanism includes the process for handling and responding to dust complaints, including requirements associated with conducting reviews of dust management practices and dust monitoring in response to complaints.	Continuous during construction	EPC Contractor
Noise	▪ Use of construction plant and equipment to undertake construction activities across the Project Site (Plant Area, Substation Area and Temporary Laydown Area) and Associated Facilities based on typical plant and	▪ During construction, the contractors shall implement the Air Quality and Noise Management Plan. ▪ Temporary noise barriers shall be used to reduce noise levels where appropriate and practicable. Such measures can be particularly appropriate for stationary or near-stationary plant such as compressors. Barriers shall be located as close to the plant as possible and, in order to provide adequate attenuation, shall have a mass per unit area of at least 7 kg/m^2. The screens may include soil mounds, site offices, site huts, acoustic sheds, or partitions. ▪ All compressors and generators used during construction activities shall be “sound reduced” models and fitted with properly lined and sealed acoustic covers, which	Mitigation	▪ Records of inspections and findings to be kept and maintained ▪ Triggers for increasing the frequency of site inspections. ▪ Ensure the Project Grievance Mechanism includes the process for handling and responding	Continuous during construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	equipment types and numbers	shall be kept closed whenever the machines are in use, and all pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers. ▪ High noise-generating works (e.g., piling) shall be planned in line with national regulations and respect maximum ambient noise levels at the nearest receptors. ▪ Stationary equipment (such as temporary generators and compressors) shall be located as far as possible from nearby receptors (e.g., communities). Equipment known to emit noise strongly in one direction, whenever possible, shall be oriented so that the noise is directed away from any sensitive receptors. ▪ Where reasonably practicable, fixed items of construction plant shall be electrically powered in preference to diesel or petrol-driven. ▪ All ancillary plant, such as generators and pumps, shall be positioned so as to cause minimum noise disturbance, and, if necessary, acoustic enclosures should be provided.		to dust complaints, including requirements associated with conducting reviews of dust management practices and dust monitoring in response to complaints.		
▪ Biodiversity	▪ Permanent land conversion at the Plant Site (including the existing wadi), Substation Site and at the bases of the towers along the OHTL route ▪ Temporary removal of vegetation and surface material within the water and gas pipeline rights-of-way, and across the Temporary Laydown Area, noting the rights-of-way and laydown area will be reinstated ▪ Elevated dust affecting vegetation adjacent to the construction works ▪ Wildlife entrapment within trenches, temporary excavations, and fences ▪ Collision with vehicles, with the majority of vehicle movements associated with the Project during construction ▪ Attraction of wildlife due to uncontrolled waste disposal	▪ Active monitoring for the Greek Tortoise must be maintained throughout the construction and excavation phases. Because this globally threatened species is highly vulnerable to road traffic, workers must exercise extreme caution during leveling and construction activities. Any tortoises observed within the active footprint must be immediately removed from the working area in accordance with the requirements above. ▪ Demarcation of all areas where construction will occur to ensure that all earthworks will be strictly limited to the required areas and existing vegetation is retained as far as possible during site preparation	▪ Mitigation	▪ Active monitoring for the Greek Tortoise ▪ Submission of Monitoring reports	▪ Continuous during construction	▪ EPC Contractor
Physical Terrestrial Environment	▪ The moving nature of the pipeline and OHTL construction activities may create a temporary and minor disruption to surface water flows; however, it is assumed that reinstatement leaves no permanent alterations to	▪ Implementation of the Construction Pollution Prevention Plan during construction and of the Pollution Prevention Management Plan and operational emissions monitoring under the Operational Environmental and Social Management System (ESMS)	Mitigation	Submission of Plan	Continuous during construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	surface water flows or accumulation ▪ The potential for impact exists at the drainage channels to be crossed along the pipeline and OHTL; however, these are not considered to be of high risk and can be managed through detailed design. Currently, detailed construction plans have not been developed, but will form part of the detailed design stage ▪ It is assumed that construction plans will be developed to assess drainage risks during construction, promoting reduced exposure in periods where rainfall is most likely to occur, and evaluating the need for installing temporary water bypass channels, as well as scheduling the main Site drainage works such as to protect the site from seasonal flood risk through the overall construction program					
Landscape and Visual Amenity	▪ Construction requires extensive clearance of vegetation and topsoil, grading and earthworks, wadi re-routing and excavation, temporarily and, in places, permanently altering the landform and drainage of the site ▪ Cranes, plant, stockpiles, spoil, dust and temporary facilities would be visible across the open plain from nearby communities and grazers for the duration of construction ▪ Night-time construction lighting would introduce artificial light into a currently dark setting,	▪ Screening and siting: siting of laydown areas, stockpiles and temporary facilities to reduce their visibility from nearby communities, and use of temporary screening where practicable ▪ Dust control: implementation of dust suppression during clearance, earthworks, stockpiling and vehicle movements by the EPC Contractor to protect visual amenity and surrounding vegetation (aligned within the Air Quality and Noise Management) ▪ Lighting control: management of construction lighting to minimize light spill toward residential communities, using directional and shielded fittings and limiting night-time working where feasible ▪ Progressive reinstatement: reinstatement of temporary working areas, landform, drainage and vegetation to pre-construction condition or better as soon as works are complete, with photographic records before and after works ▪ Stakeholder engagement and grievance redress: continued engagement with affected residents and local authorities on landscape and visual matters, with landscape, visual and lighting complaints handled through the Project Grievance Mechanism	Mitigation	Continuous Monitoring and submission of grievance log	Continuous during construction	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	extending visual effects beyond daylight hours ▪ The erection of steel lattice OHTL towers and part-built structures would begin to change the local landscape character					
Archaeology and Cultural Heritage	▪ Construction ground disturbance works may result in accidental damage to or loss of an unknown subsurface archaeological/cultural heritage resource. ▪ The effect of damage to or loss of an encountered archaeological/cultural heritage resource would be direct, long-term and irreversible. However, the likelihood of encountering and/or accidentally damaging or destroying an archaeological/cultural heritage resource of importance or value is low	▪ The EPC Contractor shall implement the Chance Find Procedure throughout the construction works at the Project site and Associated Facilities. ▪ All Project ground-breaking and ground-clearance works, including trenching, grading, excavations, soil movements and stockpiling, shall be carried out within the established construction footprint of the Project site and Associated Facilities. ▪ The EPC Contractor shall establish an archaeological watching brief for all ground disturbance/ground-breaking works, which shall not commence or continue without the presence of a qualified archaeologist. The watching brief shall continue until the completion of construction-related earthworks, including reinstatement. ▪ When a chance find is encountered, a report of the following minimum contents shall be prepared and submitted to the DoA: ▪ Photographic record of the chance finds, including photographs of the barriers and warning signage erected. ▪ Chance find location (Global Positioning Systems (GPS) coordinates) and topographic description. ▪ Description of the nature and conditions of the chance find. ▪ On completion of the DoA assessment of the chance find, the above report shall be updated with the findings of the Inspection Office and supplemented with the following formal correspondence from the Inspection Office: (i) the letter outlining any mitigation measures to be implemented, (ii) the letter granting permission to resume construction work within the chance find location. ▪ During reinstatement, the Engineering, Procurement and Construction (EPC) Contractor shall continue to work within the established construction footprint of the Project site and Associated Facilities and adhere to a sensitive backfilling and site clean-up methodology.	Mitigation	▪ The EPC Contractor shall establish an archaeological watching brief for all ground disturbance/ground-breaking works, which shall not commence or continue without the presence of a qualified archaeologist. The watching brief shall continue until the completion of construction-related earthworks, including reinstatement. ▪ When a chance find is encountered, a report of the following minimum contents shall be prepared and submitted to the DoA: ▪ Photographic record of the chance finds, including photographs of the barriers and warning signage erected. ▪ Chance find location (Global Positioning Systems (GPS) coordinates) and topographic description. ▪ Description of the nature and conditions of the chance find. ▪ On completion of the DoA assessment of the chance find, the above report shall be updated with the findings of the Inspection Office and supplemented with the following formal correspondence from the Inspection Office: (i)	Upon Occurrence	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
				the letter outlining any mitigation measures to be implemented, (ii) the letter granting permission to resume construction work within the chance find location.		
Community Health, Safety, Security and 3rd Party Infrastructure and Services	▪ Construction hazards and disturbances: open trenches and unprotected excavations (including along the water, gas pipeline and OHTL routes) present a hazard to community members and livestock, particularly where they intersect grazing movements, pedestrian routes; safety hazards associated areas of the site that are not fenced; the potential for spills or fire associated with the on-site storage of fuels, oils and chemicals; and increased exposure to flooding where temporary works alter natural wadi drainage patterns ▪ Traffic, access and road safety: increased vehicle movements on the existing public road and highway network, creating collision and safety risks for pedestrians, herders, livestock and other road users, together with temporary access restrictions and accelerated deterioration of local roads ▪ Community infrastructure and services: localized pressure on health services, water, supply, sanitation, waste management and emergency response capacity, particularly for the smaller municipalities of Al-Basiliyah and Hosha	▪ Implementation of all community health and safety measures set out in the various plans to include the Traffic and Transportation Management Plan, the Waste Management Plan, and the Project Emergency Preparedness and Response Plan and, supported by continuous monitoring, transparent communication and proactive engagement with local authorities and community representatives ▪ Advance notification of construction schedules and public awareness campaigns to alert communities to work schedules, restricted zones, temporary closures, detours and safety precautions, with particular attention to schools, grazing areas and routes used by livestock	Mitigation	▪ Monitoring, recording and reporting of community safety incidents, near-misses and grievances, with emerging risks triggering corrective action, supported by periodic joint inspections with local municipalities and districts	Periodic (joint inspections); otherwise not specified in the ESIA.	EPC Contractor
		▪ A post-construction verification and close-out program, including final safety inspections, reinstatement verification, the closure of temporary access routes and laydown areas with appropriate signage and rehabilitation, and post-construction consultation with communities and land users to confirm that residual risks have been addressed prior to operation	Mitigation	▪ A post-construction verification and close-out program, including final safety inspections, reinstatement verification, the closure of temporary access routes and laydown areas with appropriate signage and rehabilitation, and post-construction consultation with communities and land users to confirm that residual risks have been addressed prior to operation	Post-construction / prior to operation	EPC Contractor

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
Local Employment and Local Content	▪ The Project will generate a substantial volume of temporary employment, of up to approximately 1,500 personnel at peak, and a significant value of procurement and subcontracting opportunities over the approximately 20-month construction period, given the scale of the works and the number of contractors involved ▪ If managed effectively, these opportunities could make a major positive contribution to local livelihoods, household income stability and local business activity ▪ Conversely, the magnitude of potential adverse effects is also major if expectations are not met or if recruitment and procurement are not transparent and inclusive, since the real or perceived exclusion of local workers or suppliers could lead to significant dissatisfaction	▪ Implementation of all measures set out in the Local Employment and Local Procurement procedure, supported by continuous monitoring, transparent communication and proactive engagement with local authorities and community representatives, including through the following: ▪ All construction employment opportunities announced publicly and in advance through accessible local channels, clear, merit-based recruitment criteria and selection through a diverse committee in coordination with local authorities ▪ Identification and pre-qualification of local suppliers, subcontractors and service providers wherever feasible, subject to health, safety, environmental and ethical standards, with procurement prioritizing local companies, particularly SMEs and cooperatives, from within the Project area, and contracts unbundled where feasible to enable local participation ▪ Recruitment and local contracting coordinated through the municipal, district and sub-district authorities to ensure alignment with labor regulations and fairness, with Local Advisory Committees if adopted, where relevant, to facilitate communication and defuse grievances ▪ Inclusive participation: targeted outreach through local community associations, cooperatives and social media to under-represented groups, including women, youth, disabled youth and small businesses, so that opportunities are accessible to all segments of the population and not only to well-connected individuals or families ▪ Grievance redress: employment- and procurement-related grievances received, documented and resolved promptly through the Project Grievance Mechanism ▪ Managing expectations: clear, early and consistent communication with communities about the number, type, timing and temporary nature of construction opportunities, to avoid raising unrealistic expectations	Mitigation	▪ Monitoring and reporting: tracking and periodic public reporting of indicators including the number and percentage of local hires (disaggregated by locality, gender, age and skill level), the number and value of contracts awarded to local suppliers and to local women's associations and cooperatives, the number and resolution rate of employment and procurement grievances, participation in training programs, and community satisfaction, with quarterly monitoring summaries shared with lenders, local authorities and communities	Quarterly monitoring summaries	EPC Contractor
Labor Management, Working Conditions and Occupational Health and Safety	▪ The construction workforce is large, of up to approximately 1,500 personnel at peak, and will be engaged through numerous contractors and subcontractors over an intensive construction period of around 20 months, increasing the complexity of oversight and the likelihood of inconsistent labor and OHS practices ▪ The construction and commissioning activities are inherently high-risk, and the consequences of an OHS failure can be severe, including serious injury or fatality	▪ Implementation of the Labor and Working Conditions Management Plan and the OHS Management Plan across the EPC Contractor and all subcontractors, with clear contractual flow-down of labor and OHS requirements to every subcontractor and third-party employer ▪ Contractor management and oversight: commercially reasonable due diligence on the labor and OHS practices of contractors, subcontractors and recruitment agents, incorporation of Project requirements into contracts, and monitoring of performance with corrective action where required ▪ OHS supervision: competent OHS supervision on site, permit-to-work systems for high-risk activities, regular inspections, toolbox talks, and enforcement of the right of workers to stop or refuse unsafe work without penalty ▪ Accommodation and welfare monitoring: where camps or welfare facilities are provided, regular inspection and monitoring against the Worker Accommodation Standards ▪ Worker grievance redress: operation of the confidential worker grievance mechanism, with prompt documentation and resolution of concerns and no retaliation against those raising them	Mitigation	▪ Monitoring and reporting: monthly contractor reporting of workforce metrics, including workforce numbers, gender, nationality, hours worked, training delivered, OHS statistics (incidents, injuries, lost-time cases and near-misses), accommodation conditions and grievances, maintained under the oversight of the Project's environmental and social team through labor inspections, compliance audits,	Monthly (contractor reporting); other inspection/audit frequencies not specified in the ESIA.	EPC Contractor and all subcontractors

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	▪ Extreme heat, sand and dust storms, high winds and potential flash flooding elevate the risk of heat stress and other harm unless actively managed ▪ The potential engagement of foreign and migrant workers, and the possible use of temporary accommodation, introduce risks relating to recruitment practices, equal treatment and living conditions that, if unmanaged, could be significant			documentation review and worker interviews		
Gender-Based Violence, Sexual Exploitation, Abuse and Harassment (GBVH/SEAH)	▪ Based on the baseline assessments undertaken, the magnitude of potential GBVH/SEAH impacts is assessed as High Negative for the construction phase and Medium Negative for the operations phase, with the following justification: ▪ The workforce is anticipated to be predominantly male, comprising 1,600 persons during construction for 20 months, and 60 persons during operations for 25 years. ▪ The Project site is located in close proximity to local communities of Northwestern Badia and Qasabet AlMafraq, which may be used for temporary accommodating the construction personnel. ▪ Even a small number of GBVH incidents may have serious and long-lasting effects on survivors and can undermine trust in the Project.	▪ The Project will establish and enforce a Project-wide GBVH/SEAH Code of Conduct for all workers, managers, and subcontractors, translated into Arabic (or other languages if necessary). All workers will be required to read and sign this Worker Code of Conduct (provided in the worker's language), which will also be explained verbally ▪ The EPC Contractors and their subcontractors will be required to implement robust GBVH/SEAH Prevention and Response Action Plans ▪ All workers will undergo mandatory induction and periodic refresher training on behavioral expectations, boundaries, and consequences of misconduct ▪ Supervision protocols will be developed to prevent worker-community misconduct, including restrictions on worker movement where necessary ▪ A Drug and Alcohol Policy shall be developed and implemented, together with a Zero Tolerance Policy for drug- and alcohol-related incidents. The policies shall apply to all Project personnel and shall be enforced within worker accommodation facilities and during interactions in nearby communities ▪ Worker accommodation shall be maintained in compliance with IFC/EBRD Worker Accommodation Guidelines ▪ Separate, lockable, well-lit sanitary, changing, prayer and (where applicable) accommodation facilities shall be provided for women workers ▪ Project Grievance Mechanism (GRM) shall integrate GBVH-sensitive channels, ensuring confidentiality, anonymity, and non-retaliation and multiple reporting pathways (Community Liaison Officers (CLOs) women focal points, hotline, WhatsApp, trusted community intermediaries) ▪ Staff responsible for GRM and CLOs shall receive specialized GBVH/SEAH training ▪ The Project shall pre-identify and partner with specialized local GBVH service providers, including shelters, psychosocial services, and legal assistance, to ensure referral pathways for survivors. Available resources can be mapped with support from the Ministry of Social Development and CBOs ▪ Community Engagement shall include women-only consultations, where necessary, ensuring women can raise safety concerns freely ▪ The Project shall provide construction updates and worker presence notifications in all urban locations. ▪ Contractors shall undertake accountability for: ▪ Immediate dismissal and legal referral for confirmed GBVH/SEAH violations ▪ Contractual penalties and performance monitoring linked to GBVH/SEAH compliance ▪ Require subcontractor compliance as a condition of contract award ▪ Gender-sensitive security searches will be adopted if required	Mitigation	▪ Project monitoring and reporting system shall include GBVH/SEAH indicators, including training completion, incidents reported, response times, and status of corrective actions and third-party audits as required. Because GBVH/SEAH can never be reduced to zero, it will remain a high-priority, ongoing monitoring area	Periodic refresher training; ongoing monitoring.	EPC Contractors and subcontractors

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
		▪ Safe female recruitment shall be promoted, including gender-inclusive advertising and mixed-sex selection panels				
Cumulative Impacts – Land Use, Community Safety and Access	▪ The relevant VECs with regard to cumulative impacts to both the Project and proposed Jordan Hijaz Railway include land use, community safety and access. ▪ The principal potential for cumulative interaction arises from the spatial overlap between the planned railway corridor and the Project, and from the temporary encroachment of the Project's Temporary Laydown Area within the 100 m railway buffer required by the Ministry of Transport.	▪ Reinstatement and close out of the Temporary Laydown Area on completion of construction, removing the temporary encroachment within the railway buffer ▪ Should the railway advance into a period of concurrent construction or operation, managing the resulting access, traffic and safety interactions through the Traffic and Transportation Management Plan, coordinated with the railway authority.	Submission of completion of construction survey	▪ Continual formal engagement with the Ministry of Transport and the Jordan Hijaz Railway to confirm the railway program and to identify any emerging interactions; and	Continual	EPC Contractor
Cumulative Impacts – Landscape, Biodiversity and Community	▪ The relevant VECs with regard to the cumulative effects associated with the Project and the NEPCO North Substation and OHTLs Project are the shared landscape, terrestrial habitats and communities of the Rihab–Mafraq area. ▪ They may, where their construction programs coincide, give rise to additive effects on landscape and visual amenity, terrestrial habitats (including the Irbid–Mafraq Plains), traffic and community disturbance.	▪ Coordination with NEPCO on construction scheduling, traffic management and reinstatement to avoid duplication of disturbance where the construction programs coincide ▪ Delivery of landscape, habitat and community mitigation through the Biodiversity Management Plan	Submission of Plan	Continuous Coordination throughout the construction phase	Continual	EPC Contractor NEPCO

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
▪ Cumulative Impacts – All VECs	▪ Air quality ▪ Land use, community health, safety and access ▪ Landscape, biodiversity and grid infrastructure ▪ Global climate	▪ Where regional monitoring programs exist or are established by others, the Project will seek to align its own monitoring with them to reduce duplication and to contribute to a shared understanding of cumulative effects. ▪ Stakeholder engagement, initiated during scoping and continued throughout the ESIA, will be maintained for the life of the Project through ongoing consultation and the Project grievance mechanism, so that community concerns regarding cumulative effects are identified, documented and addressed.	▪ Mitigation	▪ Where regional monitoring programs exist or are established by others, the Project will seek to align its own monitoring with them to reduce duplication and to contribute to a shared understanding of cumulative effects. ▪ Stakeholder engagement, initiated during scoping and continued throughout the ESIA, will be maintained for the life of the Project through ongoing consultation and the Project grievance mechanism, so that community concerns regarding cumulative effects are identified, documented and addressed.	▪ For the life of the Project (stakeholder engagement);	▪ Developer

Table 100: ESMP for the Operation Phase

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
Air Quality and Dust	Use of the CCPP turbines during the operations phase	▪ Air Quality and Noise Management Plan will be developed and will include measures to ensure air quality impacts during operations are minimized, including the need to operate and maintain combustion equipment pursuant to the manufacturer's specifications, managing complaints, conducting air quality monitoring (where necessary) in response to complaints and undertaking operational emission monitoring and reporting, including monitoring via CEMS, manual stack emission sampling and fugitive emissions monitoring.	Mitigation	Submission of Monitoring Reports	Continuous during operation	Project Operator
Noise	Operation of the CCPP during the operations phase	▪ Operations Phase Air Quality and Noise Management Plan will be developed as part of the Operational ESMS and will include measures to ensure noise impacts during operations are minimized, including the need to operate and maintain equipment pursuant to the manufacturer's specifications, community relations management, managing complaints and conducting noise monitoring in response to complaints and specify requirement for dedicated point of contact to manage complaints. ▪ Operational logistics (e.g. deliveries to Project sites) to be planned to minimize noise impacts to communities. ▪ Noise survey to be carried out at the boundary of the Project site in the first year of stable operations to confirm the need for subsequent surveys in the event of a grievance, and if noise exceedances are recorded.	Mitigation	Submission of Monitoring Reports	Continuous during operation	Project Operator
		▪ Noise survey to be carried out at the boundary of the Project site in the first year of stable operations to confirm the need for subsequent surveys in the event of a grievance, and if noise exceedances are recorded.	Mitigation	▪ Noise survey to be carried out at the boundary of the Project site in the first year of stable operations to confirm the need for subsequent surveys in the event of a grievance, and if noise exceedances are recorded.	1st year of operation and if triggered continuous during operation	Project Operator
Biodiversity	▪ Attraction of wildlife, particularly avifauna, during evaporation pond operations ▪ Avifauna collision risk from the OHTL	▪ Implement an avifauna Post Construction Fatality Monitoring (PCFM) program along the OHTL route during spring and autumn migration periods in specific. In coordination with lenders and RSCN, should results indicate significant impacts and/or risks, discussion must occur with NEPCO for adaptive management including installation of BFDs	Mitigation	▪ Implement an avifauna Post Construction Fatality Monitoring (PCFM) program along the OHTL route during spring and autumn migration periods in specific. In coordination with lenders and RSCN, should results indicate significant impacts and/or risks, discussion must occur with NEPCO for adaptive management including installation of BFDs	Continuous during operation	Project Operator NEPCO
Physical Terrestrial Environment	▪ Impacts to surface water flows will be restricted to the Project Site, specifically the Plant and Substation	▪ Specific requirements relating to the design and maintenance of the evaporation pond to ensure measures to minimize potential for contamination to soils and groundwater, e.g. due to a spill or loss of integrity, are integrated into the design, including ongoing monitoring requirements	Mitigation	▪ Specific requirements relating to the design and maintenance of the evaporation pond to	Ongoing	Project Operator

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	Areas, the design of which have yet to be finalized. The design will incorporate new drainage channels and embankments designed to divert runoff away from the site and to provide appropriate flood protection equivalent to a 1 in 100-year rainfall event (including a 20% climate change allowance). The detailed design of the drainage and flood protection system will include consideration of the Site access and egress and will be undertaken in consultation with the relevant competent authorities including the Ministry of Transport. ▪ Drainage from areas with hazardous materials, e.g., in areas where hazardous waste or fuel is stored. Drainage from these locations will either be handled as waste and disposed of by licensed facilities, treated on-site and recycled or sent to the evaporation pond ▪ Accidental spills to soils and groundwater associated with the evaporation pond due to loss of integrity during operations			ensure measures to minimize potential for contamination to soils and groundwater, e.g. due to a spill or loss of integrity, are integrated into the design, including ongoing monitoring requirements		
Landscape and Visual Amenity	▪ The permanent presence of the plant, buildings, stacks, substation and evaporation pond introduces new industrial structures into an open, low-rise landscape for the operational life of the Project ▪ The OHTL towers, conductors, and the above-ground metering station form permanent linear and vertical features across the open plain, readily visible in	▪ Maintenance of the recessive color finishes, screening and any landscape planting established to soften the appearance of the facility ▪ Management of operational and security lighting to minimize light spill and sky glow while maintaining safety ▪ Occasional access to the OHTL, pipelines and substation for maintenance, managed to minimize disturbance to surrounding land and receptors	Mitigation	Submission of photographic proofs and periodic inspections	Post-construction; and ongoing during operation.	Project Operator
		▪ Continuation of the grievance mechanism for any landscape, visual or lighting matters arising during operation	Mitigation	▪ A post-construction review to confirm the reinstatement of temporary working areas and the effectiveness of screening and color treatment	Post-construction	Project Operator

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	the absence of natural screening ▪ Permanent operational and security lighting introduces a continuous source of night-time light and sky glow into the surrounding dark landscape					
Community Health, Safety, Security and 3rd Party Infrastructure and Services	▪ Major accident hazards and process safety: the potential for fire, explosion or hazardous release associated with the natural gas system and tie-in, distillate oil storage, chemical storage and the high-temperature and high-pressure steam and water systems, with the potential to affect the nearest receptors located within approximately 500 m of the Project Site ▪ Electrical safety and the OHTL and substation: electrocution and the need to maintain safe clearances along the OHTL right of way (RoW), together with community concern regarding potential exposure to electric and magnetic fields (EMF) ▪ Traffic and transport: ongoing, lower-level movements associated with the operational workforce and the delivery of distillate oil, chemicals, consumables and the removal of wastes ▪ Security arrangements: the ongoing presence and conduct of operational security personnel	▪ Development and implementation of an Operations community health, safety and security measures, including emergency preparedness and response arrangements coordinated with civil defense and local authorities ▪ Implementation of a process safety and major accident hazard management approach, including hazard identification and assessment (for example, HAZID and HAZOP studies), fire safety measures, the maintenance of secondary containment and emergency shutdown systems, and operational integrity management for the gas, fuel, chemical and steam systems	Mitigation	Submission of Plan	Continuous throughout the operation phase	Project Operator
		▪ Maintenance of electrical safety and safe clearances along the OHTL RoW and at the substation, and the provision of public awareness of the associated hazards, to be undertaken by NEPCO	Mitigation	Coordination with NEPCO	Prior to commencement of operation	NEPCO
		▪ Continuation of operational security arrangements in line with international good practice, and maintenance of the Project Grievance Mechanism throughout operation	Mitigation	Submission of Plan	Continuous throughout the operation phase	Project Operator
		▪ Maintaining the aviation warning lighting, obstacle markings and aerial warning spheres on all permanent tall structures and the OHTL in operable condition throughout the operational phase, and preserving the validity of the CARC No Objection Certificate, including notification to CARC and the Royal Jordanian Air Force of any subsequent changes to structure heights or configurations	Mitigation	Submission of Plan	Continuous throughout the operation phase	Project Operator
Local Employment and Local Content	▪ Operation will generate only a small number of permanent jobs, of around 60 personnel over 25 years, and a correspondingly limited volume of ongoing procurement, so the scale	▪ Continuation of transparent, non-discriminatory local recruitment for the approximately 60 operational roles, prioritizing local community members with the prerequisite skills in accordance with Jordanian law ▪ Incorporation of local employment and local procurement commitments with continued local procurement of operational goods and services where feasible	Mitigation	Submission of Plan	Continuous throughout the operation phase	Project Operator

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	of both beneficial and adverse effects during operation is low ▪ The main operational sensitivity arises not from operation itself but from the sharp reduction in employment on completion of construction, and from the risk that expectations of long-term employment are not met ▪ Routine operational procurement, including fuel and chemical deliveries, maintenance, waste services and security, nonetheless offers a modest but sustained opportunity for continued local supply	▪ Management of the construction-to-operations transition, including advance notice of demobilization timelines, support for released workers where feasible, and continuation of the Project Grievance Mechanism throughout operation				
Labor Management, Working Conditions and Occupational Health and Safety	▪ Operation involves a small permanent workforce of around 60 personnel working under controlled, procedure-based conditions, so the routine scale of effect is limited ▪ The principal operational risks arise during maintenance and outage activities, when higher-hazard tasks are undertaken, and additional contractors may be engaged ▪ The one-off reduction of the workforce on completion of construction represents a collective demobilization that requires fair management	▪ Incorporation of labor, working conditions and OHS requirements and the O&M contract, with flow-down to maintenance and specialist contractors ▪ Continuation of the OHS Management System during operation, including permit-to-work, hazardous-work controls, training, health surveillance where relevant, incident reporting and emergency preparedness, with particular attention to maintenance and outage activities ▪ Continuation of the worker grievance mechanism, the Worker Code of Conduct and non-discriminatory, fair employment practices for the operational workforce ▪ Fair management of the construction-to-operations transition and demobilization of the construction workforce, including advance notice, payment of all wages, benefits and end-of-service entitlements due under law and contract, and, where collective dismissals arise, management as a retrenchment consistent with lender requirements	Mitigation	▪ Continuation of the OHS Management System during operation, including permit-to-work, hazardous-work controls, training, health surveillance where relevant, incident reporting and emergency preparedness, with particular attention to maintenance and outage activities	Continuous throughout the operation phase	Project Operator
Gender-Based Violence, Sexual Exploitation, Abuse and Harassment (GBVH/SEAH)	▪ Based on the baseline assessments undertaken, the magnitude of potential GBVH/SEAH impacts is assessed as High Negative for the construction phase and Medium Negative for the operations phase, with the following justification:	▪ The Project will adopt a survivor-centred, confidential, and zero-tolerance approach to GBVH/SEAH risk management to comply with Jordanian labor law and international best practices. ▪ The Project will establish and enforce a Project-wide GBVH/SEAH Code of Conduct for all workers, managers, and subcontractors, translated into Arabic (or other languages if necessary). All workers will be required to read and sign this Worker Code of Conduct (provided in the worker's language), which will also be explained verbally ▪ All workers will undergo mandatory induction and periodic refresher training on behavioral expectations, boundaries, and consequences of misconduct	Mitigation	▪ Project monitoring and reporting system shall include GBVH/SEAH indicators, including training completion, incidents reported, response times, and status of corrective actions and third-party audits as required.	Periodic refresher training; ongoing monitoring.	Project Operator

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	▪ The workforce is anticipated to be predominantly male, comprising 1,600 persons during construction for 20 months, and 60 persons during operations for 25 years. ▪ The Project site is located in close proximity to local communities of Northwestern Badia and Qasabet AlMafraq, which may be used for temporary accommodating the construction personnel. ▪ Even a small number of GBVH incidents may have serious and long-lasting effects on survivors and can undermine trust in the Project.	▪ Supervision protocols will be developed to prevent worker-community misconduct, including restrictions on worker movement where necessary ▪ A Drug and Alcohol Policy shall be developed and implemented, together with a Zero Tolerance Policy for drug- and alcohol-related incidents. The policies shall apply to all Project personnel and shall be enforced within worker accommodation facilities and during interactions in nearby communities ▪ Worker accommodation shall be maintained in compliance with IFC/EBRD Worker Accommodation Guidelines ▪ Separate, lockable, well-lit sanitary, changing, prayer and (where applicable) accommodation facilities shall be provided for women workers ▪ Project Grievance Mechanism (GRM) shall integrate GBVH-sensitive channels, ensuring confidentiality, anonymity, and non-retaliation and multiple reporting pathways (Community Liaison Officers (CLOs) women focal points, hotline, WhatsApp, trusted community intermediaries) ▪ Staff responsible for GRM and CLOs shall receive specialized GBVH/SEAH training ▪ The Project shall pre-identify and partner with specialized local GBVH service providers, including shelters, psychosocial services, and legal assistance, to ensure referral pathways for survivors. Available resources can be mapped with support from the Ministry of Social Development and CBOs ▪ Community Engagement shall include women-only consultations, where necessary, ensuring women can raise safety concerns freely ▪ Gender-sensitive security searches will be adopted if required ▪ Safe female recruitment shall be promoted, including gender-inclusive advertising and mixed-sex selection panels		Because GBVH/SEAH can never be reduced to zero, it will remain a high-priority, ongoing monitoring area		
Cumulative Impacts – Air Quality	▪ The relevant VEC associated with the cumulative emission from both the Project and the gas compressor station is the ambient air quality within the communities surrounding the facilities. ▪ A significant cumulative air quality impact is considered unlikely with impacts no greater than predicted for the Project in isolation.	▪ Maintain the embedded emission controls, comprising the routine firing of natural gas, low-NOx burners, the restriction of higher-emission distillate oil to a maximum of 14 days per year, and 60 m HRSG main stacks to promote dispersion ▪ Undertake operational ambient air quality monitoring, supported by continuous emissions monitoring (CEMS), manual stack sampling and complaint-driven monitoring under the operational ESMS. This ambient monitoring will account for all cumulative sources that contribute to the air quality at the selected receptors including the gas compressor facility when it becomes operational; and ▪ Adopt an adaptive management trigger whereby a confirmed exceedance of the applicable ambient air quality standard or substantiated community complaints prompt investigation and corrective action, including engagement with the compressor station operator where relevant.	Mitigation	▪ Undertake operational ambient air quality monitoring, supported by continuous emissions monitoring (CEMS), manual stack sampling and complaint-driven monitoring under the operational ESMS. This ambient monitoring will account for all cumulative sources that contribute to the air quality at the selected receptors including the gas compressor facility when it becomes operational; and ▪ Adopt an adaptive management trigger whereby a confirmed exceedance of the applicable ambient air quality standard or substantiated community complaints prompt investigation and corrective action, including engagement	Continuous (CEMS); complaint-driven monitoring; otherwise not specified in the ESIA.	Project Operator

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
				with the compressor station operator where relevant.		
Cumulative Impacts – Land Use, Community Safety and Access	▪ The relevant VECs with regard to cumulative impacts to both the Project and proposed Jordan Hijaz Railway include land use, community safety and access. ▪ The principal potential for cumulative interaction arises from the spatial overlap between the planned railway corridor and the Project, and from the temporary encroachment of the Project's Temporary Laydown Area within the 100 m railway buffer required by the Ministry of Transport.	▪ Maintaining the 100 m buffer required by the Ministry of Transport between permanent Project components and the planned railway route ▪ Continual formal engagement with the Ministry of Transport and the Jordan Hijaz Railway to confirm the railway program and to identify any emerging interactions; and ▪ Should the railway advance into a period of concurrent construction or operation, managing the resulting access, traffic and safety interactions through the Traffic and Transportation Management Plan, coordinated with the railway authority.	Mitigation	▪ Continual formal engagement with the Ministry of Transport and the Jordan Hijaz Railway to confirm the railway program and to identify any emerging interactions; and	Continual	Project Operator
Cumulative Impacts – Landscape, Biodiversity and Community	▪ The relevant VECs with regard to the cumulative effects associated with the Project and the NEPCO North Substation and OHTLs Project are the shared landscape, terrestrial habitats and communities of the Rihab–Mafraq area. ▪ They may, where their construction programs coincide, give rise to additive effects on landscape and visual amenity, terrestrial habitats (including the Irbid–Mafraq Plains), traffic and community disturbance.	▪ Implementation of the post-construction bird fatality monitoring program on the Project's OHTL, using its results to determine the significance of collision and electrocution effects and to inform adaptive management, and alignment of this monitoring with NEPCO's programs to build a regional picture of effects on avifauna where practicable ▪ Management of electrical safety and electric and magnetic field (EMF) considerations along the OHTL rights of way through design, safe clearances and maintenance, with NEPCO responsible for its own infrastructure; and ▪ Adoption of an adaptive management trigger whereby monitoring that indicates elevated cumulative effects on habitats or avifauna prompts additional mitigation and coordination with NEPCO.	Mitigation	▪ Implementation of the post-construction bird fatality monitoring program on the Project's OHTL, using its results to determine the significance of collision and electrocution effects and to inform adaptive management, and alignment of this monitoring with NEPCO's programs to build a regional picture of effects on avifauna where practicable ▪ Adoption of an adaptive management trigger whereby monitoring that indicates elevated cumulative effects on habitats or avifauna prompts additional mitigation and coordination with NEPCO.	Post-construction fatality monitoring;	Project Operator
Cumulative Impacts – Climate Change / GHG Emissions	▪ GHG emissions are inherently cumulative, contributing to national	▪ Maintaining the embedded design measures that reduce emissions intensity, including combined-cycle operation (raising efficiency from approximately 35–40% in simple cycle to approximately 60%), routine firing on natural gas, low-NOx	Mitigation	▪ Monitoring, recording and reporting GHG emissions through the	Continuous throughout operation	Project Operator

Environmental Attribute	Potential Impact	Management Action	Type of Action	Monitoring and Reporting Action	Frequency	Responsible Entity
	and global atmospheric concentrations irrespective of their point of release.	combustion and the restriction of higher-carbon distillate oil to a maximum of 14 days per year ▪ Monitoring, recording and reporting GHG emissions through the operational ESMS, and managing exposure to carbon pricing, tightening standards and net-zero trajectories through the measures identified in the Climate Change Risk Assessment ▪ Setting the Project's contribution within Jordan's decarbonization trajectory and Nationally Determined Contribution, recognizing the additional renewable generation (up to 600 MW of solar PV in the Rihab–Mafraq area) enabled by grid reinforcements such as the NEPCO North Substation.		operational ESMS, and managing exposure to carbon pricing, tightening standards and net-zero trajectories through the measures identified in the Climate Change Risk Assessment		
Cumulative Impacts – Air Quality	▪ The relevant VEC associated with the cumulative emission from both the Project and the gas compressor station is the ambient air quality within the communities surrounding the facilities. ▪ A significant cumulative air quality impact is considered unlikely with impacts no greater than predicted for the Project in isolation.	▪ Undertake a quantitative cumulative dispersion assessment once the design and emission parameters (stack height, exit parameters and emission rates) for the Al Khanasri gas compressor station become available, to confirm the qualitative conclusion reached under Steps 4 and 5	Mitigation	▪ Undertake a quantitative cumulative dispersion assessment once the design and emission parameters (stack height, exit parameters and emission rates) for the Al Khanasri gas compressor station become available, to confirm the qualitative conclusion reached under Steps 4 and 5	Once the design and emission parameters for the Al Khanasri gas compressor station become available.	Project Operator
▪ Cumulative Impacts – All VECs	▪ Air quality ▪ Land use, community health, safety and access ▪ Landscape, biodiversity and grid infrastructure ▪ Global climate	▪ Where regional monitoring programs exist or are established by others, the Project will seek to align its own monitoring with them to reduce duplication and to contribute to a shared understanding of cumulative effects. ▪ Stakeholder engagement, initiated during scoping and continued throughout the ESIA, will be maintained for the life of the Project through ongoing consultation and the Project grievance mechanism, so that community concerns regarding cumulative effects are identified, documented and addressed.	▪ Mitigation	▪ Where regional monitoring programs exist or are established by others, the Project will seek to align its own monitoring with them to reduce duplication and to contribute to a shared understanding of cumulative effects. ▪ Stakeholder engagement, initiated during scoping and continued throughout the ESIA, will be maintained for the life of the Project through ongoing consultation and the Project grievance mechanism, so that community concerns regarding cumulative effects are identified, documented and addressed.	▪ Continuous throughout operation	▪ Project Operator

11. ANNEX

11.1 Annex I – Identified Households

Table 101: Identified Households

#	Latitude	Longitude	Description	Owner	Age	Gender	Social Status	Occupation	# of Children	Children Level of Education	Members in Household	Age Range	Permeant Accommodation	Own or Rent	Crops on Land	Cattle on Land	Personal Use	Trade Use
1	32.40705	36.056181	Structure under construction.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	32.406947	36.055591	Permanent residential structure. Occupant is a Safety Supervisor at the Gas Site.	Husam Rawashdeh	43	M	Married	Health and Safety Supervisor in the Gas Facility	5	School	7	1 to 43	Y	Own	Y	N	Y	N
3	32.408661	36.057122	Permanent residential structure with non-operational chicken farm. The father was visiting the occupant for a holiday – not a permanent resident there.	Turk Al Rawashdeh	80+	M	Unknown	Worker at the Gas Facility	2	University	3	36 to 80	Y	Own	Farm not in use	Farm not in use	N	Previously used for trade
4	32.403399	36.052337	Permanent residential structure. Consultation attempted; no contact made.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	32.402205	36.053512	Storage Area. Consultation attempted; no contact made.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

6	32.404652	36.052054	Residential structure with olive farm. Door locked; structure appears abandoned.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	32.404376	36.053738	Abandoned structure. No occupants present.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	32.417919	36.064999	Structure under construction with abandoned buildings on plot.	Mohammad Salameh	34	M	Married	Governmental Worker	3	School	5	Unknown	Under Construction	Own	N	N	N	N
9	32.418631	36.065658	Permanent residential structure.	Bilal Salameh	38	M	Married	Governmental Worker	6	School	9	Unknown	Under Construction	Own	N	N	N	N
10	32.419444	36.070748	Rented residential household.	Riyadh Al Sulayem	50	M	Married	Retired	5	School	7	10 to 30	Y	Rent	Y	N	Y	N
11	32.419444	36.070748	Consultation attempted; no contact made.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	32.419444	36.070748	Consultation attempted; no contact made.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	32.419778	36.072518	Permanent residential structure. Includes a total of four houses for siblings and cousins.	Adam Al Adwan	33	M	Single	Unemployed	0	Unknown	14	20 to 40	Y	Own	N	N	N	N
14	32.419856	36.072953	Permanent	Yasser Alshara'	28	M	Married	Unemployed	1	Unknown	3	1 to 28	Y	Own	N	N	N	N

			residential structure.															
15	32.419306	36.07449	Permanent residential structure.	Khalid Almkaifi	44	M	Married	Governmental Worker	5	School	7	8 to 44	Y	Own	Y	Y	Y	Y
16	32.417769	36.075602	Permanent residential structure.	Ali Almkaifi	57	M	Married	Retired	6	School	8	7 to 30	Y	Own	Y	Y	Y	N
17	32.416411	36.076192	Permanent residential structure. Consultation attempted; no contact made.	Ibrahim Almkaifi	Unknown	M	Married	Governmental Worker	2	Unknown	4	Unknown	Y	Own	Y	Y	N	Y
18	32.41635	36.076358	Permanent residential structure. Consultation attempted; no contact made.	Khalid Almkaifi	Unknown	M	Married	Retired	3	Unknown	5	Unknown	Y	Own	Y	Y	N	Y
19	32.415732	36.076864	Permanent residential structure with brick production activity. Occupant is father of occupants in households 15 and 16.	Jomaa Almkaifi	63	M	Married	Retired	6	Uni/ Higher Education Level	6	34 to 42	Y	Own	Y	Y	N	Y
20	32.419697	36.073792	Structure under construction. No occupants present.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	32.421026	36.057516	Residential structure. Consultation attempted; house	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

			owner was not present.															
22	32.420856	36.057076	Residential structure. Consultation attempted; occupant declined to respond.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	32.420744	36.056524	Permanent residential structure. Sons reside in Households 20 and 21 but are not currently present.	Ali Abu Zubaida	63	M	Married	Unknown	20	School	11	6 to 63	Y	Own	Y	Y	N	Y
24	32.421098	36.05661	Permanent residential structures. Consultation conducted by father in household 20.	Muna Abu Zubaida	40	F	Married	Unknown	5	School	7	8 to 18	Y	Own	N	Y	Y	N
25	32.421098	36.05661	Permanent residential structures.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	32.421098	36.05661	Permanent residential structures.	Adnan Mahmoud	38	M	Married	Governmental Worker	3	School	5	4 to 8	Y	Own	N	N	N	N
27	32.422614	36.055687	Permanent residential structures.	Ali Karasneh	53	M	Married	Retired	12	School	15	13 to 27	Y	Own	N	N	N	N
28	32.422614	36.055687	Residential structures are under construction.	Ali Karasneh	53	M	Married	Retired	12	School	15	13 to 27	Y	Own	N	N	N	N

29	32.422614	36.055687	Permanent residential structures.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	32.422614	36.055687	Permanent residential structures.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	32.422614	36.055687	Permanent residential structures.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	32.423268	36.054498	Consultation attempted; no contact made.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	32.423268	36.054498	Permanent residential structures.	Hanan Masa'd	34	F	Married	Governmental Worker	2	School	6	Unknown	Y	Own	N	N	N	N
34	32.422256	36.053818	Residential structure. No occupants observed.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

11.2 Annex II – Gender and Human Rights Risk Assessment

Presented as a standalone document

11.3 Annex III – Full Air Quality Assessment

Presented as a standalone document

11.4 Annex IV – Full Noise Assessment

Presented as a standalone document

11.5 Annex V – Critical Habitat Screening

Presented as a standalone document